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# PROCEEDINGS

## The 5th International Conference on Economics, Business, and Management Research (ICEBMR)

### Digital Economy, Human Dignity, and Inclusive Transformation in Asia

Vol 5, 2026



Faculty of Business and Economics
Sanata Dharma University

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"Digital Economy, Human Dignity, and Inclusive Transformation in Asia"
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Faculty of Business and Economics, Sanata Dharma University, Yogyakarta

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# PREFACE

Welcome to the Proceedings of the 5th International Conference on Economics, Business, and Management Research (ICEBMR) 2026. On behalf of the Faculty of Business and Economics, Universitas Sanata Dharma, we are proud to present these studies to you.

The effects of digital economies and ecosystems on global business and social systems is unprecedented. The dividing line between global business and social systems is increasingly disappearing as the digital economy advances. Digital economies create new paths for productivity, finance, and innovation, but can have adverse effects on inequality, governance, sustainability, and social human dignity.

Asia is experiencing the rapid rise of digital economies due to platform economics, digital finance, digital trade, and digital technological partnership. As a digital economy, Indonesia is one of the fastest growing economies in Southeast Asia. We face unprecedented chances to pursue development that is both inclusive and sustainable, but we have challenging, new structural problems.

The aim of ICEBMR 2026 is to provide an essential platform for an international academic discussion of these issues. The research, conceptual and policy focused papers in this volume examine the contemporary challenges of the digital economy. More importantly, the proceedings examine how business and ethical transformative governance can contribute to growth that is equitable and inclusive to all of Asia, and to the dignity and prosperity of all its people.

First of all, I would like to thank all the academics, researchers, practitioners, and students whose contributions were extremely helpful for me. My special thanks go to the organizers and our peer reviewers for their dedication to achieving such high academic standards for the book. I wish that the research and discussion covered in this book can be a starting point for further dialogue and innovative collaboration to improve the situation.

Dr. Lukas Purwoto
Organizing Committee

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# BEYOND ALGORITHMS: HOW FAITH TRADITIONS ENVISION HUMAN DIGNITY IN A DIGITAL WORLD

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***Abstract***
*India's digital transformation is reshaping everyday life at remarkable speed, yet its benefits and risks are unevenly distributed. This paper examines the promise and paradox of India's digital economy through the lens of Catholic Social Teaching (CST). It opens with four real-life accounts: a street vendor who gains access to formal credit through UPI, an elderly widow who regains independence through digital pension transfers, a young man driven into cybercrime after losing his livelihood, and a gig worker subject to opaque algorithmic control. It then reviews the Digital India Mission and its achievements in financial inclusion, governance, education, and healthcare. It also considers persistent problems, including gender and rural digital divides, cyber threats and digital violence, and job displacement caused by automation. Drawing on three CST principles (human dignity, the common good, and participation), the paper argues that evaluating digital transformation requires moving beyond the question of what technology can do to what it should do for the human person and for society. It proposes shifting from digital access to digital agency, meaning the capacity to make informed choices, protect personal data, benefit economically, challenge unfair decisions, and shape the rules of the digital economy. It also outlines the shared responsibilities of the State, businesses, universities, civil society, and faith communities. The paper concludes that a humane digital economy should be measured not by transaction volumes or market valuations, but by whether it advances dignity, inclusion, and sustainable human flourishing.*
***Keywords:*** *digital economy; human dignity; Catholic Social Teaching; common good; digital inclusion; platform work; India*

## 1. Introduction

I would like to begin by expressing my sincere gratitude to the management and the organisers of this international conference, and in a special way to Fr. Marwan, for the kind invitation. My presentation will unfold in three parts. First, I will share a few real-life experiences drawn from personal encounters. These stories will help us see how digital technology is already reshaping ordinary lives in India and how it is creating new opportunities, restoring independence, improving security, and opening access to financial and public services. Second, I will offer a brief overview of the Indian digital economy, reflecting on both its promise and its paradoxes. Digital transformation has made remarkable contributions to financial inclusion, governance of public services, education, healthcare, and entrepreneurship. At the same time, it has generated new forms of exclusion, surveillance, cybercrime, digital violence, unemployment, and insecurity. The same technology that empowers one person may leave another vulnerable. Finally, I will draw upon the principles of Catholic Social Teaching (CST) and apply them to the Indian context. In particular, I will focus on the principles of human dignity, the common good, and participation. These principles invite us to move beyond the question of what technology can do and to ask a more fundamental question: What should technology do for the human person and for society?

My purpose is not to reject digital transformation, nor to celebrate it uncritically. Rather, I hope to propose a moral and human-centred framework for evaluating it. Catholic Social Teaching reminds us that every person possesses an inherent dignity, that economic and technological progress must serve the common good, and that people must be active participants, not merely consumers, data points, or replaceable units of labour.

### *My Experience of Digital Economy*

I would now like to turn to a few personal experiences and encounters that illustrate how deeply digital technology has entered everyday life. I remember travelling from Bengaluru to Delhi for the first time in 2017. I carried ₹10,000 in cash to meet all my travel expenses—taxi

fares, food, drinks, local travel, visits, and purchases. Within two days, I had spent the entire amount in cash. Two months ago, I made a similar journey to Delhi. This time, I carried my smartphone along with ₹15,000 in cash. Surprisingly, I did not spend any cash at all. I was able to make every payment through my smartphone.

One experience particularly stayed with me. After a late-night journey, I offered the taxi drive ₹1,000 in cash. He refused to accept it and insisted that I pay him through PhonePe. He explained that it was unsafe for him to carry cash late at night. This small incident revealed a significant transformation. Digital payments are not merely making transactions faster; they are also changing people's relationship with money, safety, and mobility. Yet the impact of this transformation becomes even clearer when we listen to the experiences of ordinary citizens.

***Raju: From cash insecurity to financial inclusion***

Raju is a street vendor in Bengaluru who runs a small tea stall. Like many informal workers, he once struggled to access formal banking and credit. Banks don't lend money without the credibility. Whenever he needed money to purchase supplies or repair his stall, he depended on local moneylenders who charged extremely high rates of interest. That situation began to change when he started accepting payments through UPI. Every transaction received through his merchant account created a digital record of his daily business activity. Over time, these records demonstrated a consistent and verifiable cash flow. Banks and non-bank financial institutions could now see evidence of his business. As a result, Raju became eligible for small working-capital loans at more reasonable interest rates. Gradually, he began to move from the informal credit trap into the formal financial system. Digital payments also improved his personal safety. Raju often works late into the night. In the past, he had to carry his earnings home, making him vulnerable to theft and robbery. With UPI, the money is transferred directly into his bank account in real time. He can leave his stall without carrying a large amount of cash. This has not only reduced his physical risk; it has also given him peace of mind. He can concentrate on his business rather than constantly worrying about the safety of his earnings.

***Lakshmamma: Restoring dignity and independence***

Lakshmamma is a seventy-two-year-old widow living in a small village. Every month, she had to travel several kilometres to the bank to withdraw her pension. As walking became increasingly difficult, she had to depend on a neighbour or relative. Sometimes, after making the difficult journey, she was asked to return another day. She faced similar difficulties in accessing healthcare benefits and insurance documents. Files moved slowly, information was unclear, and she was sometimes pressured to pay unofficial fees simply to get basic services. Since she could not easily visit several offices or challenge officials, she often felt helpless. Digital services gradually began to change her life. Her pension was transferred directly into her bank account, reducing dependence on intermediaries and limiting opportunities for delay and corruption. With the help of her grandson, she learned to use a smartphone and check her account through mobile banking. She could receive a message when her pension arrived, renew her insurance, obtain health-related information, and purchase medicines without travelling long distances. For Lakshmamma, digital access was not simply a matter of convenience. It restored a measure of independence and dignity. It enabled her to receive what was already hers without having to depend entirely on the goodwill of others.

***Shakil: When digital access becomes digital vulnerability***

However, the digital economy also reveals a darker and more troubling reality. At the age of twenty-four, Shakil carried the responsibility of supporting his family. He worked at a stone-crushing plant and hoped to pay his diabetic father's medical expenses and provide for the marriage of his sister, Shabana. When the pandemic struck in 2020, he lost his job. His family's financial situation became desperate. In the midst of this crisis, Shakil turned to cybercrime. Two months after his sister's marriage, he was arrested by the Haryana Police.

Several mobile phones were found in his possession. The police alleged that he had used them to record and circulate pornographic material, send threatening messages, and blackmail unsuspecting victims. His arrest formed part of a larger investigation into a cybercrime network operating in the Nuh region of Haryana. According to police reports, the network had allegedly defrauded thousands of people of a very large sum of money.

***Ravi: The insecurity of platform work***

Ravi works as a food-delivery worker (Gig worker). He spends nearly twelve hours a day on the road. He has no fixed salary; he is paid according to the number of orders he completes. Rain, traffic congestion, rising fuel prices, and vehicle maintenance costs directly reduce his earnings.

His livelihood can also be affected by customer ratings and algorithmic decisions. A sudden decline in ratings or a complaint may lead to the suspension of his account. Yet he has little opportunity to explain his situation or appeal the decision. Ravi has no paid leave, health insurance, or guaranteed compensation if he is injured in an accident. Although the platform describes him as an "independent partner," he cannot meaningfully negotiate his wages or refuse unfair conditions. If he stops accepting orders, he risks losing the income on which his family depends. Ravi's experience exposes a central paradox of the digital economy. Digital platforms create employment and connect consumers with services. At the same time, they can conceal deep inequalities behind the language of flexibility and independence. Ravi may be called a partner, but in practice he often has little control over the terms of his work. His movements, performance, earnings, and access to employment are shaped by an algorithm that he cannot see and cannot negotiate with.

These four personal experiences highlight both the promise and the paradox of digital transformation. Digital technology can make life safer, more efficient, and more inclusive. It can help a street vendor access formal credit and enable an elderly woman to receive her pension with dignity. But it can also facilitate cybercrime and create new forms of economic insecurity. The central question, therefore, is not whether we should accept or reject technology. The more important question is: What kind of human relationships, institutions, and society are we creating through technology?

***India's Digital Transformation***

Going by these examples, we can affirm that the Indian economy is undergoing one of the most remarkable digital transformations of modern times. Technology has moved beyond corporate offices and urban centres and reached remote villages, largely due to the smartphone revolution and affordable internet access. It has reshaped the economy through online banking, UPI payments, e-commerce, online education, and telemedicine. India has one of the world's largest internet and smartphone markets, with approximately 958 million active internet users, and is emerging as a global leader in technological innovation.[1]

The COVID-19 pandemic became a watershed moment in India's digital journey. Digital platforms helped many businesses and essential services to survive. Students attended online classes, governments delivered welfare schemes, and citizens accessed services without physical contact. Technology also simplified economic transactions, with India's digital-payment ecosystem accounting for billions of transactions every month.

[1] Ministry of Electronics and Information Technology, *Digital India: Power to Empower*, https://www.digitalindia.gov.in/, accessed on 30.08.2026.

The Digital India Mission (DIM), launched in July 2015, has played an important role in this transformation.[2] It has evolved from a policy vision into a force that empowers citizens and reshapes governance. Its aim is to create a digitally empowered society and a knowledge-based economy. The mission focuses on three interconnected goals: strengthening digital infrastructure, delivering government services digitally, and empowering citizens through digital literacy and employment.

As India pursues its vision of developed India (*Vision of Viksit Bharat 2047* ), the Digital India Mission has become a cornerstone of national development. It connects technological progress with economic growth while seeking to promote equitable digital access. Through foundational digital infrastructure and services, it has contributed to India's emergence as a global leader in digital governance and innovation.

The architecture of the Digital India Mission was organised around nine pillars: Broadband Highways, providing high-speed internet connectivity; Universal Access to Mobile Connectivity, extending networks to underserved regions; Public Internet Access, strengthening Common Service Centres and post offices; e-Governance, simplifying and integrating government processes through platforms such as Aadhaar and PayGov; e-Kranti, delivering digital services in health, education, and agriculture; Information for All, promoting transparency and citizen engagement through platforms such as MyGov; Electronics Manufacturing, encouraging domestic production; IT for Jobs, promoting digital skills and employment; and Early Harvest Programmes, delivering immediate results through initiatives such as university Wi-Fi and biometric attendance systems.[3]

***The Promise and Paradox of the Digital Economy***

The digital revolution has created enormous opportunities, but it has also produced unequal access to technology, affecting education, healthcare, finance, and employment. Although a large majority of households now have internet access and smartphones, significant gender and rural divides remain. In rural India, many women do not own smartphones, and the gap is particularly wide among women between the ages of thirty and forty-four. The concern, therefore, is shifting from simple access to meaningful digital participation.[4] A smartphone is not merely a device; it is a gateway to essential financial, educational, healthcare, and government services. Closing the gap in digital capability is consequently as important as providing connectivity. The United Nations recognises this need by linking digital inclusion and gender equality with the Sustainable Development Goals.

***Cyber Threats and Digital Violence***

The expansion of the digital economy has also brought an increase in cyber threats and digital violence. These include AI-driven phishing, automated fake messages and voice notes, fraudulent investment schemes, password theft, ransomware, social-media abuse, deepfakes, image manipulation, digital sextortion, stalking, and the unauthorised sharing of intimate content. These developments remind us that digital access without digital safety can create new forms of vulnerability. Technology must therefore be accompanied by awareness, accountability, privacy protection, and effective legal safeguards.

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[2] Basu Candola, Sauradeep Bag, Debajyoti Chakravarty, and Tanusha Tyagi, "A Decade of 'Digital India Mission': Achievements, Gaps, and the Way Forward," ORF Special Report No. 271, Observer Research Foundation, August 2025.

[3] Basu Candola, Sauradeep Bag, Debajyoti Chakravarty, and Tanusha Tyagi, "A Decade of 'Digital India Mission': Achievements, Gaps, and the Way Forward," 2-4.

[4] Ravinder Rena, India's Digital Economy Opportunities, Challenges, and the Road Ahead," *Current Research Journal of Social Sciences and Humanities*, Vol. 09, No. (1) 2026, Pg. 01-04

***Unemployment through Automationz***

Automation is another major challenge. Approximately eight million people enter the Indian workforce every year, while routine entry-level roles are increasingly being affected by artificial intelligence and automation. Software development, customer service, accounting, data entry, and other repetitive tasks are undergoing significant change. India is also witnessing a contraction in some forms of white-collar employment. Although technology may create new opportunities, workers without access to reskilling and social protection may face greater insecurity. The digital economy, therefore, carries both promise and paradox. It can expand opportunity, improve public services, and strengthen inclusion. But without ethical safeguards, it can also deepen inequality, enable new forms of violence, and displace vulnerable workers. The essential question is whether digital transformation will merely make systems more efficient—or whether it will genuinely enable people to live with greater dignity, security, and participation.

***Applying Catholic Social Teaching to India's Digital Economy***

The question before us is not whether India should embrace digital technology. That question has already been answered. India is digitising rapidly—from UPI payments and digital public services to telemedicine, online education, artificial intelligence, and platform work. The more important question is: What kind of digital economy do we want to build, and whom is it meant to serve? Catholic Social Teaching offers three principles to guide this conversation: human dignity, the common good, and participation. These principles do not reject technology. Rather, they place technology within a moral vision of the human person.

***Human dignity: Every person is more than a digital identity***

The first principle is human dignity. In the Christian understanding, every person is created in the image of God.[5] Therefore, a person's value cannot depend on purchasing power, productivity, online reputation, credit history, algorithmic scores, or employment status. This has direct implications for India's digital economy. The experience of Raju, the tea-stall owner, illustrates the positive potential of digital technology. UPI enables him to receive payments securely, create a financial record, and gain access to formal credit. It reduces the risks associated with carrying cash and makes his work more visible to financial institutions. In this case, technology serves dignity because it expands Raju's agency, security, and economic opportunity.

But technology can also undermine dignity when a person is treated merely as data. Lakshmamma's digital pension transfer can restore her independence and reduce her dependence on intermediaries. Yet digital delivery is not truly dignified if she cannot understand the system, correct an error, obtain assistance, or appeal a decision. A service is not genuinely inclusive simply because it is available online. It must also be accessible, comprehensible, safe, and responsive.

A dignity-centred digital economy must therefore ask: Can people access essential services without surrendering unnecessary personal data? Can they understand how decisions affecting them are made? Can they challenge an automated decision? Can women, older persons, persons with disabilities, migrants, and people with limited literacy use the system independently? Is there always a human avenue of assistance when technology fails?

The principle of dignity also requires protection from digital violence. Cybercrime, deepfakes, online sexual exploitation, identity theft, fraud, and harassment are not merely technical problems. They are assaults on the person. Victims are not damaged "accounts" or compromised "profiles"; they are human beings whose privacy, bodily integrity, reputation, and

[5] Leo XIV, *Magnifica Humanitas*, § 50, Encyclical, May 2026, https://www.vatican.va/content/leo-xiv/en/encyclicals/documents/20260515-magnifica-humanitas.html

relationships have been violated. A dignity-based approach therefore demands strong data protection, responsible artificial intelligence, effective cybercrime prevention, digital-safety education, and meaningful remedies for victims. It also requires technology companies to accept responsibility for the social consequences of the systems they design.

***The common good: Digital infrastructure must benefit society as a whole***

The second principle is the common good. The common good is not simply the total number of digital transactions or the growth of the technology sector. It refers to the social conditions that enable all people—and the whole person—to flourish.[6] India's digital public infrastructure has demonstrated how technology can contribute to the common good. Digital payments can reduce transaction costs. Direct transfers can lessen dependence on intermediaries. Online health and education services can overcome geographical barriers. Digital platforms can connect small producers with consumers. These are important achievements. However, the common good requires us to ask who benefits, who bears the risks, and who remains excluded.

If digital transformation benefits urban consumers but excludes rural women, it is incomplete. If it creates convenience for customers while transferring uncertainty to delivery workers, it is unjust. If automation increases productivity while leaving millions without skills, social protection, or alternative employment, it cannot be called sustainable transformation. If data and algorithms are treated as private property without regard for their social effects, the common good is weakened. Data, algorithms, and digital platforms have become forms of contemporary social infrastructure. Their ownership may be private, but their consequences are public. A platform that influences access to credit, employment, welfare, education, or healthcare exercises significant social power. Such power must be governed in the public interest.

For India, this means that digital development should include: affordable and reliable connectivity in rural and underserved regions; public investment in digital literacy, especially for women and older citizens; strong safeguards for personal data and informed consent; transparent and accountable use of artificial intelligence; interoperability and open standards to prevent excessive concentration of power; accessible grievance-redressal mechanisms; social protection for workers in the platform economy; reskilling and lifelong learning for workers affected by automation; and environmental responsibility in data centres, electronic manufacturing, and digital infrastructure.

The common good also includes future generations. Digital transformation must therefore be environmentally sustainable. The expansion of data, devices, and artificial intelligence requires energy, minerals, and infrastructure. We must ask whether technological progress is increasing ecological destruction, electronic waste, and resource inequality. A sustainable digital economy must protect not only today's users but also the natural world and those who will live tomorrow.

***Participation: People must be co-creators, not passive users***

The third principle is participation. Human beings have a right and responsibility to contribute to the economic, social, cultural, and political life of their communities.[7]

[6] Pontifical Council for Justice and Peace. *Compendium of the Social Doctrine of the Church*, https://www.vatican.va/roman_curia/pontifical_councils/justpeace/documents/rc_pc_justpeace_doc_20060526_compendio-dott-soc_en.html

[7] Pontifical Council for Justice and Peace. *Compendium of the Social Doctrine of the Church*, https://www.vatican.va/roman_curia/pontifical_councils/justpeace/documents/rc_pc_justpeace_doc_20060526_compendio-dott-soc_en.html

Participation is more than access. A person may possess a smartphone and still lack meaningful participation if she cannot understand an application, afford data, protect herself from fraud, or influence decisions that affect her life. This is especially important in India, where digital systems increasingly mediate access to welfare, employment, finance, education, and public services. Digital inclusion must therefore move beyond the question, "Who is connected?" and ask, "Who can participate meaningfully, safely, and with dignity?"

Lakshmamma's experience shows that digital participation can increase independence. But her participation should not depend entirely on her grandson or a local intermediary. She needs accessible interfaces, regional-language services, voice-based assistance, disability-friendly design, and reliable human support. Otherwise, the digital system may reproduce the very dependency it was intended to remove.

Participation also has a gender dimension. When women do not own or control smartphones, they are denied access to financial services, education, employment opportunities, health information, and public life. Digital inclusion must therefore address not only infrastructure, but also affordability, safety, digital skills, household power relations, and women's control over devices and accounts.

The principle of participation is equally relevant to Ravi, the food-delivery worker. He may be described as an "independent partner," but in practice the platform can determine his access to work, income, ratings, and even continued participation. He participates in the digital economy, but may have little voice within it. This reveals the difference between participation as inclusion in a platform and participation as power, voice, and agency.

A just platform economy would provide workers with: transparent information about wages, ratings, and account suspension; the right to receive an explanation and appeal an automated decision; collective representation and freedom to organise; fair remuneration that recognises waiting time, fuel costs, and occupational risks; accident insurance, health protection, and social security; and meaningful consultation in the design of platform rules. Workers should not be reduced to inputs in an algorithm. They must be recognised as participants in economic life, with rights and responsibilities.

***From digital access to digital agency***

These three principles lead us from a narrow understanding of digital inclusion to a broader idea of digital agency. Digital access asks: Does a person have a device and an internet connection? Digital agency asks: Can the person use the technology effectively? Can the person make informed choices? Can the person protect personal information? Can the person benefit economically? Can the person challenge unfair decisions? Can the person help shape the rules of the digital economy? This distinction is crucial for India as well as the other south Asian economies. The country has built remarkable digital systems, but infrastructure alone cannot guarantee justice. Digital transformation becomes human transformation only when people gain greater freedom, security, voice, and capacity to flourish.

***The responsibility of institutions***

Catholic Social Teaching also reminds us that responsibility does not rest with individuals alone. The State, businesses, civil society, educational institutions, families, and faith communities all have important roles to play. The State must ensure that digital systems do not become instruments of exclusion or surveillance. Businesses must move beyond formal compliance and ask whether their products respect human dignity and promote the common good. Universities must prepare students not only to use artificial intelligence but also to judge its consequences ethically. Civil society must represent those who remain invisible in technological decision-making. Faith communities can: provide digital literacy and support to

vulnerable communities; create safe spaces for people facing cyber abuse and exclusion; advocate for the rights of informal and platform workers; promote ethical reflection among students, entrepreneurs, and policymakers; remind society that efficiency is not the same as justice; and insist that the poor, the elderly, women, migrants, and persons with disabilities remain visible in public policy. Faith traditions bring a language that economics and technology can sometimes lose: the language of compassion, responsibility, solidarity, conscience, and the sacredness of the person.

## 2. Conclusion

The stories of Raju, Lakshmamma, Shakil, and Ravi show that digital transformation is neither automatically liberating nor automatically oppressive. It can expand opportunity, restore independence, and protect human life. It can also intensify exclusion, enable exploitation, and magnify harm. The difference depends on the values that shape technology and the institutions that govern it. Catholic Social Teaching offers a clear moral test: Human dignity: Does this technology respect the person as an end, never merely as data, labour, or profit? The common good: Does it create social conditions in which all people—and the whole person—can flourish? Participation: Does it provide not only access, but also voice, agency, protection, and power to shape the systems that affect people's lives? The digital future of a country should not be measured only by the speed of transactions, the number of users, or the valuation of technology companies. It should also be measured by whether the poorest person can access justice, whether the elderly can live with independence, whether women can participate equally, whether workers can earn a dignified livelihood, and whether every citizen can engage in public and economic life without fear. The task before us is not simply to build smarter algorithms. It is to build a more humane digital economy, one in which technology becomes an instrument of solidarity, inclusion, and sustainable human flourishing. Beyond algorithms, we must recover the human person. Beyond connectivity, we must build communion. And beyond digital growth, we must pursue the common good.

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# AI FOR SOUTHEAST ASIA: CAPABILITY, CONTROL, AND RESPONSIBILITY FOR HUMAN FLOURISHING

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***Abstract***
*Artificial intelligence is entering everyday life in Southeast Asia through education, work, commerce, healthcare, civic participation, and disaster response. This article develops a regional perspective drawn from the author's experience of building open regional Large Language Models (LLMs) over the past few years, arguing that AI can narrow divides only when capability, control, and responsibility move closer to the communities most affected. This article organizes the discussion around four structural gaps - language and voice, cultural fit, infrastructure, and human support - and three risk domains: education, work, and trust. The analysis highlights the conditional nature of AI as an equalizer: lower-cost access to expertise does not automatically create agency. Edge AI, local-language resources, open evaluation, human oversight, and community participation therefore become design and governance considerations rather than optional additions. The article further cites SEA-LION (https://sea-lion.ai/blog/sea-lion-v4-multimodal/) as an ecosystem example of models, data, evaluation, experimentation, and community infrastructure, and develops a proposal for an ASEAN AI-for-Good institution organized around sustain, scale, and steward functions. It concludes that a positive AI future in Southeast Asia depends on collaboration and democratization of capability and meaningful control, with human dignity and local decision-making retained as practical tests.*
***Keywords:*** *artificial intelligence, Southeast Asia, edge AI, human agency, AI governance*

## Introduction

Artificial intelligence is no longer experienced only as a frontier technology. In Southeast Asia, it is entering ordinary settings in which people learn, teach, trade, care, participate in civic life, and respond to disasters. The keynote that motivates this article frames the central question in practical rather than purely technical terms: AI can narrow the region's divides only when capability, control, and responsibility move closer to the communities most affected (Tjhi, 2026). This framing shifts attention from whether AI exists to where the ability to use, correct, govern, and sustain AI is located.

The regional setting makes this question especially consequential. Southeast Asia contains substantial linguistic and cultural diversity, uneven digital infrastructure, and different institutional capacities. The result is that the same AI technology can encounter very different constraints depending on language, connectivity, professional support, and the consequences of error. The presentation therefore treats the AI "equaliser" as conditional. Its potential includes on-demand translation, personalised learning, decision support, and lower-cost creation, while its frictions include connectivity and device constraints, language and voice gaps, limited skills and supervision, and trust and safety concerns (Tjhi, 2026).

The issue is not simply one of access. A person may technically reach an AI system without having meaningful agency over the system or the decisions that follow from its output. This article proposes four practical design questions: who can use the system, who can correct it, who bears the error, and who retains capability after the interaction (Tjhi, 2026). These questions connect technical design with organizational responsibility and, ultimately, with the distribution of decision-making power.

This article examines everyday points of AI entry in the region, identifies the structural constraints visible at the edge of deployment, discusses education, work, and trust as three domain examples in which risks acquire local forms, and uses the SEA-LION journey (https://sea-lion.ai/blog/sea-lion-v4-multimodal/) as an example of open regional capability building. It then develops the presentation's proposal for an ASEAN AI-for-Good institution and concludes with a set of

practical questions for assessing whether AI strengthens human dignity, expands local capability, preserves human judgment, and can be sustained collectively (Tjhi, 2026).

**Literature Review**

*AI, Human Agency, and Responsible Governance*

A useful way to understand human capability, control, and responsibility on the development and use of AI is to place it alongside existing regional and international approaches to AI governance. The ASEAN Guide on AI Governance and Ethics presents practical guidance for the responsible design, development, and deployment of AI in the region and emphasizes alignment and interoperability across jurisdictions (ASEAN Secretariat, 2024). Its guidance also identifies risks associated with inaccurate outputs, disinformation, deepfakes, impersonation, phishing, privacy, and confidentiality in generative AI contexts (ASEAN Secretariat, 2025). These themes are closely related to the keynote's concern that access to AI does not by itself produce safe or meaningful agency.

At the global level, UNESCO's Recommendation on the Ethics of Artificial Intelligence places human dignity and human rights at the centre of AI ethics and highlights transparency, fairness, diversity, inclusiveness, privacy, and human oversight (UNESCO, 2021). The alignment is important for the article's conceptual framing: human agency is not treated as a purely individual ability to operate a tool, but as a condition supported by social, institutional, and technical arrangements. In the Southeast Asian context presented by Tjhi (2026), this means that the people closest to a problem need not merely access a model; they also need the ability to evaluate, correct, contextualise, and govern its use.

*Localisation, Language, and Cultural Fit*

Language localisation is a central component of the regional argument. Language support is separated into text, voice, and culture. For text, it points to tokenizer inefficiency, code-switching, local terminology, and the need for robust evaluation. For voice, it highlights accents and dialects, noise and low bandwidth, speech-data consent, and on-device constraints. For culture, it identifies local institutions, norms and sensitivities, neighbour-language leakage, and community values as dimensions of understanding (Tjhi, 2026). This implies that multilingual performance cannot be reduced to whether a system can generate grammatically fluent sentences.

The SEA-LION ecosystem provides a concrete regional response to this localisation challenge. AI Singapore describes SEA-LION as an open model family developed around Southeast Asian linguistic and cultural needs, while SEA-HELM is designed to evaluate linguistic and cultural competencies in Southeast Asian languages (AI Singapore, 2025a, 2025b). The ecosystem also includes open language-data infrastructure, including Project SEALD and Project ATLAS, which are intended to improve access to high-quality regional language data and enable community contribution (AI Singapore, 2025c). Together, these efforts support the presentation's broader proposition that local capability must exist across data, models, evaluation, deployment, and especially people rather than being concentrated in a single model.

*AI as a Conditional Equalizer*

AI is presented as a possible equalizer because it can reduce the cost of accessing expertise. That potential is visible in educational support, business recommendations, translation, decision support, and content creation. However, these benefits are countered by some frictions such as device access, connectivity, language coverage, skills, supervision, and trust (Tjhi, 2026). This conditional formulation is consistent with the regional emphasis of AI Ready ASEAN, a programme designed to build AI literacy among youth, educators, parents, and underserved communities through localised learning and regional capacity building (ASEAN Foundation, 2026).

The distinction between access and agency also helps explain why AI adoption statistics should be read alongside preparedness indicators. AI Ready ASEAN research reported a notable usage gap in the Philippines: 83% of students had used generative AI for educational purposes, compared with 73% of educators using generative AI for teaching. The presentation uses this gap to raise questions about guidance, policy, and preparedness rather than treating adoption itself as evidence of readiness (ASEAN Foundation, 2026; Tjhi, 2026).

**Table 1. Everyday AI Entry Points in Southeast Asia**

| Domain | Actor | Illustrative activity | Capability focus |
|---|---|---|---|
| Learn | Student | AI Ready ASEAN | Localised AI literacy |
| Teach | Teacher | CoLearn | Planning and guided tutoring |
| Trade | Merchant | Gojek | Business recommendations |
| Care | Health worker | Field scenario | Documentation and decision support |
| Create | Cultural advocate | BASAibu | Local-language civic participation |
| Respond | Disaster responder | AHA Centre | Regional coordination |

*Source: Adapted from Tjhi (2026). The healthcare row is a field scenario, not an attributed programme.*

**Discussion Points**

*AI Access Is Not the Same as Agency*

The first major discussion point is that access to AI should be understood as a pathway to capability rather than as capability itself. The "equaliser" argument is therefore conditional. Translation can reduce a language barrier; personalised learning can extend educational support; decision tools can reduce the cost of expertise; and generative systems can reduce the cost of creation. Yet each benefit depends on conditions that determine who can actually use the system, understand its limitations, correct its outputs, and carry responsibility when its recommendations are wrong (Tjhi, 2026).

This distinction is particularly important in high-stakes settings. A user who can ask an AI system for information but lacks the skills or authority to challenge an incorrect answer has access without full agency. The same applies where connectivity is intermittent, devices are scarce, or professional support is limited. In these circumstances, the distribution of responsibility matters as much as the distribution of access. An AI deployment that shifts error costs onto the least-resourced users can reproduce the very divide it was intended to narrow.

*Ground Truth at the Edge: Four Structural Gaps*

A case in point is a remote clinic scenario that can help make a broader point: the hardest AI problem is rarely the model alone (Tjhi, 2026). Four structural gaps appear at the edge - language and voice, cultural fit, infrastructure, and human support - and the same constraints can be visible in both education and healthcare.

The first gap is language and voice. Sparse training data, dialect variation, code-switching, and speech variability can reduce system reliability. The issue is broader than translation: a system that produces fluent language may still fail on local terminology or struggle with voices recorded in noisy, low-bandwidth environments. The second gap is cultural fit. Fluency can mask assumptions that are inappropriate for local institutions, norms, or values, while neighbouring languages can introduce unintended interference. The third gap is infrastructure. Cloud-only systems can be inaccessible in places where bandwidth, electricity, hardware, or device availability is constrained. The fourth gap is human support. Where teachers and clinicians are scarce, the places with the greatest need for decision support may also be the places where oversight is most difficult (Tjhi, 2026).

**Table 2. AI Potential, Frictions, and Design Questions**

| Potential | Typical friction | Design question |
|---|---|---|
| On-demand translation | Language and voice gaps | Can users understand and correct the output? |
| Personalised learning | Skills and supervision | Who guides the learner when the system is wrong? |

| Potential | Typical friction | Design question |
|---|---|---|
| Decision support | Trust, safety, and human support. | Who bears the error and retains final judgment? |
| Lower-cost creation | Access, data, and cultural fit | Who retains capability after AI assistance? |

*Source: Author synthesis from Tjhi (2026).*

*Edge AI as a Design Philosophy*

A key argument is on treating edge AI as more than a technical exercise in making a model smaller. It is presented as a design philosophy for local capability: systems should work offline where needed, degrade gracefully when conditions are imperfect, protect data through local processing, fit low-power and lower-cost environments, and broaden the human-in-the-loop by locating capability close to the people who sense the ground first (Tjhi, 2026).

This philosophy turns infrastructure from a background assumption into a core design variable. An AI system intended for Southeast Asian settings must be evaluated not only under ideal cloud-connected conditions, but also under the constraints of the place in which people are expected to use it. The significance of edge AI is therefore institutional as well as technical. When processing, data, and decision support can remain closer to users, communities may have more practical capacity to participate in the AI system rather than simply consume its outputs.

*Education, Work, and Trust: Risks with a Local Accent*

The second major discussion point is that global AI risks acquire regionally specific forms that may be grouped into education, work, and trust. In education, the concern is cognitive outsourcing: people may increasingly delegate thinking, drafting, or problem-solving to AI without equivalent institutional readiness or pedagogical guidance. In work, the concern is livelihood transition, especially where large service industries depend on tasks highly exposed to AI. In trust, the risk is industrialised deception, in which AI-assisted synthetic media and automated outreach can lower the cost and increase the scale of fraud (Tjhi, 2026).

**Table 3. Three Risk Domains Highlighted in the Southeast Asian Context**

| Domain | Risk framing | Regional evidence / illustration |
|---|---|---|
| Education | Cognitive outsourcing | AI Ready ASEAN: 83% of Filipino students vs. 73% of educators reported using generative AI in the cited education context. |
| Work | Livelihood transition | IMF Working Paper 25/43 identifies Philippine BPO as the sector with the highest proportion of jobs at risk of displacement, while also identifying AI complementarity. |
| Trust | Industrialised deception | UNODC documents deepfakes, voice cloning, synthetic identities, multilingual chatbots, and automated outreach in Southeast Asian cyber-enabled crime. |

*Source: ASEAN Foundation (2026), Cucio and Hennig (2025), and UNODC (2025); framing adapted from Tjhi (2026).*

The education example illustrates why usage and readiness should not be conflated. The cited AI Ready ASEAN research records higher generative-AI use among Filipino students than among educators. The presentation interprets the difference as a question about guidance, policy, and preparedness. The implication for institutions is not simply to suppress or accelerate usage, but to build the surrounding capability that makes use meaningful: teacher readiness, student literacy, responsible-use norms, and mechanisms for evaluating outputs (ASEAN Foundation, 2026; Tjhi, 2026).

The labour-market example is similarly conditional. Cucio and Hennig (2025) find that the Philippine BPO sector has the highest proportion of jobs at risk of displacement in their sectoral analysis, while also identifying substantial potential for complementarity. This distinction matters

because exposure does not imply a single technological outcome. The policy and management challenge becomes one of transition: identifying which tasks may change, where humans and AI can complement one another, and which skills and institutions are needed for workers to adapt (Cucio & Hennig, 2025).

The trust example shows a different dimension of the same structural problem. UNODC reports that Southeast Asian criminal actors are using AI-enabled tools for deepfakes, synthetic identities, voice cloning, and automated or multilingual interactions that can support fraud and phishing (UNODC, 2025). The scale of the risk demonstrates why trustworthy AI cannot be treated as an after-the-fact technical layer. Identity verification, incident learning, user awareness, organisational controls, and regional cooperation are part of the deployment environment in which AI operates.

*From a Model to an Ecosystem: The SEA-LION Journey*

One constructive response to these challenges is to build capability together and in the open. SEA-LION is presented as an open story in which regional knowledge, technical capability, and community participation reinforce one another (Tjhi, 2026). AI Singapore's public materials describe SEA-LION as an open multilingual model effort focused on Southeast Asian languages, culture, and use cases, while SEA-HELM provides a regional evaluation layer for linguistic and cultural competencies (AI Singapore, 2025a, 2025b).

The ecosystem view matters because no single model can resolve all of the gaps identified above. In the context of SEA-LION, the ecosystem includes the SEA-LION model family, a developer challenge for applied experimentation, Project SEALD for data and recipes, SEA-HELM for regional evaluation, Project ATLAS as a grassroots data hub and a community platform (Tjhi, 2026).

The ecosystem approach supports a second important conclusion: public-good innovation can create reusable capability. A hard local problem - such as remote care or a low-resource language - can trigger work on data, models, safety, and deployment. Those outputs can then become reusable tools, standards, and people-level skills that spill into services, firms, and institutions. Therefore, public goods are seen not as peripheral charity at the edge of the AI economy, but as capability infrastructure for the wider region (Tjhi, 2026).

*An ASEAN AI-for-Good Institution: Sustain, Scale, Steward*

One proposal is the establishment of a regional institution for AI-for-good to make the ecosystem logic durable. Its first function is to sustain a technology commons through shared datasets and compute, edge-ready reference systems, open safety and evaluation, and long-term maintenance. Its second function is to scale regional capability through fellowships and exchanges, community labs, deployment partners, and local-language expertise. Its third function is to steward governance through participatory priority-setting, independent evaluation, incident learning, and public-interest procurement (Tjhi, 2026).

**Table 4. Proposed Functions of an ASEAN AI-for-Good Institution**

| Function | Core elements | Purpose in the regional ecosystem |
|---|---|---|
| Sustain | Technology commons; shared data and compute; edge-ready systems; open safety; maintenance | Keep regional AI infrastructure available and usable over time. |
| Scale | Fellowships; exchanges; community labs; deployment partners; local-language expertise | Expand the number of people and organisations able to build and deploy responsibly. |
| Steward | Participatory priorities; independent evaluation; incident learning; public-interest procurement | Connect technical development with accountable regional governance. |

*Source: Adapted from Tjhi (2026).*

The proposal also has implications for how investment in AI capability is measured. A narrow model-centred view may focus on parameters, benchmark scores, or deployment counts. An ecosystem view adds the less visible infrastructure that allows those models to become useful and accountable:

local data, evaluation practices, trained people, community institutions, deployment partners, and mechanisms for learning from failure. In this sense, capability is not only an object that can be purchased; it is an institutional capacity that can be accumulated and shared.

*Collaboration and Democratization as Two Pillars*

Two principles sit beneath the proposed positive future: collaboration and democratisation. Collaboration means people of the region build AI and solve problems together. Democratisation means capability and meaningful control are available to those who have the greatest local stakes (Tjhi, 2026). These principles complement the ASEAN governance emphasis on responsible design and the UNESCO emphasis on human dignity and oversight (ASEAN Secretariat, 2024; UNESCO, 2021).

Taken together, the principles suggest that local participation should occur across the AI lifecycle rather than only at the moment of product adoption. Communities can contribute data, articulate needs, test systems, identify failures, develop evaluation standards, and participate in decisions about acceptable uses. This is especially important in low-resource settings because the people closest to the problem often possess context that a centralised technical process cannot fully reconstruct.

*Human Flourishing, Subsidiarity, and the Closing Examen*

We conclude by citing some parallels with Pope Leo IV's (2026) "Magnifica Humanitas" who offers an image of shared reconstruction:

> *I would like to recall the image of Nehemiah whom we chose as our companion and guide at the outset. Nehemiah heard the cry of a devastated city, brought that pain to prayer, discerned before God, asked for help, received permission to return, organized the work, confronted internal and external resistance and rebuilt the walls of Jerusalem with the assistance of the people, brick by brick. In this era of digital transformation, I see in him a striking parable of our own vocation, which is not to be passive spectators of social and cultural fractures, nor mere commentators on what is crumbling, but men and women prepared to enter the construction sites of history — research laboratories, technology companies, schools, the media, institutions and local communities — in order to rebuild what has collapsed and protect what is threatened. Like Nehemiah, we too are called to unite listening and courage, prayer and responsibility, so that, even when a technocratic mentality or partisan interests seem to prevail, the human city may become a more fitting place to live* (no. 241).

We connect this image to subsidiarity, a principle for locating decisions at the closest competent level to those affected. The concept is useful here not as a technical specification but as a governance principle: regional coordination can coexist with local decision-making when authority is placed near the people who bear the practical consequences.

The closing examination offers five questions that can function as an evaluation frame for future AI initiatives in Southeast Asia: does the system strengthen human dignity; does it expand local capability; can affected communities shape it; does it preserve human judgment; and can the region sustain it together (Tjhi, 2026). These questions translate the article's earlier discussion into a practical checklist that links technical design, institutional capacity, and governance responsibility.

**Conclusion**

The value of AI in Southeast Asia depends not only on the capabilities of models, but also on the location of knowledge, control, responsibility, and institutional support. AI can lower the cost of expertise and create new opportunities in learning, teaching, commerce, care, civic participation, and disaster response. Yet access remains conditional when connectivity, language, cultural fit, human support, and trust are unevenly distributed.

The discussion of education, work, and trust shows why global AI risks need local interpretation. The cited education usage gap, the Philippine BPO labour-market exposure identified by the IMF, and UNODC reporting on AI-enabled deception each demonstrate a different way in which AI meets existing institutions and vulnerabilities. The response proposed in the keynote is therefore not simply to adopt more AI, but to build capability around AI: edge-ready systems, local-language resources, open evaluation, human oversight, community participation, and durable institutions.

SEA-LION illustrates this ecosystem approach through the combination of open models, regional data work, evaluation, experimentation, and community infrastructure. The proposed ASEAN AI-for-Good institution extends the same logic by assigning responsibilities across sustain, scale, and steward functions. The broader objective is to ensure that the future of AI in Southeast Asia is not merely imported as a finished capability, but built in the region through collaboration and meaningful participation. The article therefore returns to the keynote's final direction: the region's AI future should be built here, together, for the common good (Tjhi, 2026).

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# BRIDGING THE DIGITAL DIVIDE: CHINESE EXPERIENCES AND COLLABORATIVE AI GOVERNANCE FOR ASEAN INCLUSIVE TRANSFORMATION

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***Abstract***
*Southeast Asia's digital economy is approaching USD 1 trillion, yet the region's artificial intelligence (AI) transformation is constrained by regulatory fragmentation, data sovereignty concerns, and unequal access to computing capacity and talent. Based on a keynote address delivered at the 5th ICEBMR 2026 in Yogyakarta, this article argues that neither the European risk-tiering model nor the United States market-first model can be transplanted directly into the Association of Southeast Asian Nations (ASEAN). It proposes a Nested Governance Matrix in which regulation, security, and industry work as three interlocking gears of collaborative governance. Drawing on Chinese experiences with agile governance and infrastructure-driven capacity building, and on three cases (Chinese micro-dramas in Indonesia, localized cloud infrastructure in Indonesia and Malaysia, and the China-Laos AI Application Cooperation Center), the article shows how sovereignty and cooperation can be co-designed rather than negotiated after the fact. It then outlines a three-stage roadmap from bilateral agile sandboxes to a multilateral umbrella under the ASEAN Digital Economy Framework Agreement (DEFA). The article concludes that a development-first, people-centric "ASEAN Way" can offer the Global South a credible alternative in global AI governance.*
***Keywords****: AI governance, digital divide, ASEAN, data sovereignty, agile governance*

## Introduction

Asia's digital transformation reveals a paradox. On one side lies what may be called the Great Leap: the ASEAN digital economy is approaching USD 1 trillion and is projected to double under the ASEAN Digital Economy Framework Agreement (DEFA). This momentum is also bottom-up, as millions of small and medium-sized enterprises (SMEs), ride-hailing drivers, and artisans move online across the region. On the other side stands an Invisible Wall of institutional friction, including clashing data sovereignty rules, algorithmic bias, and persistent compliance uncertainty. The region must therefore answer a core question: how can it harness the economic potential of AI while protecting human dignity and local sovereignty?

This question matters because the AI era has transformed the digital divide from a matter of internet access into a broader challenge. It also concerns who writes the rules, who owns the data, who controls computing capacity, and who has the skills to build and maintain AI systems. Governance approaches developed elsewhere often overlook these realities. This article develops an ASEAN-relevant approach to AI governance that draws on Chinese experience for comparison and inspiration, while insisting that these experiences are neither a ready-made template nor directly replicable in ASEAN.

The article makes three contributions. First, it explains why the dominant European and American governance models fit ASEAN poorly and why ASEAN itself must be understood as a heterogeneous, three-tier landscape rather than a single bloc. Second, it proposes a Nested Governance Matrix that links regulation, security, and industry, and it examines each dimension through Chinese experiences and concrete cases in Indonesia, Malaysia, and Laos. Third, it presents a pragmatic three-stage roadmap that moves from bilateral agile sandboxes to a multilateral framework under DEFA.

## Literature Review

### *Global AI Governance Models*

*The European Union model*

The European approach is characterized by high compliance and risk-tiering. The EU Artificial Intelligence Act (European Union, 2024) is widely regarded as a landmark of comprehensive AI regulation. For ASEAN, however, the heavy cost of algorithmic certification is a concern, because such costs can stifle SMEs and start-ups that lack legal and technical departments.

*The United States model*

The American approach puts market interests first and relies on self-regulation. Its critics point to technology giants that answer to few external checks, to platform monopolies that remain largely unchecked, and to gig workers who are left vulnerable. Both models carry strengths in their own settings, but each presumes institutional capacities that many ASEAN economies are still building.

*The trap of direct transplantation*

The central risk for ASEAN lies in directly copying and adopting extraterritorial rules. Such an approach ignores local developmental realities and the heterogeneity of the region, and a one-size-fits-all solution cannot work. This observation motivates the search for a governance model grounded in ASEAN's own conditions.

### *ASEAN's Heterogeneous Digital Landscape*

ASEAN is not one digital market but a map of at least three tiers with different AI governance postures. In the first tier are the rule-makers, with Singapore as the leading example. Singapore hosts roughly 390 AI start-ups according to StartupBlink 2026, has adopted National AI Strategy 2.0 (2023), and, through the Infocomm Media Development Authority (IMDA), issued in January 2026 what has been described as the world's first governance framework for agentic AI (Infocomm Media Development Authority, 2026). Its approach relies on voluntary frameworks and industry guidance.

The second tier consists of industry pivots. Malaysia has halted approvals of non-AI data centers since 2024, as stated by Prime Minister Anwar Ibrahim in a parliamentary reply on 24 February 2026, and it reports a digital investment pipeline of RM 59.1 billion (April 2025). It is also pursuing a Sovereign AI Cloud and hosts the secretariat of the ASEAN AI Safety Network. Thailand is concentrating on smart ports and logistics AI.

The third tier comprises what may be called sovereignty giants, which are massive markets with strict sovereignty positions. Indonesia combines the Personal Data Protection Law of 2022 (Republic of Indonesia, 2022) with Government Regulation No. 71 (Republic of Indonesia, 2019), which localizes financial data. Vietnam enacted the region's first dedicated AI Law, with 35 articles, in force since 1 March 2026, and it targets AI contributing about 6% of GDP and a top-three position in Southeast Asia by 2030. These differences show why harmonization cannot be achieved by uniform rules alone.

## Research Methods

This study adopts a qualitative, interpretive approach based on comparative policy analysis and illustrative case studies. This study uses a conceptual and policy-oriented analysis rather than a statistical one, aiming to build a framework and assess its plausibility through concrete cases instead of estimating causal effects.

### *Data Sources*

The evidence comes from four types of material: (1) regulatory texts and official measures, including China's algorithm, deep synthesis, generative AI, and AI-labeling measures, Indonesia's PDP Law and GR 71, and Vietnam's AI Law; (2) government statements, such as IMDA publications and the Malaysian parliamentary reply of 24 February 2026; (3) industry and international reports, including StartupBlink 2026 and UNESCO RAM 2026; and (4) public statements and announcements related to the cases, including those of the Malaysia Digital Economy Corporation (MDEC) and the Johor state data center committee (2025).

### *Analytical Framework and Case Selection*

The analysis is organized around the Nested Governance Matrix, in which regulation, security, and industry are treated as interlocking dimensions. Three cases were selected because each illustrates

how one dimension can be navigated in practice. Table 1 summarizes the mapping. The cases are illustrative and are not claimed to be statistically representative of all ASEAN member states.

**Table 1. Cases and their analytical dimensions**

| No | Case | Location | Dimension | Core mechanism |
|---|---|---|---|---|
| 1 | Chinese micro-dramas | Indonesia | Regulation | Agile localization of recommendation algorithms |
| 2 | Alibaba Cloud and Huawei Cloud data centers | Indonesia and Malaysia | Security | Data stays in-country; algorithms and expertise travel |
| 3 | China-Laos AI Application Cooperation Center and Nanning Roundtable | Laos and Guangxi | Industry | Sub-regional sandbox and policy coordination |

*Source:* Author's elaboration

## Research Findings and Discussion

### *The Nested Governance Matrix*

This article argues for an AI governance approach that moves beyond silos. Regulation determines market access and compliance cost. Security sets a hard boundary for compute and data. Industry provides the sandbox in which rules can be iterated and tested. As shown in Figure 1, these are three interlocking gears of collaborative governance, and if one gear jams, the whole vehicle stops. A regulatory framework without secure data infrastructure lacks trust, and a secure environment without industrial capacity produces no innovation. The remainder of this section examines each gear in turn.

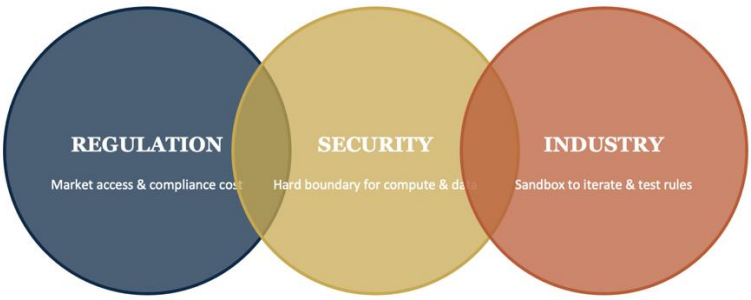



**Figure 1. The Nested Governance Matrix**
*Source:* Author's elaboration

### *Dimension 1: Regulation*

*Regulating while running: agile governance in China*

The first Chinese experience concerns what may be called tolerant prudence, a development-first doctrine summarized as "development and security in synergy" rather than security at the expense of growth. From fintech to generative AI, China has generally avoided blanket pre-market bans. Its Algorithm Filing System (*suanfa beian zhi*) asks developers to register the basic logic of their algorithms so that regulators can track risks dynamically. Dynamic sandboxes then allow innovation to breathe while baseline harms are still policed. This approach resembles a longer tradition of policy experimentation in China, in which local trials inform national rules (Heilmann, 2008). Table 2 gives an overview of the regulatory framework.

**Table 2. Overview of the regulatory framework for AI in China**

| Regulation | Effective date | Competent authority | Scope of application |
|---|---|---|---|
| Provisions on the Management of Algorithmic Recommendations | March 2022 | CAC | Recommendation algorithms |

| Regulation | Effective date | Competent authority | Scope of application |
|---|---|---|---|
| Provisions on the Administration of Deep Synthesis | January 2023 | CAC and MIIT | Deepfakes and synthesis |
| Interim Measures for the Management of Generative AI Services | August 2023 | CAC | Large model services |
| Measures for Labeling AI-Generated Content | September 2025 | CAC and SAC (National Standards Commission) | All AI-generated content |
| Artificial Intelligence Law (Draft) | December 2025 (draft for comments) | National People's Congress | All AI domains |

*Source:* Keynote materials; Cyberspace Administration of China (2022, 2023)

The lesson for ASEAN is that building an AI ecosystem does not require a thousand-page law. In emerging-market contexts, agile and dynamic guardrails tend to perform better than rigid ex-ante permissioning.

*The DEFA promise and domestic reality*

DEFA is a landmark deal on paper. Its negotiation has concluded, and it covers digital trade, e-commerce, data, AI, and talent mobility. Its "ASEAN Minus X" formula allows ready members to move faster without waiting for full uniformity. On the ground, however, the region remains a fragmented jungle of eleven countries and eleven rulebooks. For example, a fintech firm in Surabaya may need to comply with eleven different privacy and licensing regimes. Such fragmentation acts as a regressive tax on the small firms that anchor ASEAN societies. DEFA therefore provides elasticity, not uniformity, and the real test is whether ASEAN can turn that elasticity into interoperability.

*Case 1: Micro-dramas in Indonesia*

The explosive growth of Chinese micro-dramas across Southeast Asian app stores illustrates the regulatory maze. Direct exportation of recommendation algorithms runs into Indonesia's distinct cultural, religious, and digital platform regulations. The strategy that proved workable was the dynamic adjustment of recommendation algorithms to respect local cultural guardrails. This "soft compliance" or agile localization shows that navigating a regulatory maze does not always mean forcing the host country to change its laws. Technology must adapt to local cultural dignity and regulatory red lines, not the other way around.

***Dimension 2: Security***

*The sovereign trust paradox*

Security is the elephant in the room. Developing countries need foreign technology to develop, yet adopting it can feel like an infringement on sovereign control. Their demand for data sovereignty is legitimate, as seen in Indonesia's GR 71 on financial data and in Vietnam's AI Law of 2026. Geopolitical anxieties, meanwhile, often label any foreign technology cooperation as a security risk. Unilateral "technology dumps," where providers give black-box software in exchange for data, deepen suspicion. Genuine trust requires shared ownership rather than asymmetric extraction. The paradox is structural: sovereignty and cooperation must be co-designed, not negotiated after the fact.

*Case 2: Anchoring trust through localized infrastructure*

Cloud and sovereign computing in Jakarta offer a practical response. Alibaba Cloud and Huawei Cloud have invested in localized, state-of-the-art data centers in Indonesia and Malaysia instead of extracting data back to headquarters, a step that converts compliance boundaries into cooperation hubs. The keynote materials report full compliance with Indonesia's PDP Law and GR 71 and describe the expansion of Huawei Cloud's Indonesia region from three to four availability zones in 2026 (MDEC statements; Johor state data center committee, 2025). The guiding principle is that data stay in the country while algorithms and expertise travel. Trust is thereby built on physical commitment rather than contractual promises.

***Dimension 3: Industry***

*Without computing and talent, governance is a ghost ship*

The real digital divide lies in infrastructure and talent. Regulatory talk means little if local universities lack compute and local youth lack AI skills. Southeast Asia suffers a severe AI talent drain toward those great powers. Even within ASEAN, access to graphics processing units (GPUs) and grid capacity varies by an order of magnitude, and micro, small, and medium enterprises (MSMEs) struggle with connectivity costs and a shortage of localized AI engineers. A "ghost ship" of frameworks without hardware, datasets, and trained people cannot move. Governance must therefore be grounded in tangible capacity building rather than abstract principles.

*Infrastructure first: the second Chinese experience*

The second Chinese experience is summarized by the saying "if you want to get rich, build roads first(Yao xiang fu,Xian xiu lu)." China's digital leapfrogging happened because 5G, fiber, and cloud preceded the enterprise boom. Trillions of RMB were invested in 4G, 5G, fiber optics, and rural power grids before consumer applications exploded. The lessons for cooperation include joint training initiatives that upskill local engineers rather than only shipping black-box software, and the open-sourcing of foundational code so that partners can adapt and maintain systems locally. These measures transform passive technology consumers into active co-creators. The key insight is that infrastructure is a public good that lowers the coordination cost of every subsequent industry.

***Guangxi as a Bridgehead***

*Geography and institutions*

A Chinese autonomous region matters for ASEAN AI governance because of Guangxi's position. It is the permanent host of the China-ASEAN Expo, which has run for 23 years, and it shares land and sea borders with ASEAN as the only Chinese province connected to the region by both land and sea. Guangxi is moving beyond trade corridors toward digital and intelligent economic connectivity, and it links the Regional Comprehensive Economic Partnership (RCEP), DEFA, and the Belt and Road Initiative in a single regional node. It is therefore a natural testing ground for bilateral policy experiments, digital trade rules, and AI cooperation.

*Case 3: The China-Laos AI Center and the Nanning Roundtable*

The China-Laos Artificial Intelligence Application Cooperation Center in Vientiane, built by the Guangxi Investment Group in two months, was formally launched on 18 September 2025 during the China-ASEAN Ministerial Roundtable on AI in Nanning. It is described as the first national-level AI cooperation platform between China and an ASEAN member state. A sub-regional sandbox in Vientiane combined with policy coordination in Nanning illustrates a model of research and development in major Chinese centers such as Beijing, Shanghai, and Guangzhou, integration in Guangxi, and application in ASEAN(Bei shang guang yan fa,Guangxi jicheng,Dongmeng ying yong).

***A Pragmatic Three-Stage Roadmap***

Building on these findings, the article proposes a three-stage evolution from bilateral agile sandboxes to a DEFA multilateral umbrella, summarized in Table 3. The sequence starts with low-risk verticals where trust can be built quickly, then scales through corridors, and finally embeds tested mechanisms in regional agreements.

**Table 3. Three-stage roadmap for collaborative AI governance**

| Stage | Horizon | Focus | Key elements |
|---|---|---|---|
| 1 | 1-2 years | Bilateral agile sandboxes | Start with low-risk verticals such as cross-border e-commerce, agriculture, and multilingual tools; bilateral cooperation first |
| 2 | 3-5 years | Sub-regional corridor hubs | Scale through Guangxi-ASEAN digital corridors; mutual recognition of algorithmic audits; regional data-sharing protocols for disaster monitoring and healthcare |

| Stage | Horizon | Focus | Key elements |
|---|---|---|---|
| 3 | 5-10 years | DEFA multilateral umbrella | Embed tested bilateral mechanisms into DEFA and RCEP; a flexible, ASEAN-friendly common minimum baseline for AI governance |

*Source:* Author's elaboration

***The ASEAN Way as a Developing-World Voice***

For decades the "ASEAN Way" has shown how to navigate immense diversity through consultation, consensus, patience, and non-interference (Acharya, 2014). Extended to cyberspace, it offers a consensus-based, non-confrontational, and step-by-step alternative to Western blocs. It balances ethics with the fundamental right to economic development and offers the Global South a genuine alternative to technological hegemony. Combining Chinese industrial depth with ASEAN market dynamism points toward a development-first, people-centric model, with the shared aim of building digital sovereignty together.

**Conclusion**

This article has argued that bridging the digital divide in ASEAN requires collaborative AI governance that fits regional realities. European and American playbooks cannot simply be transplanted into a region of heterogeneous tiers, from rule-makers to sovereignty giants. The Nested Governance Matrix shows that regulation, security, and industry must be designed together. Chinese experiences with agile guardrails and infrastructure-first capacity building, together with the three cases examined, suggest practical routes: localize algorithms, keep data in-country while letting algorithms and expertise travel, and invest in computing and talent before demanding compliance.

Three implications follow. For policymakers, agile and dynamic guardrails are better suited to emerging-market contexts than rigid ex-ante permissioning, and DEFA's elasticity should be converted into interoperability. For firms, trust is built through physical commitments such as local infrastructure and joint training. For regional cooperation, starting with bilateral sandboxes in low-risk verticals and scaling toward a multilateral umbrella is more realistic than seeking immediate uniformity. The article is limited by its qualitative design and its small set of illustrative cases. Future research could test the framework quantitatively, for example by measuring how regulatory fragmentation affects SME adoption of AI, and could extend the case base to other ASEAN member states. Ultimately, the future of AI in Asia will be decided in the marketplaces of Yogyakarta, the innovation hubs of Jakarta, and the trading ports of Guangxi, and it should honor local sovereignty and lift human dignity.

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# FROM EXPLANATION TO DESIGN: A CONCEPTUAL FRAMEWORK FOR DESIGN SCIENCE IN DIGITAL ECONOMY RESEARCH

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## Abstract
*The rapid expansion of the Digital Economy has generated substantial explanatory knowledge about digital transformation, yet comparatively limited prescriptive knowledge about how digital systems, institutions, and ecosystems can be intentionally designed and improved. This paper addresses this gap by proposing the Digital Economy Design Science (DEDS) Framework. Drawing on a conceptual synthesis of literature on Digital Economy, Information Systems Design Science, entrepreneurship-oriented Design Science, and related socio-technical and ecosystem perspectives, the paper develops the DEDS framework comprising three interrelated dimensions: design objects, design process, and design knowledge. The framework identifies five design objects—technology, organization, institution, ecosystem, and society—and proposes an iterative five-stage process encompassing challenge and opportunity identification, socio-technical-economic design, multi-stakeholder evaluation, learning and adaptation, and transformation. It further proposes five design principles—multi-dimensionality, stakeholder plurality, dual evaluation, iterative institutional learning, and system-level value—and identifies design principles, models, governance frameworks, policy designs, and ecosystem architectures as potential forms of reusable design knowledge. The paper contributes by providing an integrative and prescriptive framework that complements explanatory Digital Economy research and connects design intervention with cumulative knowledge generation and system improvement. As a conceptual contribution, the framework requires empirical validation through case studies, Action Design Research, policy experimentation, and comparative research.*
***Keywords:*** *Digital Economy; Design Science; Digital Transformation; Socio-Technical Systems; Design Knowledge*

## Introduction
Digital Economy has become one of the fastest-growing fields in business, economics, and management research. Over the past three decades, scholarly attention has expanded from information technology (Orlikowski & Iacono, 2001; Benbasat & Zmud, 2003) and electronic commerce (Turban et al., 2018; Laudon & Traver, 2024) toward broader issues including digital platforms (Nambisan et al., 2019; Parker et al., 2016), artificial intelligence (Dwivedi et al., 2021; Brynjolfsson & McAfee, 2017), fintech (Gomber et al., 2018; Lee & Shin, 2018), digital entrepreneurship (Nambisan, 2017), digital governance (Heeks, 2006; Janssen et al., 2017), digital trade (Goldfarb & Tucker, 2019), sustainability (George et al., 2021), and data-driven innovation (Trabucchi & Buganza, 2019). Recent bibliometric studies consistently show an exponential increase in Digital Economy publications since around 2017, reflecting the growing importance of digital technologies in economic development, industrial transformation, and innovation ecosystems (Wang et al., 2024; Zhang et al., 2024). At the same time, Digital Economy research has evolved from a technology-oriented niche into an interdisciplinary field that integrates economics, information systems, management, entrepreneurship, public policy, innovation studies, and sustainability science (Goldfarb & Tucker, 2019; Wang et al., 2024).

The rapid expansion of the field has also broadened its research agenda. Contemporary studies increasingly examine digital transformation within firms (Vial, 2019), platform ecosystems (Jacobides et al., 2018; Nambisan et al., 2019), artificial intelligence and intelligent automation (Dwivedi et al., 2021), digital public infrastructure (World Bank, 2024), digital inclusion (Heeks, 2022), sustainable digitalization (George et al., 2021), and the governance of emerging technologies (Janssen et al., 2017). Research has therefore moved beyond analysing information technology adoption to understanding how digital technologies reshape markets, organizations, institutions, and societies (Goldfarb & Tucker, 2019; Vial, 2019). Nevertheless, several recent reviews conclude that Digital Economy research remains theoretically fragmented despite its rapid growth. Bibliometric analyses reveal an expanding but highly dispersed body of literature spanning multiple disciplines, theories, and research traditions, with relatively limited conceptual integration (Wang et al., 2024; Zhang et al., 2024). Similarly, recent

reviews of digital development research in the Global South indicate that the literature remains relatively descriptive and context-dependent, with fragmented evidence across technological, organizational, and institutional domains, highlighting the need for stronger theoretical development and more integrated approaches to digital transformation (Heeks et al., 2024; Pyram, 2026).

A closer examination of the literature also reveals an important methodological pattern. Despite the diversity of research topics, most Digital Economy studies adopt an explanatory orientation. Bibliometric reviews indicate that the dominant objectives of Digital Economy research are to explain the adoption of digital technologies, identify determinants of digital transformation, evaluate the performance of digital platforms, or assess the economic and social impacts of digitalization (Goldfarb & Tucker, 2019; Vial, 2019; Wang et al., 2024). Similarly, systematic reviews of digital development research in the Global South observe that existing studies predominantly employ descriptive, empirical, and explanatory approaches, while relatively few attempts to generate actionable design knowledge for addressing digital transformation challenges.

Consequently, Digital Economy research has generated substantial knowledge about why digital phenomena occur and what their consequences are. Studies have investigated technology acceptance, digital innovation, platform competition, digital entrepreneurship, financial inclusion through fintech, and the effects of artificial intelligence on productivity and organizational performance (Dwivedi et al., 2021; Gomber et al., 2018; Nambisan, 2017; Vial, 2019). These studies have significantly advanced understanding of digital transformation across organizations, industries, and societies. However, they provide comparatively limited guidance for addressing the practical design questions increasingly faced by policymakers, business leaders, entrepreneurs, and development agencies.

These practical questions differ fundamentally from explanatory research questions. Governments seek guidance on how to design inclusive digital public infrastructure and regulatory systems. Businesses seek effective architectures for digital platforms and ecosystems that simultaneously create economic and social value. Development agencies aim to design digital interventions that reduce inequality while accelerating sustainable development. Likewise, emerging economies such as Indonesia continue to face complex design challenges related to digital inclusion, cybersecurity, artificial intelligence governance, digital finance, and the development of digital talent. Recent policy analyses suggest that addressing these challenges requires coordinated institutional, technological, and governance innovations rather than isolated technological solutions.

The distinction between explanation and design is therefore becoming increasingly significant. Explaining why a digital platform succeeds does not necessarily provide knowledge about how better digital platforms should be designed. Likewise, understanding the determinants of digital transformation does not automatically generate principles for designing more resilient digital ecosystems or more inclusive digital governance arrangements. The growing gap between explanatory knowledge and practical design challenges suggests that Digital Economy research requires complementary approaches capable of generating prescriptive and actionable knowledge in addition to explanatory theories.

This challenge becomes even more significant because the Digital Economy itself is fundamentally an evolving socio-technical-economic system. Digital markets, payment systems, platform ecosystems, digital identities, governance mechanisms, regulatory institutions, and data infrastructures do not emerge spontaneously. Rather, they are intentionally conceived, designed, implemented, evaluated, and continuously adapted through interactions among governments, firms, technology developers, civil society, and users (Goldfarb & Tucker, 2019; Heeks, 2022; World Bank, 2024). As Simon (1996) argues, such human-created systems belong to the Sciences of the Artificial, where the central concern is not merely understanding existing reality but designing preferred future realities. From this perspective, advancing the Digital Economy requires more than explaining existing digital systems—it also requires systematic knowledge for designing better socio-technical-economic systems that generate sustainable economic and public value.

Design Science Research (DSR) offers a promising foundation for addressing this challenge. Originating in Information Systems, DSR emphasizes the creation and rigorous evaluation of innovative artifacts that solve practical problems while simultaneously contributing to scientific knowledge (Hevner et al., 2004; Hevner, 2007; Peffers et al., 2007). More recently, scholars have begun extending Design Science beyond information technology into entrepreneurship by designing entrepreneurial opportunities, business models, and innovation processes (Dimov, 2020; Seckler et al., 2023). These developments suggest that Design Science has progressively evolved from designing technological artifacts toward designing broader organizational and socio-economic interventions. Yet despite the rapid growth of Digital Economy research, relatively little attention has been devoted to exploring how Design Science can guide the design of digital ecosystems, institutions, governance arrangements, and societal transformation.

This paper argues that Digital Economy presents a distinctive context for applying and extending Design Science because its design problems frequently involve interconnected technological, organizational, institutional, ecosystem, and societal dimensions. Building upon developments in Information Systems and Entrepreneurship, the paper proposes a conceptual framework for Design Science in Digital Economy that complements existing explanatory research by emphasizing the creation, evaluation, and improvement of digital systems capable of generating both economic and public value. Accordingly, this paper addresses the following research question: What conceptual framework can guide Design Science in Digital Economy?

The contribution is not a new Design Science methodology, but a conceptual framework that specifies how existing Design Science principles can be extended and organized for the distinctive design challenges of Digital Economy. By shifting the unit of design from technological artifacts to socio-technical-economic systems, it seeks to bridge the gap between explaining digital transformation and designing better digital futures.

**Research Approach: Conceptual Literature Synthesis**

This paper adopts a conceptual literature synthesis rather than a systematic literature review. This approach is appropriate when the objective is to integrate concepts and perspectives from different bodies of literature in order to develop a new conceptual framework rather than to exhaustively identify and synthesize all available studies (Snyder, 2019; Torraco, 2005). The review follows a structured but flexible process of defining relevant literature domains, identifying conceptually important sources, comparing recurring themes across the domains, and synthesizing these insights into a coherent conceptual model.

The review draws on four interconnected literature streams relevant to the development of the Digital Economy Design Science (DEDS) Framework: (1) Digital Economy research, (2) Information Systems Design Science Research, (3) Entrepreneurship Design Science, and (4) broader socio-technical, ecosystem, and public-sector design literature. The sources include foundational The review draws on four interconnected literature streams relevant to the development of the Digital Economy Design Science (DEDS) Framework: (1) Digital Economy research, (2) Information Systems Design Science Research, (3) Entrepreneurship Design Science, and (4) broader socio-technical, ecosystem, and public-sector design literature. The sources include foundational scholarly works that established the conceptual foundations of digital economics and Design Science, as well as more recent reviews and studies addressing digital transformation, digital entrepreneurship, ecosystems, digital development, and digital public infrastructure (Goldfarb & Tucker, 2019; Hevner et al., 2004; Jacobides et al., 2018; Nambisan, 2017; Vial, 2019).

The literature considered spans approximately 2001–2025, with earlier publications retained where they provide foundational concepts and methodological principles, while more recent studies are used to capture the evolving characteristics and challenges of the Digital Economy. Selection was guided by conceptual relevance rather than comprehensiveness. Sources were included when they contributed to understanding the nature of Digital Economy phenomena, the principles of Design Science, the expansion of design into entrepreneurship and organizational contexts, or the design and governance of socio-technical ecosystems.

The four literature streams were compared conceptually to identify recurring dimensions concerning design objects, design processes, stakeholder configurations, evaluation criteria, and knowledge outputs. These dimensions were then synthesized to identify what existing approaches contribute individually and what remains insufficiently integrated when addressing complex Digital Economy challenges. The resulting synthesis provides the conceptual basis for the DEDS Framework, rather than claiming empirical validation or a systematic assessment of the entire literature.

**From Explanation to Design: Extending Design Science to the Digital Economy**

***Design Science Beyond Behavioral Science***

The distinction between behavioral science and design science has long been recognized as a fundamental paradigm in the sciences of the artificial. Simon (1996) argued that while the natural sciences seek to explain and predict existing phenomena, design sciences are concerned with creating preferred future situations through purposeful intervention. Behavioral research asks what is and why it occurs, whereas design research asks what ought to be and how it can be achieved. Consequently, the primary objective of design science is not merely to understand reality but to develop artifacts, models, and interventions capable of solving practical problems while simultaneously contributing to scientific knowledge.

This distinction was subsequently adopted and refined within the Information Systems (IS) discipline. Hevner et al. (2004) proposed that IS research should consist of two complementary paradigms. Behavioral Science seeks to develop and validate theories explaining or predicting organizational and technological

phenomena. In contrast, Design Science Research (DSR) focuses on creating and evaluating innovative artifacts—including constructs, models, methods, and systems—that improve organizational performance and address real-world problems. Rather than competing paradigms, behavioral science and design science are mutually reinforcing. Behavioral research provides explanatory knowledge that informs design, while design research generates practical solutions that, in turn, enrich theoretical understanding (Hevner et al., 2004; Hevner, 2007).

Subsequent developments have further refined the philosophical foundations of Design Science. Iivari (2007) argued that Design Science should be understood as an independent research paradigm with its own epistemological assumptions rather than merely an applied branch of behavioral science. Similarly, Peffers et al. (2007) proposed a systematic Design Science Research Methodology (DSRM) consisting of problem identification, objective definition, artifact design, demonstration, evaluation, and communication. Collectively, these contributions established Design Science as a rigorous approach for producing actionable knowledge while maintaining scientific validity.

Although originally developed within Information Systems, the underlying philosophy of Design Science extends well beyond technological artifacts. Its central concern is the intentional design of solutions that improve human, organizational, and societal conditions. This broader orientation provides an important foundation for extending Design Science into Digital Economy research.

***From Information Systems to Entrepreneurship***

The evolution of Design Science demonstrates a gradual expansion of its objects of design. Early Design Science Research focused primarily on information technology artifacts such as decision-support systems, databases, software architectures, algorithms, and information systems. The designed artifact was typically technological, and evaluation concentrated on its functionality, efficiency, and organizational usefulness (Hevner et al., 2004).

More recently, entrepreneurship scholars have argued that Design Science can contribute beyond technological innovation by designing entrepreneurial action itself. Rather than limiting research to explaining entrepreneurial behaviour or identifying determinants of venture success, Design Science enables researchers to develop new entrepreneurial opportunities, business models, innovation processes, and organizational practices (Dimov, 2020; Seckler et al., 2023). In this perspective, entrepreneurship becomes a process of intentional design in which entrepreneurs continuously construct, test, evaluate, and refine opportunities under conditions of uncertainty.

This extension significantly broadens the scope of Design Science. The object of design is no longer confined to technological artifacts but includes organizational capabilities, institutional arrangements, and innovation ecosystems. Knowledge generated through Design Science therefore shifts from describing entrepreneurial phenomena toward developing design principles that improve entrepreneurial practice.

The evolution from Information Systems to Entrepreneurship demonstrates that Design Science is inherently adaptive. As research domains evolve, so too do the objects of design. This intellectual trajectory suggests that extending Design Science to Digital Economy represents not a methodological discontinuity but a natural progression in its development.

***Why Digital Economy Requires a Design Science***

Digital Economy presents challenges that differ fundamentally from those addressed by traditional Information Systems or Entrepreneurship research. While Information Systems primarily designs technological artifacts and Entrepreneurship increasingly designs ventures and business models, Digital Economy encompasses much broader socio-technical-economic systems involving governments, firms, digital platforms, financial institutions, regulatory agencies, civil society, and citizens. Digital transformation therefore occurs not within isolated organizations but across interconnected ecosystems shaped by technology, institutions, governance, and public policy (Goldfarb & Tucker, 2019; Heeks, 2022).

The literature reviewed in the previous section illustrates this complexity. Contemporary Digital Economy research investigates digital platforms, artificial intelligence, fintech, digital trade, digital public infrastructure, digital inclusion, cybersecurity, and sustainability. These issues extend beyond technological innovation because they involve institutional coordination, regulatory design, stakeholder participation, and societal outcomes. Similarly, policy analyses emphasise that digital transformation

depends not only on technological capability but also on governance quality, digital literacy, infrastructure, investment, and inclusive public institutions.

Consequently, the principal object of design in Digital Economy is no longer an isolated technological artifact but an integrated socio-technical-economic system. Such systems combine digital technologies with organizational structures, institutional arrangements, governance mechanisms, market interactions, and public value creation. Designing a national digital payment system, for example, requires not only technological innovation but also regulatory frameworks, interoperability standards, institutional collaboration, cybersecurity mechanisms, and user trust. Similarly, designing digital public infrastructure or platform ecosystems requires coordinated interventions across technological, economic, organizational, and societal dimensions.

This shift in the unit of design constitutes the central argument of this paper. Rather than viewing Digital Economy as merely another application domain for existing Design Science Research, this paper proposes that Digital Economy requires a distinct conceptualization of Design Science because its design objects are fundamentally broader and more complex. Building upon the intellectual foundations established in Information Systems and Entrepreneurship, the next section proposes a conceptual framework for Design Science in Digital Economy that reflects this expanded understanding of design.

Existing approaches provide strong design knowledge at particular levels of analysis, but they do not sufficiently integrate multiple levels of design into a single research-oriented framework for Digital Economy. DEDS provides a conceptual architecture for integrating these different design levels and evaluating their interaction as parts of a socio-technical-economic system.

DEDS builds on, rather than replaces, existing Design Science and related design approaches. Table 1 positions the framework in relation to major traditions that have informed its development. The comparison shows that existing approaches provide important foundations for artifact design, organizational intervention, entrepreneurship, socio-technical alignment, ecosystem coordination, and public-sector design, but generally emphasize particular design objects or domains. DEDS seeks to integrate these perspectives by treating technology, organization, institution, ecosystem, and society as potentially interconnected objects of design within an iterative Design Science process.

**Table 2 Positioning the DEDS Framework Among Existing Design Approaches**

| Design Approach | Main references | Primary design object | Key orientation | Stakeholders / evaluation focus | Remaining gap for Digital Economy |
|---|---|---|---|---|---|
| Information Systems Design Science Research (DSR) | Hevner et al. (2004); Hevner (2007); Peffers et al. (2007) | IT artifacts, methods, and models | Utility, functionality, and problem-solving | Primarily users and organizations; emphasis on utility and performance | Traditionally emphasizes technological artifacts and organizational contexts rather than the broader configuration of economic, institutional, ecosystem, and societal dimensions |
| Action Design Research (ADR) | Hevner et al. (2004); Hevner (2007) | IT artifacts within organizational contexts | Artifact development through intervention and organizational change | Organizational actors; emphasis on contextual effectiveness and intervention | Strong contextual and intervention orientation, but less focused on multi-actor digital ecosystems, institutions, and wider societal outcomes |

| Design Approach | Main references | Primary design object | Key orientation | Stakeholders / evaluation focus | Remaining gap for Digital Economy |
|---|---|---|---|---|---|
| Entrepreneurship Design Science | Dimov (2020); Seckler et al. (2021) | Opportunities, ventures, business models, and entrepreneurial processes | Entrepreneurial action and value creation | Entrepreneurs and firms; emphasis on venture viability and value creation | Extends design beyond IT artifacts but focuses primarily on entrepreneurial actors and ventures rather than broader digital ecosystems and institutional arrangements |
| Socio-technical design | Heeks (2022); Orlikowski & Iacono (2001) | Technology–organization/social relations | Alignment between technical and social dimensions | Users, organizations, and social actors; emphasis on socio-technical fit and outcomes | Provides an important socio-technical perspective but is less explicit about integrating market, ecosystem, institutional, and public-value dimensions within a Design Science framework |
| Ecosystem design | Jacobides et al. (2018); Nambisan et al. (2019) | Ecosystem relationships and complementarities | Coordination, interdependence, and value creation | Multiple ecosystem actors; emphasis on relationships and ecosystem value | Highlights interorganizational relationships but is less explicit about systematic research-through-design and cumulative design knowledge |
| Public/policy design | Heeks (2006, 2022); World Bank (2024) | Policies, institutions, and public digital systems | Public problem-solving and digital development | Governments, citizens, communities, and other public stakeholders; emphasis on public value | Addresses institutional and societal dimensions but is not necessarily integrated with artifact-level Design Science and systematic evaluation of designed digital systems |

| Design Approach | Main references | Primary design object | Key orientation | Stakeholders / evaluation focus | Remaining gap for Digital Economy |
|---|---|---|---|---|---|
| Digital Economy Design Science (DEDS) | This paper; building on the above traditions | Socio-technical-economic systems | Integrated design and continuous improvement across technology, organization, institution, ecosystem, and society | Multiple stakeholders; evaluation of technical, economic, social, institutional, and public-value outcomes | Provides a conceptual framework for integrating multiple design levels through an iterative Design Science process and generating reusable design knowledge |

The comparison indicates that the distinctive contribution of DEDS is not a new Design Science methodology but an integrative design scope. Its unit of design can extend across multiple levels of a Digital Economy system, while its iterative process connects multi-stakeholder evaluation and institutional learning with the generation of reusable design knowledge. DEDS therefore complements existing approaches by providing a framework for design problems that cannot be adequately addressed at the level of a single artifact, organization, venture, or policy.

***The Digital Economy Design Science (DEDS) Framework***

The preceding discussion suggests that extending Design Science to the Digital Economy requires more than transferring existing methodologies from Information Systems. Rather, it requires reconceptualizing the object, process, and outcomes of design in a context where technological innovation is inseparable from institutional arrangements, governance mechanisms, economic interactions, and societal transformation. Accordingly, this paper proposes a conceptual framework for The Digital Economy Design Science (DEDS) that extends the Design Science tradition while recognising the unique characteristics of digital economies as socio-technical-economic systems.

The DEDS Framework conceptualizes Digital Economy design as an iterative knowledge-generation process in which researchers and practitioners address systemic digital challenges by designing, evaluating, and continuously improving interventions across five interconnected levels: technology, organization, institution, ecosystem, and society. The framework consists of three mutually connected dimensions: *design objects, design process,* and *design knowledge* (Hevner, 2007; Hevner et al., 2004; Peffers et al., 2007; Vial, 2019).

## *Three dimensions of DEDS*

*Design objects: What is being designed?*

The first dimension specifies the object or level at which intervention takes place, namely technology, organization, institution, ecosystem, and society. Table 3 summarizes this stage.

| Design level | Typical design object | Examples |
|---|---|---|
| **Technology** | Digital artifacts and infrastructure | AI systems, platforms, digital identity, payment systems |
| **Organization** | Organizational arrangements and business models | Digital operating models, platform governance, digital ventures |
| **Institution** | Rules, policies, standards, and governance arrangements | Data regulation, digital rights, interoperability standards |
| **Ecosystem** | Relationships among interconnected actors | Platform ecosystems, fintech ecosystems, digital public infrastructure |

| Design level | Typical design object | Examples |
|---|---|---|
| **Society** | Broader socio-economic outcomes and public value | Digital inclusion, sustainability, equitable access, social resilience |

The important point is that these levels are not independent. A digital platform, for example, involves technology but also organizational practices, rules governing participation, relationships among ecosystem actors, and consequences for society. Therefore, the appropriate design object may extend across several levels simultaneously (Jacobides et al., 2018; Nambisan et al., 2019; Orlikowski & Iacono, 2001; Vial, 2019). This formulation is consistent with the evolution of Digital Economy research from an emphasis on technological artifacts toward broader organizational, ecosystem, institutional, and societal transformations (Goldfarb & Tucker, 2019; Heeks, 2022; Nambisan, 2017; Vial, 2019).

*Design process: How is the system designed and improved?*

The second dimension specifies five iterative stages through which a Digital Economy intervention is conceived, developed, evaluated, and continuously improved. Rather than representing a strictly linear sequence, these stages form a cyclical process in which evaluation and learning can lead to redesign and renewed engagement with emerging challenges and opportunities. This iterative logic builds on the Design Science emphasis on cycles of design and evaluation while extending it to the broader socio-technical-economic context of the Digital Economy (Hevner, 2007; Hevner et al., 2004; Gregor & Hevner, 2013). Those five iterative stages are as follows:

*First, challenge and opportunity identification*. The process begins by identifying a significant Digital Economy problem or opportunity. Unlike conventional technology development, the problem may be systemic, involving conflicting stakeholder interests, institutional constraints, market dynamics, or societal consequences. The purpose is therefore not simply to identify technical deficiencies, but to recognize both challenges and opportunities and to explore the socio-technical-economic possibilities through which existing strengths can be leveraged and new forms of value can be created (Heeks, 2022; Vial, 2019). The inclusion of opportunities alongside problems is particularly important in Digital Economy contexts, where digital technologies can create new forms of entrepreneurship, innovation, and value creation rather than merely solve existing deficiencies (Dimov, 2020; Nambisan, 2017; Nambisan et al., 2019).

*Second, socio-technical-economic design*. The next stage develops an intervention appropriate to the identified challenge. Depending on the problem or opportunity, the intervention may involve a technological artifact, organizational arrangement, business model, governance mechanism, policy, ecosystem architecture, or combination of these. The central principle is that technological design should be considered together with its organizational, institutional, economic, and societal context (Hevner et al., 2004; Iivari, 2007; Orlikowski & Iacono, 2001; Vial, 2019). This broader conception of design builds on the evolution of Design Science from the design of information systems artifacts toward organizational, entrepreneurial, and broader socio-economic interventions (Dimov, 2020; Hevner, 2007; Seckler et al., 2021).

*Third, multi-stakeholder evaluation*. The proposed design is evaluated not only according to technical performance or organizational efficiency but also according to its consequences for different stakeholders. Evaluation may therefore include measures of usability, economic value, inclusion, institutional effectiveness, sustainability, trust, and public value. This stage recognizes that a design can be technically successful while producing undesirable outcomes at another level (Hevner et al., 2004; Gregor & Hevner, 2013). A multi-stakeholder perspective is particularly important for Digital Economy systems because value and consequences are distributed across interconnected actors rather than being confined to a single organization or technology (Jacobides et al., 2018; Nambisan et al., 2019).

*Fourth, learning and adaptation*. Evaluation generates knowledge about what works, what does not work, for whom, and under what conditions. This knowledge informs adaptation of the design as well as changes in organizational practices, governance arrangements, or institutional rules. Thus, failure or unintended consequences are not simply endpoints; they become sources of design learning (Gregor & Hevner, 2013; Hevner, 2007). This iterative orientation is consistent with the Design Science emphasis on repeated cycles of relevance, design, and evaluation, while extending the learning process to organizational, institutional, and ecosystem levels (Hevner, 2007).

*Fifth, transformation.* The final stage concerns the effects of the intervention on the wider Digital Economy system. Transformation may involve improved economic performance, new market arrangements, greater

inclusion, improved public services, stronger institutional capacity, or other forms of public and economic value. Importantly, transformation can also reveal new problems or unintended consequences, triggering another cycle of design (Heeks, 2022; Vial, 2019). The emphasis on transformation reflects the broader Digital Economy literature, which increasingly understands digitalization as a process that reshapes organizations, markets, ecosystems, institutions, and society rather than simply introducing new technologies (Goldfarb & Tucker, 2019; Nambisan et al., 2019; Vial, 2019).

*How the DEDS process generates design knowledge*

The DEDS process does not end with implementation. Its central research contribution is the production of reusable design knowledge (Gregor & Hevner, 2013; Hevner et al., 2004). The relationship can be represented by Figure 1.

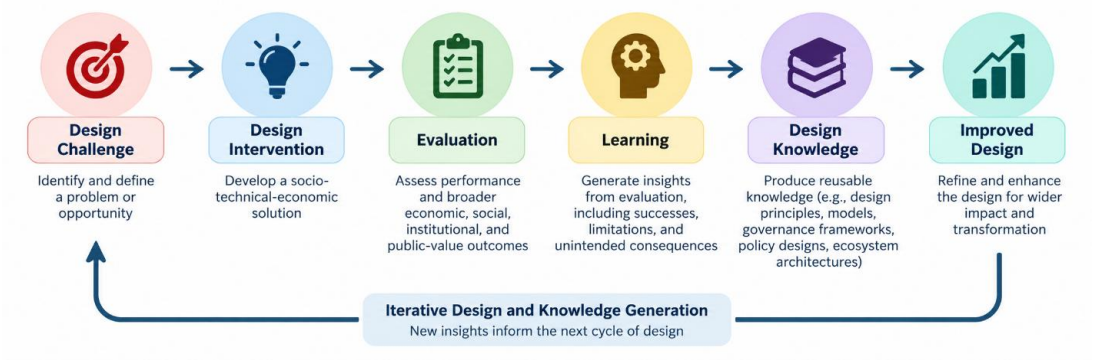



**Figure 1. Knowledge-generation logic of DEDS**

This sequence summarizes the knowledge-generation logic of DEDS: a *challenge or opportunity* triggers the development of a *design intervention*, which is then *evaluated* to generate *learning*. This learning is transformed into *reusable design knowledge*, which informs the *improvement and redesign* of the system.

The resulting design knowledge can take several forms, namely design principles, design models, governance frameworks, policy designs, and ecosystem architectures.

**Table 4. The Resulting Design Knowledge**

| Type of design knowledge | What it provides |
|---|---|
| **Design principles** | General guidance about how a Digital Economy system should be designed |
| **Design models** | Conceptual representations of how system components should interact |
| **Governance frameworks** | Principles and mechanisms for coordinating stakeholders and institutions |
| **Policy designs** | Structured approaches to addressing systemic digital challenges |
| **Ecosystem architectures** | Configurations of actors, relationships, rules, and technological infrastructure |

This distinction is important because the artifact or intervention is not the only research output. The design process should produce knowledge that can inform subsequent designs in similar or different contexts (Gregor & Hevner, 2013; Hevner et al., 2004). The emphasis on different forms of design knowledge is consistent with the Design Science literature, which distinguishes between the designed artifact and the more generalizable knowledge generated through the design and evaluation process (Gregor & Hevner, 2013; Peffers et al., 2007). It also resonates with the development of Design Science in entrepreneurship, where design principles and conceptual knowledge can emerge from the process of designing entrepreneurial opportunities and interventions (Dimov, 2020; Seckler et al., 2021). For example, designing a digital payment ecosystem may produce not only a functioning payment system but also design principles concerning interoperability, stakeholder participation, data governance, and financial inclusion. These principles can subsequently inform the design of other digital ecosystems.

***The central mechanism of DEDS***

The nature and complexity of the design object determine the scope of the design process. Designing an AI application may require primarily technological and organizational considerations. Designing a national digital identity system, by contrast, requires simultaneous consideration of technology, organizations, institutions, ecosystem relationships, and societal consequences (Heeks, 2022; Vial, 2019; World Bank, 2024).

Design, evaluation, and learning generate knowledge about effective configurations, mechanisms, and conditions. Repeated iterations therefore transform practical experience into potentially reusable design knowledge (Gregor & Hevner, 2013; Hevner, 2007). The resulting principles, models, governance frameworks, and architectures inform subsequent interventions. Design knowledge therefore becomes an input into future design rather than simply a final output (Gregor & Hevner, 2013).

The relationship also runs in the opposite direction. Design processes can reveal mechanisms and relationships that may subsequently contribute to explanatory theory. Thus, DEDS does not replace explanatory Digital Economy research. Instead, it creates a bidirectional relationship between explanation and design (Gregor & Hevner, 2013; Vial, 2019). DEDS integrates design objects, iterative design processes, and cumulative design knowledge so that Digital Economy research can move from explaining existing socio-technical-economic systems toward systematically designing and improving alternative ones.

***DEDS Design Principles***

The DEDS Framework is intended not only to describe the scope and process of Digital Economy design but also to provide prescriptive guidance for how such design should be undertaken. Based on the preceding synthesis of Design Science, Digital Economy, entrepreneurship, ecosystem, and socio-technical perspectives, five design principles are proposed.

*Design Principle 1*: Multi-dimensionality. Digital Economy interventions should simultaneously consider technological, organizational, institutional, ecosystem, and societal dimensions of the design problem. A digital intervention may generate consequences beyond the level at which it is initially developed. Therefore, design should consider the interactions among these dimensions rather than optimizing a single component in isolation (Hevner et al., 2004; Iivari, 2007; Jacobides et al., 2018; Vial, 2019).

*Design Principle 2*: Stakeholder plurality. Digital Economy designs should incorporate multiple stakeholder perspectives because system value is distributed across users, firms, governments, communities, and other ecosystem actors. The interests, capabilities, and experiences of these actors may differ, making multi-stakeholder engagement important for both design relevance and evaluation (Gregor & Hevner, 2013; Jacobides et al., 2018; Nambisan et al., 2019).

*Design Principle 3*: Dual evaluation. Digital Economy designs should be evaluated through both system performance and broader economic, social, institutional, and public-value outcomes. Technical functionality or organizational efficiency alone may not adequately capture whether a digital intervention creates desirable outcomes across the wider system (Hevner et al., 2004; Gregor & Hevner, 2013; Heeks, 2022).

*Design Principle 4*: Iterative institutional learning. Digital Economy designs should incorporate feedback and institutional learning because digital systems evolve through technological, market, regulatory, and societal change. Evaluation should therefore generate learning that can inform not only subsequent versions of the design but also organizational practices, governance arrangements, and institutional responses (Hevner, 2007; Gregor & Hevner, 2013; Heeks, 2022; Vial, 2019).

*Design Principle 5:* System-level value. Digital Economy design should seek value creation at the level of the wider socio-technical-economic system rather than optimizing individual technologies or organizations alone. This principle recognizes that digital transformation involves interconnected changes in technologies, organizations, markets, institutions, and society, and that value creation may therefore depend on the configuration and interaction of these elements (Goldfarb & Tucker, 2019; Jacobides et al., 2018; Nambisan et al., 2019; Vial, 2019).

Taken together, these five principles make DEDS prescriptive rather than merely descriptive. They provide practical guidance for researchers and practitioners in determining what should be considered when designing Digital Economy systems, how different stakeholders and levels should be incorporated, and how design outcomes should be evaluated and improved over time. At the same time, the principles remain sufficiently general to be applied across different Digital Economy contexts without prescribing a single type of technology, organization, or institutional arrangement.

***The DEDS Framework***

The three dimensions of DEDS—design objects, design process, and design knowledge—are brought together in the framework shown in Figure 1. The framework illustrates how Digital Economy challenges and opportunities are addressed through interventions that may span technological, organizational, institutional, ecosystem, and societal levels. These interventions are developed and evaluated through an iterative process of design, multi-stakeholder evaluation, learning, and adaptation, generating reusable design knowledge that informs subsequent design and system improvement.

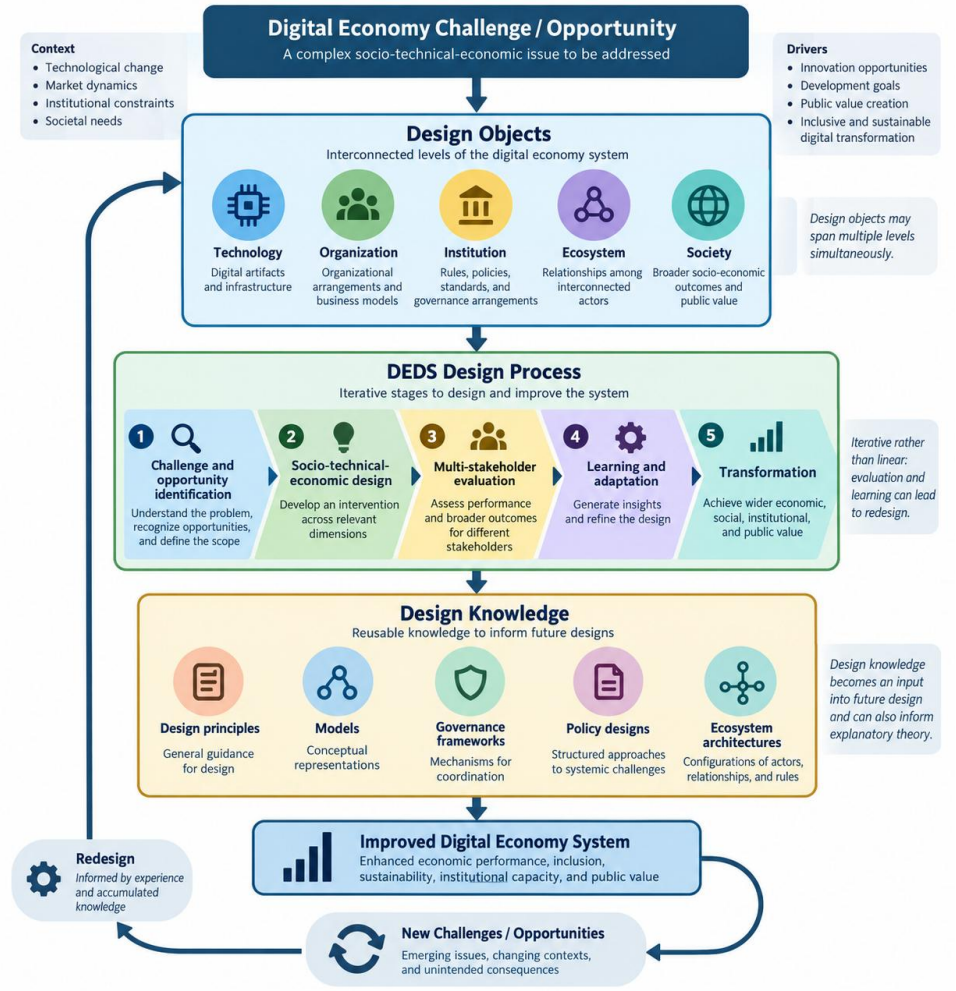



**Figure 2. The Digital Economy Design Science Framework**

The framework should not be interpreted as a strictly linear sequence. Rather, it represents a continuous cycle of design and learning. A Digital Economy challenge or opportunity triggers design, while evaluation generates learning and design knowledge that can improve the intervention. Transformation may subsequently reveal new challenges or opportunities, initiating another cycle of redesign. In this way, DEDS connects design intervention, evaluation, knowledge generation, and continuous system transformation, while allowing design knowledge from one cycle to inform future designs.

The distinctive contribution of DEDS does not lie in introducing Design Science as a new methodology or claiming that existing Design Science approaches cannot address Digital Economy problems. Rather, DEDS specifies how design knowledge can be generated when the design problem simultaneously involves multiple levels of a digital economy system. Existing approaches provide important foundations for artifact design, organizational intervention, entrepreneurship, socio-technical alignment, ecosystem coordination, and public-sector innovation. DEDS connects these perspectives by treating technology, organization, institution, ecosystem, and society as potentially interdependent design objects and by linking their design through an iterative process of evaluation, learning, and adaptation. Its distinctive unit of analysis is therefore not necessarily a particular artifact or organization but the configuration and interaction of multiple elements within a socio-technical-economic system.

Ultimately, the principal contribution of the DEDS Framework lies in repositioning Digital Economy as a design-oriented field of inquiry. The rapid evolution of artificial intelligence, digital platforms, fintech, and digital public infrastructure means that researchers are increasingly confronted with questions concerning the intentional design of future digital systems rather than merely explaining existing ones. As digital transformation becomes more pervasive, the capacity to generate actionable design knowledge will become increasingly important for creating digital economies that are not only technologically advanced but also inclusive, resilient, sustainable, and socially beneficial.

The DEDS Framework therefore complements existing explanatory paradigms by providing a conceptual foundation for producing knowledge that simultaneously advances theory and improves practice. In doing so, it bridges the longstanding divide between explanation and design and proposes a new research agenda for Digital Economy scholarship.

***Implications of the Digital Economy Design Science (DEDS) Framework***

The proposed DEDS Framework has important implications for both the future development of Digital Economy research and the practice of digital transformation. Rather than replacing existing explanatory approaches, DEDS complements them by expanding the scope of inquiry from understanding digital phenomena to intentionally designing and improving digital systems. Its implications follow directly from the five design principles of multi-dimensionality, stakeholder plurality, dual evaluation, iterative institutional learning, and system-level value.

***Implications for Research***

For researchers, the principle of multi-dimensionality encourages Digital Economy research to move beyond studies focused on individual technologies or organizations toward research that examines interactions among technology, organization, institution, ecosystem, and society. This broadens the possible objects of Design Science from digital artifacts to more complex socio-technical-economic systems.

The *principle of stakeholder plurality* further implies that design research should incorporate the perspectives and interests of multiple actors. Researchers can therefore investigate not only whether a digital intervention works technically, but also how its design affects users, firms, governments, communities, and other ecosystem participants.

The *principle of dual evaluation* expands the criteria by which Digital Economy designs are assessed. Technical performance and organizational efficiency remain important, but they should be considered alongside economic, social, institutional, sustainability, and public-value outcomes. This encourages researchers to develop richer evaluation approaches for digital interventions.

The *principle of iterative institutional learning* positions design as a continuing process rather than a one-time intervention. Researchers can study how feedback, unintended consequences, technological change, market evolution, and regulatory responses generate learning that informs subsequent redesign. This creates opportunities to connect Design Science with longitudinal and context-sensitive research.

Finally, the principle of system-level value encourages researchers to consider whether an intervention improves the wider digital system rather than simply optimizing an individual artifact, organization, or transaction. Accordingly, DEDS encourages research that complements explanatory questions with design questions concerning how digital systems can be intentionally configured to create economic and societal value.

These principles also expand the expected outputs of Digital Economy research. In addition to explanatory theories, researchers can develop design principles, models, governance frameworks, policy designs, and ecosystem architectures that provide reusable knowledge for subsequent interventions.

***Implications for Practice***

For practitioners, the five principles provide a practical orientation for designing and implementing digital transformation. Multi-dimensionality implies that technology implementation should be considered together with organizational capabilities, institutional arrangements, ecosystem relationships, and societal consequences. Digital transformation should therefore not be treated simply as the adoption of new technologies.

*Stakeholder plurality* implies that governments, businesses, users, communities, and other relevant actors should be involved in the design and evaluation of digital systems. This is particularly important where digital systems create interdependencies among actors or distribute benefits and risks unevenly.

*Dual evaluation* requires practitioners to assess both system performance and broader outcomes. A digital platform, payment system, or public digital service, for example, should be evaluated not only in terms of

efficiency and adoption but also in terms of inclusion, trust, sustainability, institutional effectiveness, and public value.

The *iterative institutional learning* principle means that implementation should incorporate mechanisms for feedback, monitoring, learning, and adaptation. Digital transformation should therefore be understood as an evolving process in which designs can be modified in response to changing technologies, markets, regulations, and stakeholder experiences.

Finally, the **system-level value** principle encourages practitioners to avoid optimizing individual organizational interests at the expense of the wider ecosystem. For businesses, particularly platform companies and digital startups, this means considering how business models, governance arrangements, and technological choices contribute to sustainable value creation across the broader ecosystem.

***Implications for Policymakers***

For policymakers, DEDS has a particularly important implication: policy and regulation should be treated as components of the digital system being designed rather than as external constraints imposed after technological development. This follows directly from the principles of multi-dimensionality and system-level value.

The principle of *stakeholder plurality* further suggests that digital policies should incorporate the perspectives of businesses, technology providers, users, civil society, and affected communities. Dual evaluation requires policymakers to assess not only economic efficiency and technological performance but also inclusion, equity, sustainability, trust, and public value. The principle of iterative institutional learning is particularly relevant to regulation because digital technologies and markets evolve faster than many existing institutional arrangements. Digital policies therefore need mechanisms for experimentation, feedback, evaluation, and revision rather than being treated as fixed solutions. Taken together, these principles position policy design as an integral part of Digital Economy system design. DEDS therefore provides policymakers with a way to connect technology, markets, institutions, stakeholder interests, and public value within a single iterative design process.

**Conclusion**

The rapid expansion of Digital Economy research has significantly advanced understanding of how digital technologies transform organizations, markets, industries, and societies. Nevertheless, this paper argues that the field remains predominantly explanatory, with much research focusing on the determinants, processes, and consequences of digital transformation. While such knowledge remains essential, it provides comparatively limited guidance for designing and continuously improving the complex digital systems, institutions, ecosystems, and governance arrangements required to address emerging challenges and realize new opportunities.

To address this gap, the paper proposed the Digital Economy Design Science (DEDS) Framework as a conceptual extension of Design Science to the broader Digital Economy domain. Drawing on developments in Information Systems, Entrepreneurship, and related socio-technical, ecosystem, and public-sector design perspectives, DEDS shifts attention from individual artifacts or ventures toward socio-technical-economic systems in which technology, organization, institution, ecosystem, and society are interconnected design objects.

The framework integrates three mutually connected dimensions: design objects, design process, and design knowledge. The design process consists of five iterative stages: challenge and opportunity identification, socio-technical-economic design, multi-stakeholder evaluation, learning and adaptation, and transformation. Rather than representing a linear sequence, these stages form a continuous cycle in which evaluation and learning inform redesign, transformation generates new challenges and opportunities, and accumulated design knowledge informs subsequent interventions.

The paper further proposed five DEDS Design Principles: multi-dimensionality, stakeholder plurality, dual evaluation, iterative institutional learning, and system-level value. Together, these principles make DEDS not merely a descriptive framework but a prescriptive orientation for Digital Economy design. They guide researchers and practitioners in determining what should be considered in design, whose perspectives should be incorporated, how outcomes should be evaluated, how learning should inform adaptation, and how value should be considered at the level of the wider system.

The contribution of DEDS is therefore not to replace existing Design Science approaches but to connect and extend them for Digital Economy contexts in which design problems cross technological, organizational, institutional, ecosystem, and societal boundaries. It also broadens the potential outputs of design research beyond individual artifacts to include design principles, models, governance frameworks, policy designs, and ecosystem architectures. Importantly, governance and policy are treated not simply as external constraints on digital

innovation but as potential components of the digital system that can themselves be designed, evaluated, and adapted.

For practice, DEDS provides a conceptual basis for integrating technological innovation with organizational change, stakeholder participation, institutional learning, governance, and public value. For policymakers, it highlights the importance of designing regulatory and institutional arrangements together with digital infrastructures and markets. For researchers, it opens a pathway for complementing explanatory Digital Economy research with systematic inquiry into how better digital futures can be designed and evaluated.

This paper is conceptual and therefore has important limitations. The DEDS Framework has not yet been empirically validated across different Digital Economy contexts, and the proposed principles require further examination regarding their applicability, interactions, and boundary conditions. Future research should therefore test DEDS through multiple case studies, Action Design Research, living laboratories, policy experimentation, and comparative studies across industries, ecosystems, and countries. Such research can refine the framework and generate context-specific design principles and cumulative design knowledge.

Ultimately, Digital Economy research should not be limited to explaining how digital transformation occurs. It should also contribute to designing and improving the digital futures that societies, organizations, and institutions seek to create. By bridging explanation and design, the Digital Economy Design Science (DEDS) Framework provides a conceptual foundation for a more integrative, iterative, and action-oriented Digital Economy scholarship.

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# DIGITAL ECONOMY AND POVERTY REDUCTION: THE CONTRIBUTIONS OF COMMUNITY-BASED TOURISM TO LIVELIHOOD IMPROVEMENT. A CASE STUDY OF MTO WA MBU VILLAGE, MONDULI DISTRICT, ARUSHA, TANZANIA.

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***Abstract***
*This study examined the contribution of Community-Based Tourism (CBT) to livelihood improvement in Mto wa Mbu Village, Monduli District, Arusha Region. The objectives were to identify CBT activities, assess their role in income generation, and evaluate employment creation. Using a descriptive design with quantitative and qualitative approaches, data were collected from community members, CBT beneficiaries, tour operators, and tourism officers through questionnaires and interviews. Findings revealed cultural tourism and guiding services as the most common CBT activities, supported by agro-tourism, handicrafts, and accommodation. A majority of respondents were directly engaged in CBT, which contributed significantly to household income, skills development, and community empowerment. Tourism infrastructure, training, and product promotion enhanced these benefits, though access to loans and financial services remained weak. CBT also created employment and improved household welfare, confirming its multi-dimensional role beyond income. Key informants noted government and NGO support through training, but limited private sector reinvestment. Challenges included inadequate funding, poor infrastructure in remote areas, low community awareness, and seasonal tourist fluctuations. The study concludes that CBT is vital for sustainable livelihoods and local economic development, recommending stronger support through training, microfinance, infrastructure investment, and destination marketing.*
***Keyword:*** *Community-Based Tourism and Livelihood Improvement*

## 1. Introduction

Tourism has increasingly become one of the most important sectors contributing to global economic development, employment creation, and poverty reduction, and in recent years there has been a shift from mass tourism to more inclusive approaches such as Community-Based Tourism (CBT), which emphasizes the involvement of local communities in tourism activities and ensures that they benefit directly (World Tourism Organization, 2018).

CBT is widely recognized as a strategy for achieving sustainable development, especially in developing countries. The World Bank (2020) highlights that community-based tourism contributes to income generation, employment creation, and economic diversification, and that these benefits are especially valuable in rural communities where alternative livelihood options are limited. Empirical studies from the Americas show that CBT has helped communities diversify their livelihoods; for example, in Nicaragua, CBT initiatives have enabled rural communities to engage in cultural tourism, handicrafts and small businesses, contributing to poverty reduction and improved livelihoods (Zapata, Hall, Lindo, & Vanderschaeghe, 2011).

CBT has been widely used as a tool for rural development and conservation, contributing to income generation and community development (Mbaiwa, 2004), while also enhancing community participation and promoting sustainable use of natural resources (Spenceley, 2008). In East Africa, CBT is closely linked to wildlife conservation and cultural tourism, with community enterprises enabling local people to benefit through employment and revenue sharing (Manyara & Jones, 2007; Ahebwa, van der Duim, & Sandbrook, 2012), although challenges such as unequal distribution of benefits and weak institutional support still exist in many destinations (Dangi &

Jamal, 2016).

Tourism plays a significant role in economic development by contributing to GDP and employment. Studies conducted in areas such as Ngorongoro and Tarangire show that CBT has improved income and employment opportunities (Nelson, Foley, Foley, et al., 2013). Mto wa Mbu village, located in Monduli District, Arusha Region, is one of the most well-known cultural CBT destinations in Tanzania. The area is home to more than 120 ethnic groups and offers various tourism activities such as cultural tours, local guiding, handicrafts, and agro-tourism, providing local communities with opportunities to generate income and improve their livelihoods.

The study is significant to several groups of stakeholders. For policymakers and local government authorities, it provides evidence-based insight into the role of CBT in promoting socio-economic development, which can inform policies that encourage equitable participation and benefit-sharing (Akama & Kikuchi, 1995; Nelson et al., 2013). For tourism practitioners, NGOs and development partners, the findings identify the strengths, challenges and opportunities of CBT in Mto wa Mbu, information that can guide planning, resource allocation and capacity-building initiatives (Spenceley, 2008; Tosun, 2006). Academically, the study contributes to the literature on community-based tourism and sustainable livelihoods, and serves as a reference for students, researchers and practitioners interested in tourism development and community participation.

Despite the growth of CBT in Tanzania, limited empirical studies have specifically assessed its contribution to livelihood improvement in Mto wa Mbu Village. While some community members benefit substantially, others continue to face challenges such as limited skills, unequal distribution of tourism benefits, and lack of access to markets and financial services. Most existing Tanzanian studies on CBT and livelihoods have concentrated on wildlife-based destinations such as Serengeti and Ngorongoro, leaving culturally based destinations such as Mto wa Mbu comparatively under-researched. Therefore, this study was conducted to assess the contribution of Community-Based Tourism to livelihood improvement, as a pathway to poverty reduction, in Mto wa Mbu village.

To address this gap, the study pursued three specific research objectives: to identify the types of Community-Based Tourism activities practiced in Mto wa Mbu village; to assess the contribution of Community-Based Tourism to income generation among local communities; and to assess the role of Community-Based Tourism in employment creation for local residents. Conducted in Mto wa Mbu Village, Monduli District, the mixed-methods study engaged 45 participants comprising community members, CBT beneficiaries, tour operators and tourism officers. The research employed structured questionnaires and semi-structured key informant interviews, utilizing both closed-ended and open-ended questions, to achieve the research objectives effectively.

## 2. Literature Review

### 2.1 *Background of the Study*

Community-Based Tourism (CBT) encompasses a wide range of tourism activities that are owned, managed and operated by local communities with the aim of generating income and improving livelihoods. Scheyvens (1999) identified village tours, traditional performances and community-managed accommodation as common CBT forms in developing countries, while Ashley (2000) observed that CBT initiatives often involve small-scale enterprises such as craft markets and cultural exhibitions that diversify household livelihoods. In Kenya, community-based tourism enterprises operate through eco-lodges, cultural villages and handicraft markets that generate income and employment (Manyara & Jones, 2007), while in Uganda, CBT activities include guiding services, cultural performances and community-managed enterprises around protected areas (Ahebwa et al., 2012).

Goodwin (2008) emphasizes that CBT significantly improves household income by enabling communities to participate directly in tourism value chains, and Mitchell and Ashley

(2010) similarly found that CBT improves income through direct earnings and linkages with other economic sectors, such as agriculture, transport and food supply. Similar income gains have been documented in Uganda and Ethiopia (Ahebwa et al., 2012; Teshome, 2015). Tourism is also recognized as a labour-intensive sector generating both direct and indirect employment; Scheyvens (1999) argues that CBT promotes self-employment and entrepreneurship, especially for women and youth, while Ashley (2000) found that tourism employment provides an alternative source of livelihood that reduces dependence on agriculture.

Most previous studies on CBT and livelihoods in Tanzania have focused on wildlife-based destinations such as Serengeti and Ngorongoro (Nelson, 2012), while limited empirical evidence exists on cultural-based CBT destinations such as Mto wa Mbu Village, where tourism is strongly linked to cultural diversity, agro-tourism, and community guiding services. This study therefore sought to fill this empirical gap by documenting the specific proportions of CBT activity uptake and its contribution to income and employment in a culturally based tourism destination.

#### *2.1.1. The Sustainable Livelihoods Framework*

In this mixed-methods research, the Sustainable Livelihoods Framework (SLF), developed by the Department for International Development (DFID, 1999) and Scoones (1998), is applied as the theoretical framework. The SLF explains how individuals and communities use different livelihood assets, human, social, natural, physical and financial capital, together with the surrounding vulnerability context and transforming structures and processes, to pursue livelihood strategies and achieve improved livelihood outcomes such as income, employment and well-being. Human capital, comprising guiding, hospitality and cultural-performance skills, and social capital, expressed through tourism groups and cultural associations, are central to how community members engage in and benefit from CBT (Scheyvens, 1999; Ahebwa et al., 2012). Natural capital, including agricultural land, cultural diversity and proximity to the Lake Manyara ecosystem, provides the resource base for CBT activities (Moscardo, 2020), while physical capital such as roads and tourism facilities, and financial capital such as income, savings and credit, shape the extent to which households can participate in and benefit from tourism (Mitchell & Ashley, 2010; Goodwin, 2008). This framework is relevant because it explains how CBT contributes to livelihood improvement in Mto wa Mbu Village.

#### *2.1.2. The Conceptual Framework: Community-Based Tourism and Livelihood Improvement*

The conceptual framework of this study illustrates the relationship between Community-Based Tourism, as the independent variable, and livelihood improvement, as a pathway to poverty reduction, as the dependent variable, guided by the Sustainable Livelihoods Framework (DFID, 1999).

##### *2.1.2.1. Independent Variable: Community-Based Tourism Activities*

The independent variable in this study is Community-Based Tourism (CBT) activities in Mto wa Mbu village, which include community participation, referring to the involvement of local people in planning, decision-making and implementation of tourism activities; institutional support, comprising guidance, policies and assistance provided by government authorities, tourism boards and non-governmental organizations; access to finance, including credit facilities and grants; and infrastructure development, including roads, communication systems and tourism facilities. Evidence from literature shows that communities actively involved in CBT activities such as cultural tourism, homestays, guiding services and handicraft production experience improved income, employment opportunities and empowerment (Manyara & Jones, 2007; Salazar, 2012).

#### *2.1.2.2. Dependent Variable: Livelihood Improvement*

The dependent variable in this study is livelihood improvement, as a pathway to poverty reduction, among local communities in Mto wa Mbu village, measured through income generation, employment creation, skills development, community empowerment and household welfare improvement. Evidence from literature confirms that participation in CBT leads to improved income, employment creation, skills development and empowerment, with communities engaged in cultural tourism and community enterprises reporting improved livelihoods (Mitchell & Ashley, 2010; Ahebwa et al., 2012).

Therefore, in order to effectively address the research objectives, this study investigated the following research questions. Objective One; To identify the types of Community-Based Tourism activities practiced in Mto wa Mbu village. Research Question One; What types of Community-Based Tourism activities are practiced in Mto wa Mbu village? Objective Two; To assess the contribution of Community-Based Tourism to income generation among local communities in Mto wa Mbu village. Research Question Two: How does Community-Based Tourism contribute to income generation among local communities? Objective Three: To assess the role of Community-Based Tourism in employment creation for local residents in Mto wa Mbu village. Research Question Three; To what extent does Community-Based Tourism create employment opportunities for local residents in Mto wa Mbu?

## 3. Research Method

This study utilized a mixed research method, combining both qualitative and quantitative approaches as defined by Creswell (2014). The integration of these methods allowed the researcher to address various complexities in the research problem. The study adopted a convergent parallel design, a mixed-methods design in which the researcher collects both quantitative and qualitative data simultaneously, analyses them separately, and then merges the results to draw comprehensive conclusions (Creswell, 2014). The study was conducted in Mto wa Mbu Village, Monduli District, Arusha Region, situated along the northern tourism circuit of Tanzania near Lake Manyara National Park, and home to more than 120 ethnic groups, making it one of the most culturally diverse and popular community-based tourism destinations in northern Tanzania. Using Yamane's formula, a sample of 45 respondents was drawn from a target population of 7,995, comprising community members, CBT beneficiaries, tour operators and tourism officers, as summarized in table below,

**Table 1. Population and Sample Distribution**

| Category | Sample Size | Percentage |
|---|---|---|
| Community members | 18 | 40% |
| CBT Beneficiaries | 14 | 31% |
| Tour operators | 9 | 20% |
| Tourism officers | 4 | 10% |
| **Total** | **45** | **100%** |

*Source*: Field Data (2026)

Simple random sampling was used for selecting questionnaire respondents, ensuring each individual in the target population had an equal chance of participation, thereby reducing selection bias (Etikan, Musa, & Alkassim, 2016). Purposive sampling was used for interviews to select key informants with extensive knowledge and direct involvement in cultural tourism activities, such as village leaders and tour operators (Palinkas, Horwitz, Green, & Wisdom, 2015). Primary data were collected through structured questionnaires administered to 40 respondents and semi-structured interviews with 5 key informants, while secondary data were obtained from government reports, journals and previous studies. The use of descriptive statistics for quantitative data analysis and thematic analysis for qualitative data (Braun & Clarke, 2006) added rigor to the study. Triangulation, achieved by combining structured questionnaires with semi-structured key informant interviews, further strengthened the validity and reliability of the findings by allowing quantitative

patterns to be cross-checked against qualitative explanations from tourism officers and tour operators.

## 4. Research Findings and Discussion

### 4.1 *Findings*

In this study, a total of 45 respondents from Mto wa Mbu village participated, comprising 18 community members, 14 CBT beneficiaries, 9 tour operators and 4 tourism officers, representing a response rate of 100%; all questionnaires returned were valid and usable for analysis.

### 4.2 *Demographic Profile of Respondents*

Of the 45 respondents, 24 (53.3%) were male and 21 (46.7%) were female, showing a fairly balanced gender distribution that suggests the findings reflect perspectives across genders in the Mto wa Mbu community. The slightly higher proportion of male respondent's mirrors patterns observed in tourism-related activities where guiding and operational roles have historically shown male dominance, while the substantial female representation indicates meaningful gender inclusion in activities such as handicraft production and cultural performances.

**Table 2. Age Distribution of Respondents**

| Age Category | Frequency | Percentage (%) |
|---|---|---|
| 18–25 | 10 | 22.2% |
| 26–35 | 15 | 33.3% |
| 36–45 | 12 | 26.7% |
| 46–55 | 6 | 13.3% |
| 56 and above | 2 | 4.4% |
| **Total** | **45** | **100%** |

*Source*: Field Data (2026)

The findings show that most respondents (33.3%) were between 26 and 35 years old, implying that many community members involved in CBT activities are relatively young and economically active, with greater physical ability and interest in tourism entrepreneurship. In terms of education, most respondents (33.3%) had attained college-level education, followed by secondary-level holders (31.1%), 17.8% with primary education, 13.3% with university education, and 4.4% with no formal education, indicating a moderately skilled community capable of engaging with tourism enterprises. Regarding occupation, farming remained the leading primary occupation (33.3%), closely followed by tourism-related work (31.1%), business (26.7%) and other occupations (8.9%), suggesting that CBT increasingly complements, rather than replaces, agriculture as a livelihood source in Mto wa Mbu.

### 4.3 *Objective One: Types of Community-Based Tourism Activities Practiced in Mto wa Mbu*

The findings show that 38 respondents (84.4%) were directly involved in CBT activities, while 7 (15.6%) reported no involvement. As shown in Table 3, cultural tourism (35.6%) and guiding services (24.4%) emerged as the most commonly practiced CBT activities, complemented by agro-tourism (20.0%), handicrafts (13.3%) and accommodation services (6.7%).

**Table 3. Types of Community-Based Tourism Activities Practiced**

| CBT Activity | Frequency | Percentage (%) |
|---|---|---|
| Cultural Tourism | 16 | 35.6% |
| Guiding Services | 11 | 24.4% |
| Agro-tourism | 9 | 20.0% |
| Handicrafts | 6 | 13.3% |
| Accommodation Services | 3 | 6.7% |
| **Total** | **45** | **100%** |

*Source*: Field Data (2026)

Cultural tourism, practiced by 35.6% of respondents, involves guided village tours, traditional dance performances and visits to homesteads of the different ethnic groups residing in Mto wa Mbu; respondents cited direct interaction with tourists, quick cash payments and low start-up costs as its main advantages, though seasonal fluctuation in visitor numbers and limited bargaining power for individual households remain constraints. Guiding services (24.4%) offer direct income per tour and opportunities to build relationships with tour operators, but income fluctuates strongly with the tourist season and remains concentrated among a small number of trained guides. Agro-tourism (20.0%), which involves hosting tourists on banana, rice and vegetable farms, diversifies household income beyond crop sales, while handicraft production (13.3%), mainly beadwork, basketry and wood carving, is particularly important for women's groups as a flexible, home-based income source, though it faces limited market access beyond the village. Accommodation services (6.7%) remain the least practiced activity, constrained mainly by high set-up costs and limited capital, despite their potential for higher per-visitor earnings. According to one Tourism Officer interviewed, "Cultural tours remain our biggest attraction because tourists want to see how different tribes live side by side in one village".

**Discussion**

By looking at the data, cultural tourism (35.6%) and guiding services (24.4%) together account for 60% of all CBT activity uptake in Mto wa Mbu, confirming that these two activities form the backbone of household engagement in tourism. This is consistent with Scheyvens (1999) and Ashley (2000), who observed that community tours and small-scale enterprises form the backbone of CBT in developing countries, and with Manyara and Jones (2007) and Ahebwa et al. (2012), who found similar activity patterns in Kenya and Uganda. However, unlike most previous studies conducted in wildlife-based destinations such as Serengeti and Ngorongoro, which emphasize eco-tourism and conservation-linked activities, this study confirms that in a culturally diverse setting such as Mto wa Mbu, cultural tourism and guiding services, rather than wildlife-based activities, are the primary entry points into CBT. This extends existing knowledge by documenting the specific proportions of activity uptake in a cultural tourism destination that had previously received limited empirical attention. Agro-tourism, handicrafts and accommodation services remain less practiced, mainly due to higher set-up costs and limited accessibility of farms and guesthouses to visitors, as confirmed during interviews with tour operators.

### *4.4 Objective Two: The Contribution of Community-Based Tourism to Income Generation*

The analysis indicated that institutional support factors, alongside CBT participation, positively influenced household income in Mto wa Mbu. Table 4 summarizes the frequency and percentage distribution of respondents' levels of agreement regarding institutional support and income outcomes.

**Table 4. Responses on Institutional Support and Contribution of CBT to Income Generation**

*(SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree)*

| Statement | SA | A | N | D | SD | Total |
|---|---|---|---|---|---|---|
| Government and NGOs provide enough support for CBT activities | 8 (17.8%) | 16 (35.6%) | 12 (26.7%) | 6 (13.3%) | 3 (6.7%) | 45 |
| Community members have access to training related to tourism | 9 (20.0%) | 17 (37.8%) | 10 (22.2%) | 6 (13.3%) | 3 (6.7%) | 45 |

| Statement | SA | A | N | D | SD | Total |
|---|---|---|---|---|---|---|
| Access to loans or financial support helps improve CBT activities | 7 (15.6%) | 15 (33.3%) | 13 (28.9%) | 7 (15.6%) | 3 (6.7%) | 45 |
| Tourism infrastructure (roads, water, electricity) supports CBT growth | 10 (22.2%) | 18 (40.0%) | 9 (20.0%) | 5 (11.1%) | 3 (6.7%) | 45 |
| Local tourism products are well promoted to visitors | 9 (20.0%) | 16 (35.6%) | 11 (24.4%) | 6 (13.3%) | 3 (6.7%) | 45 |
| Community-Based Tourism has improved household income in this area | 14 (31.1%) | 19 (42.2%) | 7 (15.6%) | 3 (6.7%) | 2 (4.4%) | 45 |

*Source*: Researcher (2026)

One Tour Operator remarked, "Our local guides earn directly from every tour they lead, and this money goes straight into the household," while another explained, "Women's groups making beadwork and baskets have been able to send their children to school using income from craft sales".

**Discussion**

The data shows that institutional support and CBT participation had a broad and positive influence on household income in Mto wa Mbu. Tourism infrastructure recorded the strongest agreement (62.2% combined agree and strongly agree), followed by access to training (57.8%) and local product promotion (55.6%), highlighting the importance of these enabling conditions for income-generating CBT activities. Access to loans and financial support recorded the lowest agreement (48.9%) and the highest combined neutral and disagreeing responses (51.1%), suggesting that limited access to credit remains the weakest link in the institutional support system. So, by looking at the total of 73.3% of respondents who agree or strongly agree that CBT has directly improved household income, against only 11.1% who disagree or strongly disagree, this implies that existing training, infrastructure and promotional efforts have been sufficient to translate participation into tangible income gains for most households, even where access to finance remains limited. These findings support Goodwin (2008) and Mitchell and Ashley (2010), who found that CBT improves household income through direct earnings and linkages with other sectors, and Ahebwa et al. (2012) and Teshome (2015), who reported similar income gains in Uganda and Ethiopia. However, unlike studies conducted in wildlife-based and conservation tourism destinations, this study found that in a cultural tourism setting such as Mto wa Mbu, infrastructure and training, rather than financial access, were the strongest drivers of income improvement, while financial constraints remained the binding limitation, extending the literature by showing that income gains from CBT can be substantial even where access to finance is comparatively weak, provided that infrastructure and training are reasonably well established.

### *4.5 Objective Three: The Role of Community-Based Tourism in Employment Creation*

The study also examined the role of Community-Based Tourism in employment creation and its broader contribution to livelihood improvement. Table 5 shows the frequency and percentage distribution of responses concerning employment, skills development, community empowerment and household welfare.

**Table 5. Responses on Employment Creation and Broader Livelihood Improvement**

*(SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree)*

| Statement | SA | A | N | D | SD | Total |
|---|---|---|---|---|---|---|
| Community-Based Tourism has created employment opportunities for local people | 13 (28.9%) | 20 (44.4%) | 7 (15.6%) | 4 (8.9%) | 1 (2.2%) | 45 |
| Community-Based Tourism has improved skills and knowledge among community members | 12 (26.7%) | 18 (40.0%) | 9 (20.0%) | 4 (8.9%) | 2 (4.4%) | 45 |
| Community-Based Tourism has increased community empowerment and participation | 11 (24.4%) | 19 (42.2%) | 9 (20.0%) | 4 (8.9%) | 2 (4.4%) | 45 |
| Overall, Community-Based Tourism has improved the welfare of households in Mto wa Mbu village | 13 (28.9%) | 20 (44.4%) | 8 (17.8%) | 3 (6.7%) | 1 (2.2%) | 45 |

*Source*: Field Data (2026)

One Tour Operator explained the seasonal nature of this employment, "The challenge is that during the rainy season, very few tourists come, so casual jobs linked to tourism almost disappear," while a Tourism Officer added, "Many families in the outskirts of the village don't even know how to get involved in CBT because information does not reach them".

***Discussion***

The results show that 73.3% of respondents agreed or strongly agreed that CBT has created employment opportunities for local residents, whether directly as guides, cultural performers and craft producers, or indirectly through related services such as transport and food supply; only 11.1% disagreed, indicating that employment creation is one of the most consistently recognized benefits of CBT in the study area. Skills development and community empowerment were each recognised by 66.7% of respondents, demonstrating that participation in CBT is not limited to income and jobs, but also builds human and social capital within the community. Overall household welfare recorded the highest agreement (73.3%), confirming that Community-Based Tourism functions as a multi-dimensional livelihood strategy in Mto wa Mbu rather than one that benefits households through employment alone. These results support Scheyvens (1999) and Ashley (2000), who found that CBT promotes self-employment and reduces dependence on agriculture, and Manyara and Jones (2007) and Ahebwa et al. (2012), who reported similar employment outcomes in Kenya and Uganda. However, qualitative findings from key informant interviews revealed that employment linked to CBT in Mto wa Mbu is strongly seasonal, fluctuating with tourist volumes, and concentrated among a relatively small number of trained guides and established households. This nuances prior assumptions of uniform and stable employment gains from CBT, showing instead that employment benefits, while broadly positive, are unevenly distributed and vulnerable to seasonal fluctuation, a dimension not fully captured in earlier wildlife-tourism-focused studies.

## 5. Conclusion

This study set out to assess the contribution of Community-Based Tourism to livelihood improvement in Mto wa Mbu Village, Monduli District, Arusha Region, guided by three specific objectives concentrating on the types of CBT activities practiced, the contribution of CBT to income generation, and the role of CBT in employment creation. The evidence points to cultural tourism and guiding services as the dominant CBT activities, complemented by agro-tourism, handicraft production and accommodation services. These activities have positively contributed to household income, employment creation, skills development, community empowerment and overall household welfare, with 84.4% of respondents directly involved in CBT, 73.3% confirming improved household income, and 73.3% confirming improved employment and welfare outcomes. However, these benefits are not evenly distributed across all households in the village, and remain constrained by limited access to finance and by the seasonal nature of tourist arrivals, with gains concentrated among households with existing access to training, guiding networks and accessible farmland. These findings align with the Sustainable Livelihoods Framework by showing that human, social, natural, physical and financial capital jointly shape the extent to which households benefit from CBT, with financial capital emerging as the most constrained of the five. They also support the conceptual framework, confirming that Community-Based Tourism activities influence livelihood improvement through institutional support, infrastructure and training, moderated by access to finance. No major contradictions with the framework were observed, but the study enriches it by highlighting the seasonality of tourism demand and unequal distribution of benefits as important considerations in cultural tourism contexts. The study therefore affirms that strengthening the contribution of Community-Based Tourism to livelihood improvement and poverty reduction in Mto wa Mbu demands a coordinated, multi-actor strategy involving government, tour operators, non-governmental organisations, local communities and researchers.

## 6. Recommendations

Based on the findings of this study, it is generally recommended that Community-Based Tourism in Mto wa Mbu Village should be strengthened through a coordinated and inclusive multi-stakeholder approach involving government authorities, local communities, tourism businesses, non-governmental organizations and financial institutions. Particular attention should be given to improving access to affordable finance, strengthening tourism infrastructure, expanding skills and entrepreneurship training, improving digital and market access, and ensuring fair participation and distribution of tourism opportunities among households. Since the study found that CBT contributes positively to household income, employment, skills development, community empowerment and household welfare, strengthening these enabling conditions would increase the capacity of local communities to participate effectively in tourism value chains and translate tourism growth into more sustainable livelihood outcomes and poverty reduction.

Furthermore, stakeholders should promote diversification of CBT products by strengthening cultural tourism, guiding, agro-tourism, handicrafts and accommodation services, while improving linkages between these activities. This would help reduce dependence on a limited number of tourism activities and reduce the vulnerability of households to seasonal fluctuations in tourist arrivals. Community members should also be encouraged to form and strengthen cooperative groups and savings schemes to improve bargaining power, access to finance and market opportunities. Overall, CBT planning and development in Mto wa Mbu should adopt a community-centred, inclusive and sustainable approach that ensures tourism benefits reach a wider proportion of households, including women, youth and communities located outside the main tourist circuit.

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# UNDERSTANDING CHATGPT USER EXPERIENCE: A NETNOGRAPHIC STUDY OF MULTIDIMENSIONAL CONSUMER FEEDBACK

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***Abstract***
*This research qualitatively examines ChatGPT user experiences using netnography and Reflexive Thematic Analysis. Data from 2,150 user reviews were analyzed with Niteni tools to identify key patterns and themes. User experience is shown as multidimensional, shaped by technical, functional, and economic factors. Four themes emerged: App Development Suggestions, App Performance Issues, Monetization Concerns, and User Experience Issues. Findings highlight the dual nature of experiences and an expectation gap affecting satisfaction and loyalty. The study presents a novel conceptual model capturing the dynamic interplay among these dimensions and explicitly frames artificial intelligence user experience as multidimensional, illustrated through user-generated feedback. Implications stress the need to develop stable, flexible, user-focused artificial intelligence services.*
***Keywords****: Netnography, Reflexive Thematic Analysis, ChatGPT, User Experience, AI Applications, Consumer Reviews.*

## 1. Introduction

The advancement of artificial intelligence (AI) technology, especially conversational agents like ChatGPT, has changed how consumers interact in digital spaces. User experience now plays a crucial role in technology adoption (Dwivedi et al., 2023; Natarajan & Periaiya, 2024). Consumer reviews and ratings shape perceptions and decisions about digital technology (Chevalier & Mayzlin, 2006; Filieri, 2016). The Technology Acceptance Model highlights the importance of perceived usefulness and ease of use for acceptance (Davis, 1989). Yet, much of the research focuses on isolated aspects of adoption and performance, thereby failing to fully capture the complex, evolving nature of user experience with interactive AI (Dwivedi et al., 2023; Kozinets, 2023).

In practice, the user experience of ChatGPT is influenced by its technical quality, feature completeness, and monetization policies, which collectively shape users' perceived value, in line with the broader conceptualization of value proposed by Zeithaml (1988). The progression of AI brings challenges to the credibility and trustworthiness of digital information and can increase user skepticism (Dwivedi et al., 2023; Filieri, 2016; Natarajan & Periaiya, 2024). Literature shows that credibility shapes attitudes and trust (Kim & Moon, 2025). Word-of-mouth and digital reviews influence perceived quality and usage (Chevalier & Mayzlin, 2006; Davey et al., 2025; Dellarocas, 2003). These factors create an expectation gap across the technical, psychological, and economic dimensions of the digital ecosystem.

We need to understand user experience by looking at technical, functional, and economic factors. This study uses netnography with Reflexive Thematic Analysis (RTA) to explore ChatGPT user experiences (Byrne, 2022; Kozinets, 2015). This approach captures e-WOM and digital interactions naturally (Costello et al., 2017; Heinonen & Medberg, 2018; Kozinets, 2002, 2023).
This study identifies four primary dimensions: App Development Suggestions, App Performance Issues, Monetization Concerns, and User Experience Issues, and develops a conceptual model elucidating the dynamic relationships among these dimensions. The novelty of this research lies in

integrating the three principal aspects of AI user experience, which have previously been examined separately, thereby yielding a more comprehensive multidimensional framework. Accordingly, this research not only extends the literature on AI user experience but also offers practical implications for developers in designing more adaptive, human-centered, and responsive services aligned with user needs (Byrne, 2022; Costello et al., 2017; Heinonen & Medberg, 2018; Kozinets, 2023). This study answers: (1) How do ChatGPT users describe their experiences in reviews? (2) What themes appear in their feedback? (3) How do these experiences show an expectation gap in AI services?

## 2. Literature Review

### *2.1 Consumer Evaluation of ChatGPT: Key Theoretical Constructs*

Research on ChatGPT, particularly through consumer ratings and reviews, highlights its relevance in understanding AI-based digital interactions, especially in relation to satisfaction, trust, perceived service quality, and user engagement, as grounded in prior consumer behavior literature (Anderson & Srinivasan, 2003; Oliver, 2010). User satisfaction is the emotional reaction to the user experience, shaped by speed, accuracy, and ease of interaction, and is a key factor in user loyalty (Anderson & Srinivasan, 2003; Oliver, 2010). User trust means confidence in the system's security, credibility, and reliability; transparency strengthens long-term relationships, even if users perceive it differently (Gefen, 2000; McKnight et al., 2002; Pavlou, 2003). Service quality is the system's ability to meet expectations through reliability, responsiveness, and accuracy, which directly shape user evaluation (Ladhari, 2009; Parasuraman et al., 1988; Zeithaml, 1988). User engagement encompasses emotional, mental, and behavioral participation in digital interactions, influenced by sharing motivation and platform features, and its role in the model remains debated (Brodie et al., 2011; Hollebeek, 2011; Zaichkowsky, 1985).

These four variables comprise user reviews and shape perceptions of trustworthiness, credibility, and skepticism toward AI services (Chevalier & Mayzlin, 2006; Dellarocas, 2003; Mudambi & Schuff, 2010). Studies show that consumer reviews affect trust and decisions to use services, mainly because two-sided messages boost information credibility (Chevalier & Mayzlin, 2006; Mudambi & Schuff, 2010). Yet, AI-based reviews like those from ChatGPT raise doubts about accuracy and limited references, as some studies report inconsistent information quality and a lack of citations (Bischof et al., 2025; Davey et al., 2025). Because of this, information credibility is crucial for adopting digital technology (Kim & Moon, 2025). Netnography allows researchers to naturally observe e-WOM dynamics in digital communities (Heinonen & Medberg, 2018; Kozinets, 2002, 2023). Therefore, this research calls for an evaluation framework that integrates satisfaction, trust, service quality, and user engagement to clearly understand the dynamics of AI-based reviews (Chevalier & Mayzlin, 2006; Heinonen & Medberg, 2018; Kim & Moon, 2025).

### *2.2 Existing Research on Consumer Reviews: From Human-Generated to AI-Generated Content*

Filieri (2016) shows that trust in online reviews depends on content quality, language, review valence, source credibility, and review patterns. Natarajan and Periaiya (2024) confirm that consistent, relevant, and factual reviews, as well as platform characteristics, affect writer credibility and shape consumer attitudes. Skepticism reduces review value. Other literature also says content and presentation on digital platforms affect review credibility (Chevalier & Mayzlin, 2006; Dellarocas, 2003; Mudambi & Schuff, 2010).

However, the majority of studies continue to focus on human-generated reviews, thereby insufficiently addressing how consumers evaluate AI-generated reviews, such as those from ChatGPT. Recent literature indicates that AI-based reviews have limitations, including potential inaccuracies, lack of references, and variability in output quality, which raise doubts about information credibility (Bischof et al., 2025; Koike et al., 2024). This situation underscores the need to understand the dynamics of trust, credibility, and skepticism in the context of AI.

In this regard, netnography emerges as a pertinent approach, as it can capture consumer interactions and perceptions in a naturalistic manner by analyzing electronic word-of-mouth (e-WOM) in digital environments (Costello et al., 2017; Heinonen & Medberg, 2018; Kozinets, 2002). Consequently, this study addresses the gap in the literature by examining consumer evaluation of AI-based reviews holistically, integrating perspectives from traditional review credibility and the challenges of AI technology reliability (Bischof et al., 2025; Mudambi & Schuff, 2010).

## 3. Research Methods

### *3.1 Explanation of netnography*

This study employs netnography, a qualitative method, to understand consumer perceptions and experiences in digital environments by analyzing user reviews. Netnography is a standardized approach that emphasizes the examination of consumer interactions and communications within online communities, particularly in the context of electronic word-of-mouth (e-WOM) (Heinonen & Medberg, 2018; Kozinets, 2002; Xun & Reynolds, 2010). It is pertinent for capturing contextual meanings, social dynamics, and authentic experiences that cannot be fully elucidated through surveys or experiments (Kozinets, 2023). Data were purposively collected from 2,150 user reviews of ChatGPT in the App Store during the period of July–December 2025, based on inclusion and exclusion criteria to ensure data quality. In this study, digital app reviews are considered a form of user-generated content that captures spontaneous user evaluations of technology-based services (Heinonen & Medberg, 2018; Xun & Reynolds, 2010). Data analysis was conducted using the RTA approach to identify patterns and develop reflective interpretations (Byrne, 2022), supported by Niteni: Qualitative Analysis Tools with AI to enhance the systematization, consistency, and efficiency of the coding and categorization process (Wahyudi, 2025). This approach is non-intrusive, allowing for natural data collection without researcher intervention (Kozinets, 2023). From an ethical perspective, this study considers the public-private boundaries of data and the protection of participants' identities through anonymity and the paraphrasing of quotations (Costello et al., 2017; Langer & Beckman, 2005). Overall, this method facilitates an in-depth exploration of the meanings, perceptions, and dynamics of consumer interactions with AI services within a complex digital ecosystem.

### 3.2 *Tables*

The data analysis technique employed in this research integrates a netnographic approach with a qualitative coding process grounded in thematic analysis and the Gioia method to comprehensively understand the dynamics of digital interaction (Byrne, 2022; Kozinets, 2002). The analysis commences with open coding to inductively identify first-order codes from the review data, then advances to axial coding to develop second-order themes, and ultimately yields aggregated dimensions as the primary conceptual constructs (Byrne, 2022). This process employs Niteni Tools to systematically enhance the efficiency, consistency, and traceability of qualitative analysis (Wahyudi, 2025). This approach is consistent with the principles of netnography, which emphasize meaning, social dynamics, and patterns of interaction within digital communities (Costello et al., 2017; Kozinets, 2002), as well as with the framework of thematic analysis focusing on the construction of themes from qualitative data (Byrne, 2022). The study ensures validity and reliability through double coding, consensus discussions, and literature triangulation as forms of methodological rigor in qualitative research (Byrne, 2022; Costello et al., 2017). Despite limitations such as representation bias and the absence of non-verbal data, this approach remains effective in capturing authentic meaning and providing contextual understanding of digital consumer behavior within an AI-based ecosystem (Byrne, 2022; Heinonen & Medberg, 2018; Kozinets, 2023).

## 4. Research Findings and Discussion

### 4.1 *Initial Coding*

Initial coding is the foundational phase of qualitative analysis, in which units of meaning are identified, and descriptive codes are inductively developed from user review data

(Byrne, 2022; Costello et al., 2017). The analysis reveals a duality in user experiences with ChatGPT, highlighting users' appreciation for the application's benefits in learning, task completion, and rapid information retrieval. These advantages are facilitated by interactive features and adaptive responses that enhance user engagement (Kim & Moon, 2025; Koike et al., 2024; Othman et al., 2025). These findings align with netnography and thematic analysis approaches, which emphasize understanding contextual meaning in digital interactions (Byrne, 2022; Heinonen & Medberg, 2018; Kozinets, 2002), and are further supported by the Technology Acceptance Model, which elucidates the role of perceived usefulness and ease of use in technology adoption (Davis, 1989; Kim & Moon, 2025). Additionally, the educational benefits of ChatGPT are consistent with findings that AI models can effectively and adaptively support the learning process (Koike et al., 2024; Othman et al., 2025).

However, users also expressed dissatisfaction with feature limitations, declining response quality, and technical obstacles such as errors, lag, and access restrictions, in both free and paid versions (Dass & Packham, 2023; Davey et al., 2025; Dogan et al., 2025). Criticisms regarding monetization policies and the perceived mismatch between service value further reinforce negative perceptions of application quality and affect users' overall evaluations (Dass & Packham, 2023; Davey et al., 2025). These findings suggest that user experience is influenced by the imbalance between feature innovation, system stability, and user expectations within an AI-based digital ecosystem (Heinonen & Medberg, 2018; Kozinets, 2023). Therefore, the management of AI services must integrate technical quality, service value, and responsiveness to user needs to enhance satisfaction and ensure sustainable use (Dellarocas, 2003; Heinonen & Medberg, 2018; Kim & Moon, 2025).

The word cloud visualization in Figure 1, supported by the initial coding frequencies in Table 1, indicates that users' evaluations of ChatGPT are predominantly positive, with frequent occurrences of terms such as "very helpful" (186), "very good" (141), "very useful" (59), "good app" (36), and "very satisfied" (32). This suggests that users generally perceive significant benefits from ChatGPT in supporting learning activities, information seeking, and productivity, reflecting high perceived usefulness and user satisfaction. Nevertheless, negative sentiments are also consistently present, as evidenced by the frequency of terms like "not good" (60), "not satisfied" (48), "not working" (31), "error prone" (19), "not accurate" (16), and "slow response" (11). These findings indicate issues with technical performance, response accuracy, and system stability. Furthermore, concerns related to feature limitations and monetization are evident through the appearance of terms such as "feature request" (15), "limited feature" (7), "limit issue" (9), and "too expensive" (9), reflecting users' need for feature development as well as objections to access restrictions and service fees.




**Figure 1. Word Cloud Visualization of Initial Coding from ChatGPT User Reviews (n = 2,150)**

The distribution of reviews indicates a dichotomy in user experiences, with appreciation for ChatGPT's utility coexisting with criticisms of its performance, feature limitations, and monetization strategies. This underscores a discrepancy between expected and actual performance (Davis, 1989; Kim & Moon, 2025). Online reviews serve both as indicators of trust and as a means to assess the quality of AI services (Costello et al., 2017; Dellarocas, 2003; Heinonen & Medberg, 2018), particularly in evaluating AI-generated content that exhibits both advantages and limitations (Lockie & Choi, 2024). Empirical evidence also highlights inconsistencies and limitations in AI accuracy, necessitating caution and efforts to enhance quality (Bischof et al., 2025; Zhang et al., 2024). Consequently, user feedback provides a strategic foundation for developing more responsive, reliable, and user-centric AI services (Davis, 1989; Dellarocas, 2003; Heinonen & Medberg, 2018).

### 4.2 *Second-Order Themes*

Second-order themes are interpretive conceptual categories that emerge from aggregating first-order codes or initial coding and connect empirical data with theoretical concepts in qualitative analysis (Byrne, 2022). Through the initial coding of ChatGPT user reviews, researchers discerned a structure of perceptions organized into themes, as depicted in Table 1. These themes include Need Improvement, Feature Request, Need Fix, Lack of Features, Positive Experience, Negative Experience, Performance Issues, and Premium Features, which collectively encapsulate the dynamics of user experiences (Costello et al., 2017; Heinonen & Medberg, 2018; Kozinets, 2002). The findings related to Positive Experience suggest that users perceive ChatGPT as an effective tool for learning, task completion, and information retrieval, facilitated by its interactivity and personalization, which enhance user engagement (Kim & Moon, 2025; Koike et al., 2024; Synekop et al., 2024).

Conversely, the prominence of the Need Improvement, Need Fix, and Performance Issues themes highlights technical challenges such as errors, lags, and inconsistent responses that diminish the quality of the user experience (Bischof et al., 2025; Davey et al., 2025; Othman et al., 2025). The Lack of Features and Feature Request themes reflect users' expectations for more adaptable feature development, while the Premium Features theme underscores the tension between service benefits and subscription costs (Pandey et al., 2024; Psilopatis et al., 2024; Zhang et al., 2024). Additionally, the Negative Experience theme underscores dissatisfaction stemming from system updates and service restrictions that affect perceptions of application quality (Davey et al., 2025). Overall, these findings indicate that ChatGPT users' experiences tend to be ambivalent, where the perceived benefits are not always matched by system stability and the fulfillment of expectations. This highlights the need for more responsive and user-oriented service development within the AI ecosystem, in line with prior research on user-generated feedback and digital service evaluation (Dellarocas, 2003; Heinonen & Medberg, 2018; Kozinets, 2023).

**Table 1. Hierarchical Structure of Themes from Initial Coding to Final Themes in Netnographic Analysis**

| Initial Themes | | | Second Themes | Final Themes |
|---|---|---|---|---|
| 1. Good But | 10. Good But Flaky | 19. Good But Not Perfect | Need Improvement | App Development Suggestions |
| 2. Good But Bug | 11. Good But Flawed | 20. Good But Old | | |
| 3. Good But Limited | 12. Good But Forgetful | 21. Good But Unclear | | |
| 4. Good But Paid | 13. Good But Greedy | 22. Good But Wrong | | |
| 5. Good But Slow | 14. Good But Improve | 23. Helpful But | | |
| 6. Good But Buggy | 15. Good But Issue | 24. Helpful But Err | | |
| 7. Good But Different | 16. Good But Lag | 25. Helpful But Limited | | |
| 8. Good But Error | 17. Good But More | 26. Helpful But Unclear | | |
| 9. Good But Expensive | 18. Good But Need More | 27. Helpful But Wrong | | |
| 1. Feature Request | 4. Add Memory | 6. Feature Issue | Feature Request | |
| 2. Add Feature | 5. Add Theme | 7. Feature Missing | | |
| 3. Add Chat Limit | | | | |
| 1. Need Fix | 3. Request Fix | 5. Fix Bug | Need Fix | |
| 2. Needs Fix | 4. Bug Fix | 6. Fix The Issue | | |
| 3. Request Fix | | | | |
| 1. Limited Feature | 3. Limited Func | 5. Missing Feature | Lack of Features | |
| 2. Limited Chat | 4. Limited Use | | | |
| 1. Disappointed | 13. Not Good | 25. Too Rigid | Negative Experience | User Experience Issues |
| 2. Disappointing | 14. Not Satisfied | 26. Too Buggy | | |
| 3. Very Bad | 15. Unsatisfied User | 27. Too Slow | | |
| 4. Very Disappointed | 16. Not Like | 28. Too Expensive | | |
| 5. Bad Experience | 17. Not Like Before | 29. Getting Worse | | |
| 6. Bad App | 18. Not Working | 30. Worse After Update | | |
| 7. Bad AI | 19. Not Useful | 31. Worse Now | | |
| 8. Worst Model | 20. Useless Feature | 32. Worse Response | | |
| 9. Worst Update | 21. Waste Of Time | 33. Worse Update | | |
| 10. Terrible App | 22. Too Limited | 34. Worse Version | | |
| 11. Frustrating | 23. Too Many Bug | | | |
| 12. Frustrating Experience | 24. Too Restricted | | | |
| 1. Good App | 12. Best AI | 22. Enjoyable App | Positive Experience | |
| 2. Good AI | 13. Best App | 23. Very Good App | | |
| 3. Good Feature | 14. Excellent App | 24. Very Fun | | |
| 4. Good Response | 15. Excellent AI | 25. Very Satisfied | | |
| 5. Helpful | 16. Great App | 26. Very Happy | | |
| 6. Like It | 17. Awesome App | 27. Grateful | | |
| 7. Love App | 18. Amazing App | 28. Grateful User | | |
| 8. Love It | 19. Cool App | 29. Thank You | | |
| 9. Very Good | 20. Fun App | 30. Thanks | | |
| 10. Very Helpful | 21. Fun Chat | 31. Appreciate | | |
| 11. Very Useful | | | | |
| 1. Slow Response | 14. Buggy | 27. Still Error | Performance Issues | App Performance Issues |
| 2. Slow Image | 15. Error Prone | 28. System Error | | |
| 3. Slow Process | 16. Error Message | 29. Connection Issue | | |
| 4. Slow App | 17. Error Occurred | 30. Login Issue | | |
| 5. Slow Processing | 18. Error Occurs | 31. Account Issue | | |
| 6. Slow Edit | 19. Error | 32. Account Problem | | |
| 7. Slow Load | 20. App Error | 33. Upload Issue | | |
| 8. Slow Loading | 21. Error After Update | 34. Image Issue | | |
| 9. Slow Login | 22. Error Always | 35. File Issue | | |
| 10. Slow Photo | 23. Error Login | 36. History Issue | | |
| 11. Slow Upload | 24. Many Errors | 37. Null Issue | | |
| 12. Laggy | 25. Some Errors | 38. Data Loss | | |
| 13. Buggy App | 26. Sometimes Error | | | |
| 1. Paid Feature | 3. Too Expensive | 5. High Premium | Premium Features | Monetization Concerns |
| 2. Premium Issue | 4. Expensive Upgrade | | | |

### 4.3 *Final Themes*

The final themes presented in Table 1 are derived from the integration of intermediate-level themes, forming a conceptual framework to elucidate the phenomenon in a more abstract and comprehensive manner within the context of thematic analysis (Byrne, 2022; Kozinets, 2002). The analysis identified four principal dimensions: App Development Suggestions, User Experience Issues, App Performance Issues, and Monetization Concerns, which together reflect ChatGPT users' perceptions and experiences, consistent with prior approaches to categorizing user-generated feedback and review data (Costello et al., 2017; Heinonen & Medberg, 2018; Xun & Reynolds, 2010). The App Development Suggestions theme reflects users' elevated expectations for feature innovation and system enhancement, aligning with the role of online feedback in driving product development (Chevalier & Mayzlin, 2006; Dellarocas, 2003; Kozinets, 2002).

The User Experience Issues theme captures ambivalent experiences in which the app's benefits coexist with criticisms of response quality and information accuracy (Dass & Packham, 2023; Davey et al., 2025; Othman et al., 2025). The App Performance Issues theme underscores technical limitations, such as lag, slow response times, and inconsistent system performance, that affect the app's reliability (Othman et al., 2025; Psilopatis et al., 2024; Zhang et al., 2024). Meanwhile, the Monetization Concerns theme indicates that perceptions of pricing and feature restrictions influence assessments of service value and decisions regarding usage (Chevalier & Mayzlin, 2006; Davis, 1989; Dellarocas, 2003). Overall, these findings affirm that the ChatGPT user experience is shaped by the interplay among feature quality, system performance, user

experience, and monetization policies, and are consistent with the Technology Acceptance Model framework in explaining the adoption of AI-based technology (Davis, 1989; Kim & Moon, 2025).

### 4.4 *Final Themes Refinement*

The Final Themes Refinement process, as delineated in Table 2, serves as an evaluative mechanism to generate themes that are coherent, representative, and capable of providing a comprehensive explanation of the phenomenon (Byrne, 2022; Kozinets, 2023). The refinement process identified four principal themes, each with structured indicators: App Development Suggestions, User Experience Issues, App Performance Issues, and Monetization Concerns. These themes are supported by a netnography approach and RTA to enhance the understanding of the digital user experience (Costello et al., 2017; Heinonen & Medberg, 2018). The theme of App Development Suggestions underscores the significance of feature innovation and system improvements in response to user feedback (Davis, 1989; Dellarocas, 2003; Xun & Reynolds, 2010). The App Performance Issues theme highlights performance limitations, such as lag and slow response times, which affect the quality of AI services (Bischof et al., 2025; Koike et al., 2024). The Monetization Concerns theme reflects the perceived value concerning premium costs and feature limitations that influence user adoption (Chevalier & Mayzlin, 2006; Davis, 1989). Meanwhile, the User Experience Issues theme describes the ambivalent experiences users encounter in digital interactions (Heinonen & Medberg, 2018; Kozinets, 2002). Overall, this process fortifies the connection between empirical data and thematic interpretation. The final themes derived from the thematic analysis are presented in full in the following table.

**Table 1. Final Themes Refinement: Meaning Focus and Indicators of User Perceptions toward ChatGPT**

| No. | Final Theme | Focus on Meaning | Indicators |
|---|---|---|---|
| 1 | App Development Suggestions | Improvement of application quality and features | Requests for new features, Bug and error fixes, AI performance enhancement |
| 2 | User Experience Issues | User experience with the application | Positive experiences, Negative experiences, User dissatisfaction |
| 3 | App Performance Issues | Application performance and usability | Usage limitations, Slow image generation process, App lagging |
| 4 | Monetization Concerns | Application monetization policy | Premium pricing, Limitations on free features, Premium promotion |

#### *4.4.1 App Development Suggestions*

The theme of App Development Suggestions reflects users' needs and expectations for improving the quality and functionality of the ChatGPT application, as identified through the subthemes of Feature Request, Lack of Features, Need Fix, and Need Improvement, following a thematic analysis approach (Braun & Clarke, 2006). The analysis indicates that users propose features such as keyword search, conversation management, and greater flexibility of use, reflecting their desire for easier access and improved control over the service (Heinonen & Medberg, 2018; Kozinets, 2023). The netnographic approach corroborates that user feedback in digital spaces mirrors a comprehensive service experience and serves as a foundation for innovative app development (Costello et al., 2017; Kozinets, 2023). However, the limited features and modifications following updates have led to negative perceptions of the service's completeness and inconsistent AI performance (Alam et al., 2025; Bischof et al., 2025; Othman et al., 2025). Furthermore, reports of bugs and technical

disruptions suggest that system stability is a crucial factor in shaping the user experience (Koike et al., 2024; Rumokoy & Frank, 2025). Nonetheless, users continue to recognize the app's benefits while advocating for enhanced performance and feature optimization to meet expectations (Psilopatis et al., 2024). Overall, responsive and continuous app development is essential for increasing user satisfaction and loyalty (Heinonen & Medberg, 2018; Kozinets, 2023).

#### *4.4.2 App Performance Issues*

The theme of App Performance Issues underscores the challenges related to the application's performance and usability, which continue to be hindered by technical impediments such as errors, bugs, lag, and slow response and upload times. These issues directly degrade the user experience (Rumokoy & Frank, 2025). The findings suggest that system instability and performance limitations are significant factors influencing user satisfaction and accessibility, as evidenced by complaints regarding slow response times and a buggy application (Shahzad et al., 2024). Theoretically, this situation is consistent with the Technology Acceptance Model, which highlights the importance of usability and ease of use in technology adoption (Davis, 1989; Kim & Moon, 2025), and is further supported by the significance of system design and information quality in enhancing user experience (Ghorbanzadeh & Sharbatiyan, 2024).

Furthermore, variations in AI response quality illustrate performance limitations, with the accuracy and completeness of output remaining inconsistent in certain usage contexts (Bischof et al., 2025; Othman et al., 2025). Reviews based on netnography and electronic word-of-mouth (e-WOM) also affirm that user experience in the digital realm significantly influences perceptions of service quality and satisfaction (Dellarocas, 2003; Heinonen & Medberg, 2018). Therefore, enhancing system stability and application responsiveness is crucial for maintaining service quality and sustaining user loyalty.

#### *4.4.3 Monetization Concerns*

The issue of Monetization Concerns pertains to users' perceptions of monetization strategies, particularly regarding premium fees, limitations on free features, and the promotion of paid services (Shahzad et al., 2024). Users often perceive the subscription costs as disproportionate to the benefits received, which restricts access to essential features and diminishes user satisfaction and engagement. Conceptually, the disparity between cost and service quality affects perceived value and the effectiveness of digital application use, potentially exacerbating negative perceptions if not accompanied by optimal performance (Rumokoy & Frank, 2025).

Furthermore, user reviews and electronic word of mouth (e-WOM) significantly influence price perceptions and service value within digital communities (Xun & Reynolds, 2010). The netnography approach underscores that users' experiences with monetization can be understood in context through online interactions (Dass & Packham, 2023; Greitemeyer & Kastenmüller, 2023). Consequently, equitable and adaptable monetization strategies should align with the principles of the Technology Acceptance Model, wherein usefulness and ease of use determine satisfaction and intention to use (Kozinets, 2023; Synekop et al., 2024).

#### *4.4.4 User Experience Issues*

The theme of User Experience Issues encapsulates the dualistic nature of ChatGPT users' experiences, characterized by both appreciation and dissatisfaction with the application (Alam et al., 2025). Users perceive ChatGPT as a tool that supports learning, enhances productivity, and facilitates information access, thereby contributing to increased cognitive and affective satisfaction (Dogan et al., 2025;

Lockie & Choi, 2024; Othman et al., 2025). These observations are consistent with the Technology Acceptance Model framework, which posits that perceived usefulness and ease of use are pivotal in shaping positive attitudes and intentions toward technology adoption (Dass & Packham, 2023; Kim & Moon, 2025).

Conversely, users also report dissatisfaction stemming from inconsistent response quality, limited features, suboptimal updates, and technical issues that detract from user comfort (Bischof et al., 2025; Koike et al., 2024; Shahzad et al., 2024). Cross-domain studies indicate that AI outputs continue to exhibit limitations in accuracy, context, and citation, necessitating human evaluation in complex scenarios (Dogan et al., 2025; Koike et al., 2024). This highlights an expectation gap between anticipated and actual performance, where system stability, consistency of quality, and information credibility are critical factors influencing user experience (Othman et al., 2025; Rumokoy & Frank, 2025).

### 4.5 *Final Themes Refinement Path*

The conceptual model in figure 2 illustrates that the user experience of ChatGPT evolves in a non-linear manner through the interplay of technical, functional, and economic dimensions, consistent with prior frameworks on user experience and multidimensional data structuring (Costello et al., 2017; Heinonen & Medberg, 2018). The functional dimension, particularly through App Development Suggestions, enhances the user experience when features effectively address user needs and improve usability, aligning with the principles of perceived usefulness and ease of use as outlined in the Technology Acceptance Model (Davis, 1989; Kim & Moon, 2025). In contrast, technical challenges in App Performance Issues, such as errors, lag, and system limitations, directly diminish the quality of interaction and user satisfaction (Koike et al., 2024; Rumokoy & Frank, 2025).

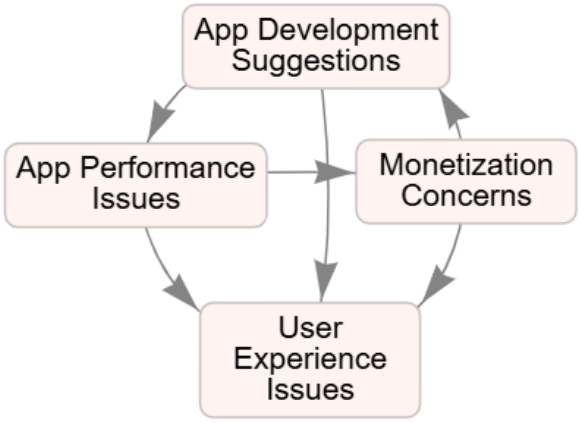



**Fig. 2. Conceptual Model of Relationships among Final Themes Influencing User Experience in ChatGPT**

In addition, the dimension of Monetization Concerns impacts the user experience through perceived value, particularly when the costs of services do not align with the benefits received (Alam et al., 2025; Zeithaml, 1988). The literature indicates that user reviews and word of mouth significantly influence perceived value and the decision to adopt technology (Chevalier & Mayzlin, 2006; Dellarocas, 2003). In this context, user feedback functions not only as an evaluative tool but also as a constructive mechanism for fostering feature innovation and service enhancement (Filieri, 2016; Xun & Reynolds, 2010). Interpretively, these findings confirm that user experience results from a dynamic equilibrium among these dimensions, necessitating a holistic, user-centered design approach in the development of AI services to integrate system quality, feature flexibility, and equitable monetization strategies (Delone & McLean, 2003; Shahzad et al., 2024).

### 4.6 *Interpretation of findings*

The findings of this study reveal that user reviews of ChatGPT exhibit a multidimensional thematic structure encompassing App Development Suggestions, App Performance Issues, Monetization Concerns, and User Experience Issues, thereby reflecting users' concurrent satisfaction and dissatisfaction (Byrne, 2022; Kozinets, 2023). These results suggest an expectation gap between ideal expectations and actual performance, shaped by the service's technical, functional, and economic dimensions (Dwivedi et al., 2023; Zeithaml, 1988). Theoretically, this research substantiates the notion that consumer reviews influence user perceptions and attitudes towards digital technology (Chevalier & Mayzlin, 2006; Filieri, 2016). Furthermore, this study contributes to the literature by framing the AI experience as a dynamic phenomenon that transcends traditional adoption models (Davis, 1989; Natarajan & Periaiya, 2024). In practice, this research underscores the significance of a user-driven development approach, leveraging digital feedback to enhance service quality (Heinonen & Medberg, 2018; Kozinets, 2002). Consequently, two-way interaction emerges as crucial for the development of adaptive and user-centered AI (Costello et al., 2017; Kim & Moon, 2025).

### 4.7 *Novel or unique contributions*

This study presents a novel examination of ChatGPT users' experience through a netnographic approach in conjunction with Reflexive Thematic Analysis. This methodology enables the capture of user experiences in a contextual, naturalistic, and reflective manner. In contrast to previous research, which often focuses on technology adoption or system performance in a fragmented manner, this study demonstrates that the AI user experience is multidimensional and influenced by the interplay among technical, functional, and economic factors. This substantive novelty is encapsulated in four primary themes: App Development Suggestions, App Performance Issues, Monetization Concerns, and User Experience Issues, which collectively illustrate the duality of user experiences, oscillating between satisfaction and dissatisfaction. The findings underscore that the disparity between technology performance, user expectations, and service value constitutes the principal source of the expectation gap. Methodologically, integrating netnography and RTA enhances the study of digital consumer behavior by facilitating a deeper understanding of the meanings underlying user reviews. In practice, this study underscores the significance of user-oriented AI development by advocating improvements in system stability, response quality, feature development, and monetization strategies.

### 4.8 *Equations*

This study contributes to the theoretical enrichment of the digital consumer behavior literature by illustrating that user experience with ChatGPT is influenced not only by usability and system performance but also by the dynamic interplay of technical, functional, and economic dimensions. Employing a netnographic approach and Reflexive Thematic Analysis, this research posits that consumer reviews function not merely as functional evaluations but also as a medium for shaping perceptions, trust, skepticism, and user loyalty (Filieri, 2016; Natarajan & Periaiya, 2024). The findings suggest that AI user experience is multidimensional, encompassing issues such as response quality, system performance, feature development, monetization, and overall usage experience, and is influenced by the expectation gap between user aspirations and the service's actual performance. Methodologically, integrating netnography and RTA offers significant contributions by providing a more contextual, reflective, and authentic understanding of the dynamics of digital interaction. Consequently, this study expands the conceptual framework of AI and consumer behavior research by positioning user experience as a complex and dynamic construct within the digital ecosystem.

## 5. Conclusion

### 5.1 *Conclusion*

This study concludes that ChatGPT's user experience is intricate and multifaceted, influenced by technical, functional, and economic dimensions, and manifested in themes such as App Development Suggestions, App Performance Issues, Monetization Concerns, and User

Experience Issues. Users acknowledge ChatGPT's utility, speed, and its role in facilitating daily activities; however, they also express dissatisfaction with technical difficulties, declining response quality, limited features, and monetization policies perceived as not yet commensurate with the value of the service provided. These findings suggest an expectation gap between users' expectations and the application's actual performance, which affects user perception, satisfaction, and loyalty. Consequently, future development of ChatGPT should prioritize enhancing system stability, improving AI response quality, adding more flexible features, and devising monetization strategies that better respond to user needs. Overall, this study underscores that the success of AI technology is significantly determined by its capacity to continuously adapt to user experience and feedback within a dynamic digital ecosystem.

### 5.2 *Recommendation*

Based on empirical findings, several strategic recommendations can be advanced to enhance the quality of ChatGPT services. Firstly, developers should prioritize system stability by addressing bugs, minimizing errors, and optimizing application performance to mitigate users' primary concerns regarding technical issues. Secondly, the quality of AI responses must be enhanced by ensuring accuracy, relevance, and the ability to deliver more natural, contextually appropriate answers. Thirdly, the development of more adaptable features, such as history search, message editing, and service personalization, should be considered to augment the user experience. Fourthly, monetization strategies should be recalibrated to be more adaptive and commensurate with users' perceived value, including more affordable pricing and fewer feature restrictions in the free version. Fifthly, improving usability and ease of navigation is essential to creating a more intuitive experience. Lastly, transparent and responsive communication regarding digital user feedback is vital to building trust, reducing resistance to change, and minimizing the expectation gap. Overall, a user-centered approach grounded in user feedback is crucial for enhancing user satisfaction and loyalty.

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In accordance with AI policy, the authors used ChatGPT and Grammarly Pro only to improve grammar and clarity. No AI tools contributed to scientific content, data analysis, or interpretation.

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# AI ADOPTION, TECHNOSTRESS, AND SUSTAINABLE CONSUMPTION BEHAVIOR AMONG GENERATION Z: A SYSTEMATIC LITERATURE REVIEW AND INDICATOR DEVELOPMENT

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***Abstract***
*Artificial Intelligence (AI) has been found to have a negative impact through technostress. Beyond technostress, AI can trigger continuous consumerist behavior, driven by algorithms that identify potential consumers' needs. However, the relationship between technostress and consumerist behavior, particularly among Generation Z, remains underexplored. Therefore, this study seeks to establish a framework grounded in three theoretical constructs: AI adoption derived from TAM or UTAUT, consumption behavior, and technostress. The aim is to develop a measurement instrument for a quantitative study. The literature review underpinning this study comprises 39 articles indexed in Scopus and Web of Science, identified using the search terms "AI adoption," "technostress," "sustainable consumption," and "Generation Z." The review identified 37 indicators, distributed as follows: 15 for AI adoption, 15 for technostress, and 7 for sustainable consumption behavior. These indicators serve as a robust foundation for developing a survey to gather primary data. Future empirical research will require a validation process, with Indonesian Generation Z serving as the study subjects.*
***Keywords****: AI adoption; technostress; sustainable consumption behavior; Generation Z; indicator development*

## 1. Introduction

The development of artificial intelligence (AI) has significantly transformed how consumers make decisions, how supply chains operate, and the overall landscape of digital commerce. AI has now become an integral part of everyday digital consumer experiences, as seen in features such as personalized recommendations, chatbots, predictive analytics, and smart home devices. This shift is particularly evident among Generation Z (born between 1997 and 2012), who, having grown up in a digital environment, are the most active users of AI platforms (Priporas et al., 2017) (Twenge & Campbell, 2019). However, alongside the proven utility of AI tools, a growing body of literature documents the psychological costs associated with intensive technology use—a phenomenon conceptualized as technostress. Defined as a modern adaptation disorder caused by an inability to cope with new computer technologies in a healthy manner, technostress has been operationalized into five distinct dimensions (Tarafdar et al., 2015).

The emergence of technological complexity, technological burden, technological intrusion, technological insecurity, and technological uncertainty. Existing research on technology-related stress is limited to organizational and workplace contexts (Ayyagari et al., 2011). This situation clearly indicates a relationship between technology-related stress and consumer behavior—particularly sustainable consumption—whether users are aware of it or not. Consumer behavior is already influenced by AI algorithms, whether through e-commerce shopping or social media. The influence of AI also impacts people's choices when selecting more energy-efficient electronic products equipped with smart sensors. These sustainable consumption choices also encompass environmentally and socially conscious consumption decisions (Moser, 2015), (Jaiswal & Kant, 2018).

The positive contribution of artificial intelligence—whether it facilitates or potentially undermines sustainable consumption patterns—makes theoretical sense but remains underdeveloped empirically. Artificial intelligence algorithms provide personalized sustainability information and reduce cognitive barriers to eco-friendly purchases; however, these systems can

also encourage excessive consumption through algorithmic persuasion and frictionless purchasing mechanisms (Jiménez-Barreto et al., 2022). This systematic literature review examines the relationships among these three research areas by synthesizing existing theoretical and empirical knowledge across the adoption of AI, technology stress, and sustainable consumption behavior. Specifically, this review aims to: (1) map the theoretical foundations underlying each construct; (2) identify and catalog validated measurement indicators from the peer-reviewed literature; (3) identify priority directions for future empirical research in the context of Generation Z.

## 2. Review Methodology

The integrative narrative synthesis approach is consistent with the established protocol for theory-building literature reviews in information systems and consumer behavior research (Dwivedi et al., 2019). This review protocol comprises three stages: literature search and screening, quality assessment, and thematic synthesis.

### *2.1 Search Strategy*

A systematic database search was conducted in Scopus, Web of Science (WoS), and Google Scholar using a Boolean combination of the following search terms: ("AI adoption" OR "artificial intelligence adoption" OR "technology acceptance") AND ('technostress' OR "technology stress" OR "techno-overload") AND ("sustainable consumption" OR "green purchasing" OR "eco-friendly behavior") AND ("Generation Z" OR "digital natives" OR "millennials"). A secondary search targeted each specific construct individually to ensure comprehensive coverage of the underlying theories.

### *2.2 Inclusion and Exclusion Criteria*

Articles are included if: (1) they were published in a peer-reviewed journal indexed in Scopus Q1/Q2 or Web of Science, (2) they were published between 2000 and 2024, (3) it addresses at least one of the three core constructs, and (4) it provides operationalized measurement items, validated scales, or theoretical propositions relevant to the development of indicators. Articles are excluded if they are conference proceedings, book chapters, dissertations, or gray literature, or if they do not present empirical findings or a validated theoretical framework.

### *2.3 Analysis Approach*

Thematic analysis was used to identify indicator items, theoretical relationships, and methodological insights from sources that met the criteria. An inductive coding framework was developed based on the literature and used to extract: (a) construct definitions, (b) validated measurement items, (c) antecedent and outcome variables, and (d) moderating and mediating mechanisms. The synthesized findings were organized based on three main theoretical pillars: TAM/UTAUT, the Technostress Framework, and the theory of Sustainable Consumer Behavior.

## 3. Theoretical Foundation

### *3.1 Technology Acceptance Model and UTAUT: AI Adoption Construct*

The Technology Acceptance Model (TAM), introduced by Davis (Davis, 1989), identifies perceived usefulness (PU) and perceived ease of use (PEOU) as fundamental determinants of technology adoption intentions and behavior. This two-factor model has demonstrated robust predictive validity across cultures and technologies over more than three decades of empirical research (Marangunić & Granić, 2015). In the context of AI-based consumer technologies, Perceived Usefulness (PU) relates to the extent to which AI recommendations, automated decisions, and intelligent personalization are perceived to enhance efficiency and the quality of consumption, while Perceived Ease of Use (PEOU) reflects the smoothness and intuitive nature of AI-mediated interfaces. The Unified Theory of Acceptance and Use of Technology (UTAUT), introduced by Venkatesh (Venkatesh et al., 2003), unifies eight competing theories of technology acceptance into four key determinants: performance expectations, effort expectations, social influence, and supporting conditions. A consumer-oriented extension of

UTAUT, namely UTAUT (Venkatesh et al., 2012) adds hedonic motivation, perceived value, and habit as additional constructs that are highly relevant to technology use outside of organizational contexts.

A meta-analysis review by Tamilmani et al. (2021) positions UTAUT as a comprehensive technology adoption framework for consumers, synthesizing 60 UTAUT2-based studies. UTAUT is capable of explaining 52–74% of the variance in consumer behavioral intentions across various technological contexts (Benbya et al., 2021). The characteristics of AI usage which are agency-based, anthropomorphic, and probabilistic—require an expansion of the traditional TAM and UTAUT constructs by adding variables such as trust in AI, perceptions of AI intelligence, and algorithmic transparency. Longoni et al. (2019) demonstrated that resistance to AI rooted in the disregard for uniqueness—specifically, the perception that AI cannot accommodate individual heterogeneity—is a significant barrier to adoption and must be accounted for in measurement instruments (Longoni et al., 2019). A multidisciplinary synthesis that emphasizes that the adoption of AI is best understood as a multidimensional process encompassing cognitive, affective, and behavioral components (Dwivedi et al., 2021). Generation Z is the target user group for AI, characterized by "digital nativity"—an intuitive familiarity with digital devices (Lu et al., 2005). Their comfort interacting with this technology accelerates the adoption of AI, but simultaneously raises expectations for AI systems, making assessments of Perceived Ease of Use particularly crucial for this demographic group.

### *3.2* Technostress Framework Five Dimension Model

Technostress was first theorized as an adaptation disorder arising from an individual's inability to cope with computing and digital technologies. This inability to operate these technologies leads to psychological tension or stress (Brand, n.d.) (Ragu-Nathan et al., 2008) (Tarafdar et al., 2015).The operationalization of technostress that is predominant in recent research provides the measurement framework adopted in this review. Techno-overload refers to a condition in which technology forces users to work faster, process more information, and bear a higher cognitive load than they can sustain over time (Tarafdar et al., 2007). The techno-overload experienced by consumers of digital products has its own impact or burden—namely, the risk of decision-making fatigue and information overload—which arises from a ceaseless stream of notifications, recommendations, and alerts generated by AI (Ayyagari et al., 2011). Technoinvasion describes the intrusion of technology into personal time and space, creating a norm of constant availability that blurs the boundaries between work life and consumer life. Technoinvasion has negative impacts because it intrudes too deeply into personal and confidential information that can be accessed by subjective AI across these five dimensions (Throuvala et al., 2019)Technocomplexity encompasses the cognitive load arising from the perceived difficulty in learning, using, and troubleshooting technological systems (Shu et al., 2011).

In AI-mediated systems, complexity is exacerbated by the opaque nature of algorithmic processes; users often do not understand the reasoning behind specific recommendations, thereby increasing the perception of complexity beyond mere interface aspects. Techno-insecurity manifests as anxiety regarding the potential loss of jobs, the obsolescence of skills, and a loss of competitiveness in a technology-intensive environment (Tarafdar et al., 2015). Although traditionally studied in the context of employment, techno-insecurity is now increasingly relevant to consumers as AI automates consultative, creative, and analytical functions—tasks that previously required human expertise. Finally, techno-uncertainty encompasses the disorientation and anxiety triggered by rapid technological change, which causes established competencies to become obsolete quickly (Salanova et al., 2013).

Resource Conservation Theory provides a theoretical framework for understanding how technostress negatively impacts sustained behavior. This theory posits that individuals are motivated to acquire, maintain, and protect valuable resources, including cognitive capacity, emotional energy, time, and identity. Technostress depletes these resources through continuous

demands and uncertainty, thereby triggering resource-conservation behaviors that may involve disengaging cognitively from complex, multi-criteria decision-making tasks, such as evaluating sustainable consumption.

### *3.3 Sustainable Consumption Behavior: Theory and Measurement*

Sustainable consumption behavior is defined as a pattern of consumption activities that meets current needs without compromising the ability of future generations to meet their own needs. In the literature on consumer behavior, SCB has been operationalized into four main dimensions of environmentally friendly purchasing behavior: choosing environmentally certified or low-impact products; ethical consumption, which involves preferring socially responsible brands and fair-trade products; participation in the sharing economy by using the "product-as-a-service" model to reduce resource consumption; and waste minimization through reduction, reuse, and recycling of consumption outputs (Bocken et al., 2014) (Maniatis, 2016). The Theory of Planned Behavior is the most frequently applied framework for predicting eco-friendly purchasing intentions; meta-analysis evidence confirms that attitudes toward sustainable consumption, subjective norms related to sustainability, and perceived behavioral control collectively explain between 40% and 68% of the variance in eco-friendly purchasing intentions (Ajzen, 1991) (Follows & Jobber, 2000).

The Theory of Planned Behavior incorporates environmental concern and knowledge as antecedents of attitude and demonstrates the mediating role of lifestyle orientation between knowledge and purchasing behavior (Moser, 2015). In digital and AI-mediated contexts, sustainable consumption behavior (SCB) has additional determining factors. Previous research has found that AI-based digital platforms create an information framework that reduces the search costs for sustainable alternatives, thereby increasing the likelihood of purchasing eco-friendly products (Wongloet et al., 2023). They identified culture, social identity, and gender as moderators of the relationship between attitudes and behavior in eco-friendly purchasing; these findings are highly relevant to the identity formation of sustainability-conscious Generation Z. The impact of AI personalization on sustainable consumption, which noted a 34% increase in the selection of sustainable products when AI recommendations align with environmental values—a finding that serves as a theoretical foundation for examining AI adoption as a predictor of SCB (Jiménez-Barreto et al., 2022).

## 4. Indicator Development and Measurement Framework

### *4.1 AI Adoption Indicators*

The following AI adoption indicators are synthesized from Dwivedi and Venkatesh and adapted for the context of consumer AI (e-commerce personalization, virtual assistants, and recommendation systems) (Dwivedi et al., 2019) (Venkatesh et al., 2012). A specific dimension regarding the application of AI for sustainability was added to capture consumers' understanding and use of AI tools in actual resource-saving behaviors—including energy monitoring, water conservation, and carbon footprint tracking—a dimension that was underrepresented in previous TAM/UTAUT instruments but is increasingly relevant in AI-based smart home applications and eco-friendly behaviors. The statement items were formulated using a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

**Table 1. Dimension codes and AI Adoption Indicators based on the source document**

| Code | Dimension | Indicator Item | Source |
|---|---|---|---|
| AI1 | Perceived Usefulness | Using AI-based applications helps me find sustainable products more efficiently. | (Davis, 1989)(Jiménez-Barreto et al., 2022) |
| AI2 | Perceived Usefulness | AI recommendations improve the quality of my purchasing decisions. | (Davis, 1989) (Garrett et al., 2023) |
| AI3 | Perceived Usefulness | AI tools save me time when searching for environmentally friendly products. | (Venkatesh et al., 2003) |
| AI4 | Perceived Ease of Use | Interacting with AI-powered platforms is simple and intuitive for me. | (Davis, 1989) (Marangunić & Granić, 2015) |
| AI5 | Perceived Ease of Use | I can quickly learn how to use new AI features without external assistance. | (Wang & Chuang, 2024) |
| AI6 | Behavioral Intention | I intend to continue using AI-based services in my future consumption activities. | (Venkatesh et al., 2012) |
| AI7 | Behavioral Intention | I plan to increase my use of AI tools for making purchasing decisions. | (Benbya et al., 2021) |
| AI8 | Actual Use | I regularly use AI recommendation systems when shopping online. | (Pillai et al., 2020) |
| AI9 | Actual Use | AI assistants are part of my daily digital consumption routine. | (Randers et al., 2021) |
| AI10 | Trust in AI | I trust the recommendations provided by AI systems I use. | (Longoni et al., 2019) |
| AI11 | Trust in AI | AI systems I interact with make transparent and explainable suggestions. | (Puntoni et al., 2021) |
| AI12 | Hedonic Motivation | Using AI-powered apps is enjoyable and engaging for me. | (Baptista & Oliveira, 2015) (Venkatesh et al., 2012) |
| AI13 | AI for Energy & Water Saving | I use AI-powered smart home or energy management applications to monitor and reduce my electricity and water consumption. | (Salvi et al., 2023) |
| AI14 | AI for Carbon Footprint Awareness | AI tools help me calculate and understand the carbon footprint of my daily consumption choices (e.g., food, transportation, fashion). | (Dwivedi et al., 2019)(Wongloet et al., 2023) |
| AI15 | AI for Sustainable Resource Management | AI-based applications I use provide actionable suggestions to help me reduce waste, save water, and optimize resource use in my daily life. | (Yuan et al., 2021) (Joiner et al., 2023) |

### *4.2 Technostress Indicators*

The technostress indicators were adapted from the Technostress Creator Scale (TCS) developed by Tarafdar (Tarafdar et al., 2015) and subsequently validated in subsequent studies (Ragu-

Nathan et al., 2008). To ensure relevance to the context of this study, all items were modified from their original work-related context to reflect consumers' interactions with artificial intelligence technology in daily life. Specifically, references to workplace technology, work-related tasks, and the organizational environment were reworded to capture AI-related experiences in the context of personal consumption and everyday use, while retaining the conceptual meaning of the original construct.

**Table 2. Dimension codes and Technostress Indicators based on source documents**

| Code | Dimension | Indicator Item | Source |
|---|---|---|---|
| TS1 | Techno-overload | I feel overwhelmed by the amount of information generated by AI systems I use. | (Brand, n.d.) (Ayyagari et al., 2011) |
| TS2 | Techno-overload | AI-driven notifications and updates make me feel pressured to act immediately. | (Ragu-Nathan et al., 2008) |
| TS3 | Techno-overload | Using multiple AI platforms simultaneously increases my mental workload. | (Shu et al., 2011) |
| TS4 | Techno-invasion | AI applications make me feel that I must remain available and responsive at all times. | (Tarafdar et al., 2007) |
| TS5 | Techno-invasion | Technology disrupts my personal time and space more than I would like. | (Throuvala et al., 2019) |
| TS6 | Techno-invasion | AI-enabled connectivity invades my sense of privacy and personal boundaries. | (Ragu-Nathan et al., 2008) |
| TS7 | Techno-complexity | I find AI-powered platforms difficult to understand and use effectively. | (Fuglseth & Sørebø, 2014) |
| TS8 | Techno-complexity | Frequent updates and changes to AI features make me anxious about keeping up. | (Salanova et al., 2013) |
| TS9 | Techno-complexity | I spend too much time trying to figure out how AI systems work. | (Shu et al., 2011) |
| TS10 | Techno-insecurity | I worry that AI will make my existing skills and knowledge obsolete. | (Tarafdar et al., 2015) |
| TS11 | Techno-insecurity | I feel threatened by people who know more about AI than I do. | (Ragu-Nathan et al., 2008) |
| TS12 | Techno-insecurity | I am afraid that my inability to keep up with AI developments will put me at a disadvantage. | (Brand, n.d.) |
| TS13 | Techno-uncertainty | The rapidly changing nature of AI technology makes me uncertain about the future. | (Tarafdar et al., 2007) |
| TS14 | Techno-uncertainty | I am unsure how to adapt when AI platforms change their algorithms or interface. | (Ayyagari et al., 2011) |
| TS15 | Techno-uncertainty | The unpredictability of AI-driven recommendations causes me stress. | (Throuvala et al., 2019) |

### *4.3 Sustainable Consumption Behavior Indicators*

The Sustainable Consumption Behavior (SCB) indicator was synthesized from well-established scales in the sustainable consumption literature and subsequently adapted for this study. This adaptation process involved revising the wording of the indicator items to reflect

consumption decisions influenced by digital technologies and AI-based services, which have become an integral part of Generation Z consumers' daily lives. Throughout this process, special attention was given to preserving the conceptual meaning of the original measurement instrument while enhancing its relevance to the new, technology-driven consumption context.

**Table 3. Dimension codes and indicators for Sustainable Consumption Behavior based on document sources**

| Code | Dimension | Indicator Item | Source |
|---|---|---|---|
| SCB1 | Green Purchasing | I actively use AI recommendations to identify and purchase eco-friendly products. | (Jaiswal & Kant, 2018) |
| SCB2 | Green Purchasing | I prefer to buy products recommended by AI that have low environmental impact. | (Moser, 2015)(Follows & Jobber, 2000) |
| SCB4 | Ethical Consumption | I choose products suggested by AI that align with fair-trade and ethical standards. | (Sreen et al., 2018) |
| SCB5 | Sharing Economy | I participate in sharing economy platforms (e.g., rental, resale) facilitated by AI matching systems. | (Bocken et al., 2014) |
| SCB6 | Waste Minimization | I use AI-based apps to track and reduce waste from my consumption activities. | (Maniatis, 2016) |
| SCB7 | Waste Minimization | AI recommendations have helped me shift toward a more minimalist consumption lifestyle. | (Nguyen et al., 2025) |

### *4.4 Summary of Indicator Framework*

Table 4 presents a comprehensive summary of the measurement framework used in this study. Specifically, the table outlines the constructs under investigation, the number of indicators used to operationalize each construct, the underlying theoretical basis, and the recommended Likert scale. This table also illustrates how established measurement scales have been adapted to the context of AI-mediated consumption and sustainable behavior among Generation Z, while maintaining conceptual consistency with the prior literature.

**Table 4. Summary of Dimensions and Indicators for AI Adoption, Technostress, and Sustainable Consumption Behavior**

| Construct | Dimensions | # Indicators | Theoretical Basis | Scale |
|---|---|---|---|---|
| AI Adoption | Perceived Usefulness, Ease of Use, Behavioral Intention, Actual Use, Trust, Hedonic Motivation, AI for Sustainability Implementation | 15 (AI1–AI15) | TAM<br>UTAUT | 5-point Likert |
| Technostress | Techno-overload, Techno-invasion, Techno-complexity, Techno-insecurity, Techno-uncertainty | 15 (TS1–TS15) | Technostress Framework<br>COR Theory | 5-point Likert |
| Sustainable Consumption Behavior | Green Purchasing, Ethical Consumption, Sharing Economy, Waste Minimization | 7 (SCB1–SCB7) | TPB | 5-point Likert |
| Total | 12 sub-dimensions | 37 indicators | 5 core theoretical frameworks | 5-point Likert |

### *4.5 Conceptual Model and Hypothesized Relationships*

Building on the three theoretical pillars synthesized above, Figure 1 integrates AI Adoption, Technostress, and Sustainable Consumption Behavior (SCB) into a single conceptual model, bounded by Indonesian Generation Z as the target population. The model formalizes the dual pathway implied throughout this review: AI adoption is expected to increase technostress through the mechanisms described in Section 3.2 (P1), while technostress, through the resource-depletion logic of Conservation of Resources (COR) Theory, is expected to reduce engagement in the deliberative, multi-criteria evaluation that sustainable consumption requires (P2). At the same time, AI adoption is expected to exert a direct, positive effect on SCB through mechanisms such as AI-curated sustainability information and reduced search costs for eco-friendly alternatives, net of its indirect effect through technostress (P3). Together, P1–P3 specify a mediation structure in which technostress partially transmits the effect of AI adoption on SCB, providing explicit, testable propositions for the subsequent quantitative validation phase of this research.

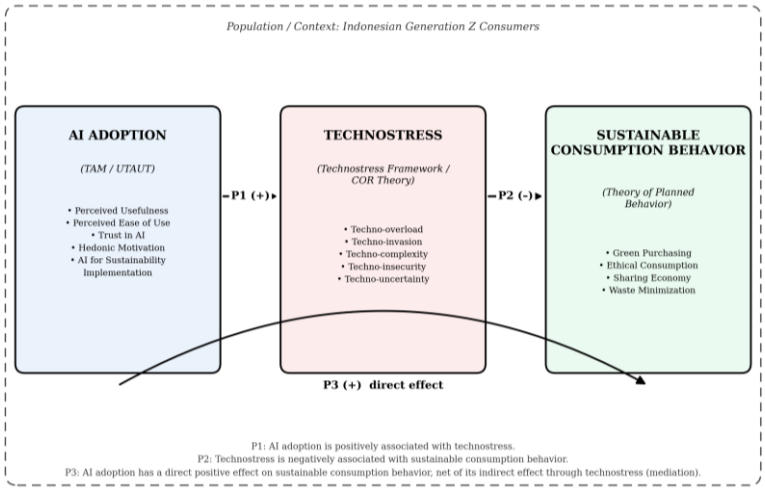



**Figure 1. Conceptual model of AI adoption, technostress, and sustainable consumption behavior among Indonesian Generation Z consumers, with hypothesized propositions P1–P3.**

## 5. Conclusion

This systematic literature review has synthesized research spanning the fields of technology acceptance, technostress, and sustainable consumption behavior to develop a measurement framework with a strong theoretical and empirical foundation, consisting of 37 validated indicators across three main constructs. This integrated model based on TAM/UTAUT, the Technostress Framework, Resource Conservation Theory, and Theory of Planned Behavior provides a solid conceptual and instrumental foundation for future quantitative research on how AI adoption and technostress jointly shape sustainable consumption behavior among Generation Z.

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# THE COST OF INDONESIA'S NICKEL BOOM: ENVIRONMENTAL JUSTICE, SACRIFICE ZONES, AND SLOW VIOLENCE IN KABAENA AND HALMAHERA

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***Abstract***
*This paper investigates how nickel mining has affected local communities in Kabaena Island, Southeast Sulawesi, and Halmahera Island, North Maluku. Drawing on a qualitative comparative case study based on secondary evidence from peer-reviewed literature and investigative journalism, the study analyzes the cases through the integrated lenses of Environmental Justice, Sacrifice Zones, and Slow Violence. The findings indicate that the benefits and burdens of Indonesia's nickel boom are distributed unevenly. Local communities experience declining livelihoods, environmental degradation, adverse health outcomes, and limited participation in decision-making, while the economic gains accrue primarily to industrial actors and the state. Kabaena and Halmahera both exhibit similar patterns of environmental degradation, livelihood disruption, governance exclusion, and cumulative health risks, reflecting structural environmental injustice characterized by spatial concentration of environmental risks, procedural exclusion, and cumulative socio-ecological harm. Rather than treating environmental degradation as an inevitable consequence of economic development, the study demonstrates how governance failures and unequal power relations contribute to the creation of localized sacrifice zones within the global green transition. The paper contributes to the literature on environmental justice and sustainable resource governance by proposing an integrated conceptual framework linking environmental justice, sacrifice zones, and slow violence in the context of critical mineral extraction.*
***Keywords:*** *Environmental Justice, Indonesia, Nickel Boom, Sacrifice Zones, Slow Violence.*

## Introduction

The global transition toward low-carbon energy systems has significantly increased demand for critical minerals, particularly nickel, which is an essential component of lithium-ion batteries used in electric vehicles and renewable energy storage systems (Stewart, 2025). As the world's largest holder of nickel reserves, accounting for approximately 42% of global reserves, Indonesia has positioned itself as a strategic supplier in the emerging green economy (Stewart, 2025; Sunuhadi et al., 2024). Since the Indonesian government prohibited the export of raw nickel ore in 2020, downstream industrialisation has accelerated rapidly, contributing substantially to national economic growth and attracting large-scale foreign investment, particularly from China (Sasongko, 2024). Nickel has consequently become a cornerstone of Indonesia's industrial development strategy and its ambition to become a global hub for electric vehicle battery production.

Despite these macroeconomic achievements, concerns have emerged regarding the uneven distribution of the costs and benefits of Indonesia's nickel boom. While the expansion of nickel extraction has generated employment, exports, and government revenue, numerous studies have documented serious environmental degradation, declining livelihoods, health risks, and social conflicts in mining regions (Astuti et al., 2025; Fünfgeld & Kammler, 2025). These impacts are particularly evident in Kabaena Island, Southeast Sulawesi, and Halmahera Island, North Maluku, where rapid mining expansion has transformed landscapes and disrupted the lives of Indigenous and local communities. Reports describe deteriorating water quality, marine ecosystem degradation, respiratory illnesses, reduced agricultural and fisheries income, and increasing restrictions on community participation in decisions affecting their environment (Gokkon, 2025; Jacobson, 2025; Jong, 2025).

These developments reveal an important paradox. The global energy transition is widely promoted as a pathway toward environmental sustainability, yet the extraction of minerals required to support this transition may generate significant environmental and social burdens for communities

located at the beginning of global supply chains. This paradox has attracted increasing scholarly attention under the concepts of just transition and environmental justice, which argue that the benefits and burdens of environmental policies should be distributed fairly and that affected communities should meaningfully participate in decision-making (Mohai et al., 2009; Owen & Kemp, 2014). However, existing studies on Indonesia's nickel sector have primarily focused on environmental impacts, industrial policy, or economic development (Astuti et al., 2025; Lahadalia et al., 2024; Sunuhadi et al., 2024), while comparatively little attention has been devoted to understanding how environmental injustice is produced through the interaction of unequal power relations, governance failures, and the gradual accumulation of environmental harm.

To address this gap, this paper integrates three complementary theoretical perspectives: Environmental Justice, Sacrifice Zones, and Slow Violence. Environmental Justice explains how environmental risks and benefits are distributed unequally among different social groups (Mohai et al., 2009). The concept of Sacrifice Zones highlights the spatial concentration of environmental degradation in places whose residents possess limited political and economic power (Juskus, 2023). Meanwhile, Nixon's (2011) concept of Slow Violence emphasises the cumulative and often invisible nature of environmental harm that unfolds gradually over time. Taken together, these perspectives provide a comprehensive framework for understanding not only where environmental burdens are concentrated, but also why they persist and how they progressively undermine community well-being.

This study investigates the cases of Kabaena and Halmahera to examine how Indonesia's nickel expansion has affected Indigenous and local communities. Specifically, it asks: (1) How has nickel mining transformed the environmental and socio-economic conditions of local communities in Kabaena and Halmahera? (2) To what extent can these mining regions be understood as environmental sacrifice zones? (3) How do environmental injustice and slow violence help explain the unequal distribution of the costs and benefits of Indonesia's nickel-driven development?

Using a qualitative comparative case study based on secondary evidence from peer-reviewed publications, government reports, NGO reports, and investigative journalism, this paper argues that the environmental and social consequences experienced by communities in Kabaena and Halmahera are not merely unintended externalities of industrial development. Rather, they reflect broader patterns of environmental injustice characterised by procedural exclusion, unequal exposure to environmental risks, and the gradual erosion of livelihoods and ecological systems. By integrating Environmental Justice, Sacrifice Zones, and Slow Violence into a single analytical framework, this study contributes to emerging debates on sustainable resource governance and the governance challenges associated with critical mineral extraction in the Global South.

The remainder of the paper is organised as follows. The next section reviews the literature and develops the conceptual framework. This is followed by the research methodology, the comparative analysis of the two mining regions, a discussion of the theoretical and policy implications, and concluding remarks on achieving a more just and sustainable governance of Indonesia's nickel industry.

## Literature Review and Conceptual Framework

### *Environmental Justice and critical mineral extraction*

The accelerating global transition toward low-carbon technologies has intensified demand for critical minerals, raising new questions about the social and environmental consequences of resource extraction. Although the green transition is intended to mitigate climate change, its benefits and burdens are often distributed unevenly across regions and social groups. Countries rich in critical minerals increasingly bear the environmental costs of extraction, while the benefits of clean energy are largely enjoyed by consumers and industries elsewhere. This unequal distribution has brought the concept of *Environmental Justice (EJ)* to the forefront of sustainability debates.

Environmental Justice originated in the United States during the civil rights movement in response to the disproportionate concentration of hazardous waste facilities in low-income and minority communities (Cutter, 1995; Mohai et al., 2009). Since then, the concept has evolved beyond questions of environmental protection to encompass the fairness of environmental decision-making and access to environmental benefits. Contemporary EJ scholarship generally identifies three interrelated dimensions. *Distributive justice* concerns the equitable distribution of environmental benefits and burdens. *Procedural justice* focuses on meaningful participation in environmental decision-making. *Recognition*

*justice* emphasises respect for the identities, cultures, knowledge systems, and rights of affected communities (Schlosberg, 2007).

These dimensions are particularly relevant to extractive industries in the Global South. Mining projects frequently generate substantial national economic benefits while imposing environmental degradation, health risks, and livelihood losses on nearby communities (Bebbington et al., 2008). Consequently, environmental justice has become an important framework for evaluating whether mineral-based development contributes to genuinely sustainable development or merely redistributes environmental risks to politically and economically marginalised populations.

Recent studies on Indonesia's nickel industry similarly demonstrate tensions between industrial development and community well-being. While downstream industrialisation has strengthened Indonesia's economic position in global battery supply chains, mining expansion has also generated increasing concerns regarding pollution, land-use change, community displacement, and unequal participation in environmental governance (Astuti et al., 2025; Lahadalia et al., 2024; Sunuhadi et al., 2024). These studies provide important evidence of environmental impacts but pay comparatively less attention to how these impacts become institutionalised through broader structures of power and governance.

***Sacrifice Zones and unequal development***

The concept of *Sacrifice Zones* provides a spatial perspective on environmental injustice by explaining why environmental degradation becomes concentrated in particular places. Originally associated with areas exposed to intensive industrial pollution in the United States, sacrifice zones describe locations where environmental destruction is considered an acceptable cost of achieving broader economic or political objectives (Juskus, 2023).

Sacrifice zones are not simply environmentally degraded areas. Rather, they emerge where particular communities possess insufficient political, economic, or institutional power to resist environmentally harmful development. Decisions regarding industrial expansion therefore become embedded in unequal relationships between governments, corporations, and local communities. Environmental harm is effectively normalised because those bearing the greatest costs have the least influence over decision-making.

The concept has increasingly been applied beyond North America to examine extractive industries, hazardous waste disposal, and fossil-fuel development in the Global South (Auerochs, 2025). In these contexts, sacrifice zones frequently coincide with Indigenous territories or economically marginalised regions where communities experience limited access to legal protection, environmental information, and political representation. The concept therefore extends Environmental Justice by highlighting the geographical concentration of environmental risks within unequal systems of development.

In Indonesia, rapid nickel expansion raises similar concerns. Mining activities have increasingly transformed small islands and ecologically sensitive regions into centres of mineral extraction. The resulting environmental degradation raises important questions regarding whether these landscapes have effectively become sacrifice zones within the global transition toward renewable energy.

***Slow Violence and environmental change***

While *Environmental Justice* explains unequal outcomes and *Sacrifice Zones* identify their spatial concentration, these perspectives provide less insight into how environmental harm unfolds over time. Rob Nixon's (2011) concept of *Slow Violence* addresses this temporal dimension.

*Slow violence* refers to environmental destruction that occurs gradually, often invisibly, and accumulates over extended periods. Unlike spectacular forms of violence that receive immediate public attention, slow violence progresses incrementally through pollution, ecosystem degradation, declining health, and the gradual erosion of livelihoods. Its cumulative nature frequently obscures causal relationships between industrial activities and long-term human suffering.

This perspective is particularly relevant to mining industries because many environmental impacts emerge only after years of continuous extraction. Water contamination, biodiversity loss, declining agricultural productivity, chronic respiratory diseases, and cultural disruption rarely occur as isolated events. Instead, they accumulate gradually, progressively reducing the resilience of affected communities while remaining politically and socially under-recognised.

Nixon's framework therefore complements Environmental Justice by demonstrating how environmental inequalities become embedded within everyday life through cumulative ecological degradation rather than sudden disasters. It also explains why communities may remain trapped in environmentally hazardous conditions despite continuing evidence of environmental decline.

***An integrated conceptual framework***

Although Environmental Justice, Sacrifice Zones, and Slow Violence have developed as distinct theoretical traditions, they are highly complementary for analysing contemporary critical mineral extraction. This study integrates these perspectives into a single conceptual framework. Environmental Justice provides the normative framework for evaluating whether environmental costs and benefits are distributed fairly and whether affected communities participate meaningfully in decision-making. Sacrifice Zones explain the spatial concentration of environmental burdens in politically and economically marginalised regions. Slow Violence explains the temporal processes through which cumulative environmental degradation progressively undermines livelihoods, health, and ecological resilience. Taken together, these perspectives suggest that environmental injustice is not simply the consequence of isolated pollution incidents. Rather, it emerges through interactions between governance arrangements, unequal power relations, spatial concentration of environmental risks, and cumulative environmental degradation.

Accordingly, this paper proposes that Indonesia's nickel expansion can be understood as a governance process in which industrial development generates geographically concentrated environmental burdens that accumulate over time and disproportionately affect communities with limited political influence. This integrated framework guides the subsequent comparative analysis of Kabaena and Halmahera by examining three analytical questions:

1) How are the environmental costs and economic benefits of nickel mining distributed?
2) To what extent have Kabaena and Halmahera become environmental sacrifice zones?
3) How does cumulative environmental degradation contribute to slow violence and the erosion of community livelihoods?

These questions provide the analytical bridge between theory and the empirical findings presented in the following sections. This study argues that environmental injustice in Indonesia's nickel industry is best understood as the interaction of distributive inequality, governance asymmetry, and cumulative socio-environmental degradation.

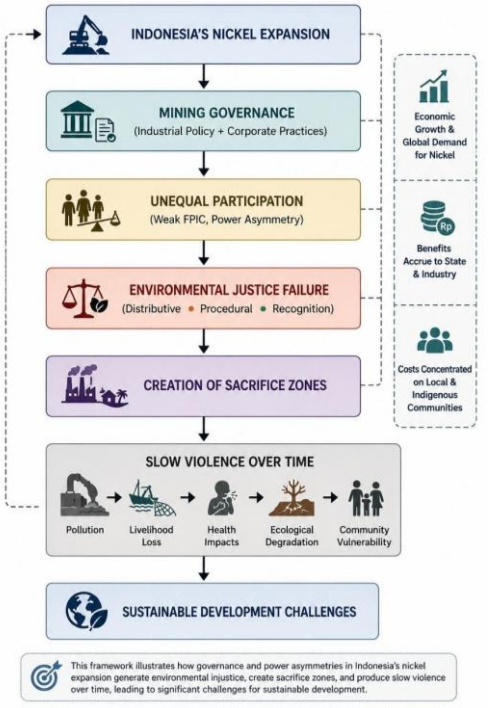



**Figure 1. Proposed Conceptual Framework**

**Research Methodology**

This study adopts a qualitative comparative case study to examine the socio-environmental impacts of nickel mining on Indigenous and local communities in Kabaena Island (Southeast Sulawesi) and Halmahera Island (North Maluku). These two islands were selected because they represent two of Indonesia's most rapidly expanding nickel mining regions, where large-scale industrial development has generated widespread concerns over environmental degradation, declining livelihoods, and conflicts involving Indigenous and local communities (Astuti et al., 2025; Gokkon, 2025; Jacobson, 2025; Jong, 2025). A comparative case study is appropriate because it enables an in-depth analysis of how similar processes of resource extraction produce comparable patterns of environmental injustice across different geographical settings (Yin, 2018).

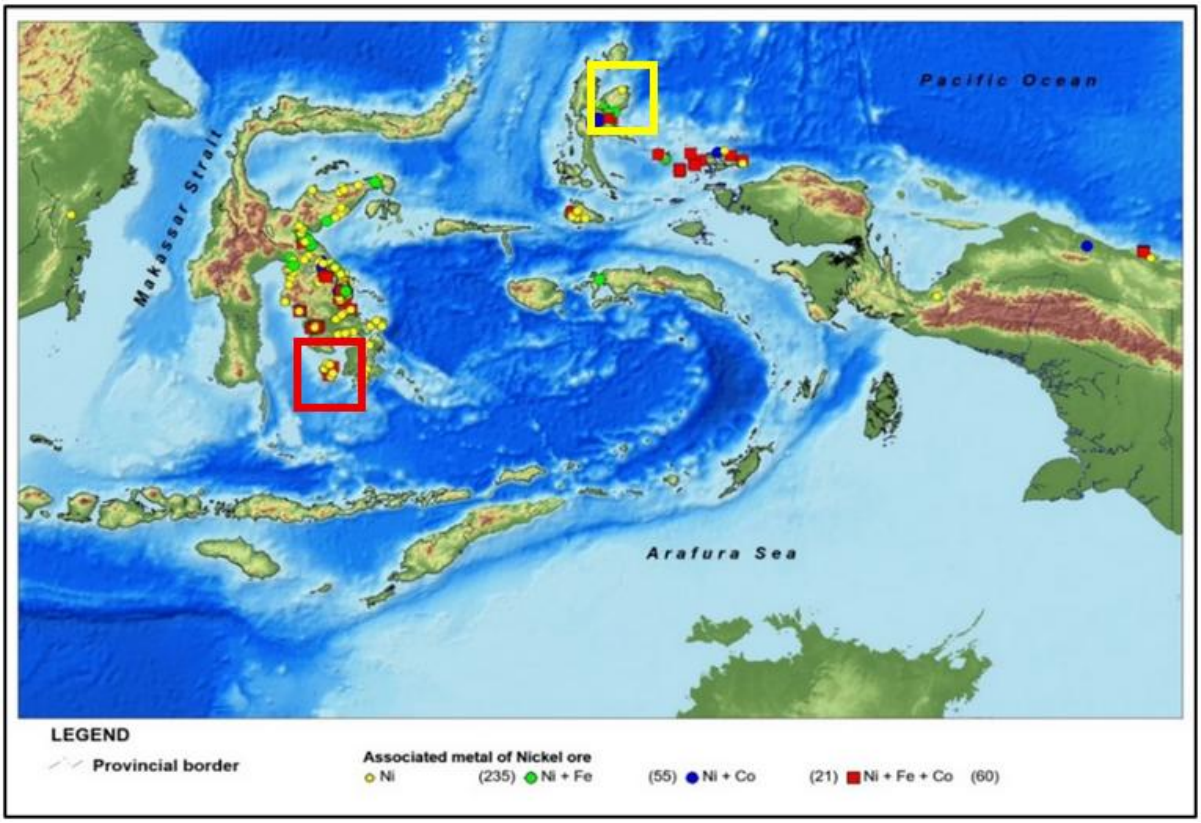



**Figure 2. The location of the two cases studied:**
*Kabaena* Southeast Sulawesi *(left)* and *Halmahera,* North Maluku *(right)* (Sunuhadi et al. 2024)

The analysis is based exclusively on secondary data collected from multiple sources to enhance the credibility of the findings through data triangulation (Creswell & Poth, 2018). These sources include peer-reviewed journal articles, Indonesian government publications, reports from non-governmental organizations, policy documents, and investigative journalism published by reputable media outlets such as *Mongabay*. The selected documents provide evidence on environmental conditions, health impacts, livelihood changes, governance practices, and community responses to nickel mining in both study areas.

The collected data were analysed using thematic analysis (Braun & Clarke, 2006). Guided by the integrated conceptual framework developed in the previous section, the analysis focused on identifying recurring themes related to environmental degradation, livelihood transformation, health impacts, community participation, and governance. These themes were subsequently interpreted through the lenses of Environmental Justice, Sacrifice Zones, and Slow Violence to understand how environmental risks and development benefits are distributed across different stakeholders.

This methodological approach does not seek to establish causal relationships in a statistical sense. Rather, it aims to generate an analytically rich understanding of how environmental injustice is experienced and reproduced within Indonesia's expanding nickel industry. By systematically synthesising evidence from diverse sources, the study provides a comprehensive interpretation of the

socio-environmental consequences of nickel extraction in two of Indonesia's most rapidly developing mining regions. Yet, because this study relies on secondary evidence, its findings should be interpreted as an analytical synthesis rather than direct observations from fieldwork.

**Research Findings**

The comparative analysis reveals that nickel mining has generated remarkably similar socio-environmental consequences in Kabaena and Halmahera despite differences in geography, industrial configuration, and local livelihoods. In both cases, rapid mining expansion has transformed landscapes, altered local economies, increased environmental and health risks, and intensified tensions between industrial development and community well-being. While Indonesia's nickel industry has become a key driver of national economic growth and the global energy transition, the empirical evidence indicates that the benefits and burdens of this development have been distributed unevenly. National economic gains and industrial investment have expanded considerably, whereas the environmental and social costs have been borne primarily by Indigenous and local communities living closest to mining and processing operations.

***Transformation of landscapes and ecosystems***

The first and most visible finding concerns the rapid transformation of natural landscapes. Both Kabaena and Halmahera have experienced extensive environmental change following the expansion of nickel extraction, although the forms of degradation differ according to their ecological characteristics. Kabaena, a relatively small island in Southeast Sulawesi, has undergone extensive land conversion as mining concessions expanded across the island. Recent investigations estimate that approximately 73–75% of the island has been allocated for nickel mining activities (Jong, 2025). Large-scale vegetation clearing has accelerated soil erosion, increasing sediment runoff into rivers and coastal waters. Communities report that formerly clear coastal waters have become reddish-brown, particularly after rainfall, reflecting heavy sedimentation associated with mining activities (Astuti et al., 2025; Gokkon, 2025; Jong, 2025). The deterioration of marine water quality has reduced the ecological productivity of coastal ecosystems that support fisheries and seaweed cultivation, resulting in declining seaweed quality, lower harvests, and substantial income losses for coastal households (Astuti et al., 2025; Gokkon, 2025; Jong, 2025).

In Halmahera, environmental transformation has occurred on a larger industrial scale, driven by the rapid expansion of nickel mining and downstream processing industries (Astuti et al., 2025; Fünfgeld & Kammler, 2025). The rapid development of the Indonesia Weda Bay Industrial Park (IWIP) has required extensive land clearing, industrial infrastructure, transportation networks, and energy production facilities (Fünfgeld & Kammler, 2025; Jacobson, 2025). More than 5,000 hectares of tropical forest have reportedly been converted into mining and industrial areas, accompanied by expanding coal-fired power generation to support nickel smelting (Jacobson, 2025). While Kabaena illustrates the ecological consequences of open-pit mining on a small island ecosystem, Halmahera demonstrates the cumulative environmental impacts of vertically integrated mining and processing industries (Astuti et al., 2025; Fünfgeld & Kammler, 2025).

Despite these contextual differences, the two cases reveal similar ecological trajectories. Mining expansion has altered terrestrial and marine ecosystems, reduced biodiversity, and increased the vulnerability of communities that depend directly on environmental resources. Environmental degradation is therefore not confined to mining sites but extends across broader ecological systems that sustain local livelihoods.

***Livelihood disruption and declining household resilience***

The second major finding concerns the transformation of local livelihoods. Across both islands, environmental degradation has translated directly into declining household income and increasing economic vulnerability.

The Bajau communities of Kabaena provide one of the clearest illustrations of this process. Traditionally dependent upon fishing, seaweed cultivation, and small-scale coastal resource management, these communities rely heavily on healthy marine ecosystems (Astuti et al., 2025; Gokkon, 2025). As sedimentation and pollution have degraded coastal waters, seaweed production has declined substantially (Gokkon, 2025; Jong, 2025). Farmers report not only lower production volumes

but also poorer product quality, leading to dramatic reductions in market prices. According to recent field investigations, household income from seaweed farming has fallen by nearly 70% in several villages, including Kokoe, Liwu Lampona, Telaga Besar, and Wulu (Jong, 2025). Many households have consequently been forced either to seek alternative employment or to depend upon increasingly uncertain fishing activities (Astuti et al., 2025; Gokkon, 2025).

Livelihood disruption in Halmahera follows a comparable pattern although through different mechanisms. Industrial expansion has reduced community access to forests, agricultural land, and coastal resources while simultaneously increasing environmental pollution (Astuti et al., 2025; Fünfgeld & Kammler, 2025). Traditional economic activities have become increasingly difficult as mining infrastructure occupies former agricultural areas and environmental degradation affects fisheries and water resources (Fünfgeld & Kammler, 2025; Jacobson, 2025). Although industrialisation has generated employment opportunities, these jobs are unevenly distributed and frequently require technical skills unavailable to many local residents (Astuti et al., 2025; Fünfgeld & Kammler, 2025). Consequently, while industrialisation has created new employment opportunities, the benefits have been distributed unevenly, with many local households continuing to experience declining access to traditional livelihood resources (Astuti et al., 2025; Fünfgeld & Kammler, 2025).

Across both cases, livelihood decline extends beyond reduced income. The evidence suggests a broader erosion of household resilience. Communities that previously diversified livelihoods through fishing, farming, and forest products have become increasingly dependent upon uncertain labour markets or declining natural resources. Environmental degradation therefore produces not only immediate economic losses but also reduces the long-term adaptive capacity of local communities.

***Environmental health risks***

The third finding concerns growing public health risks associated with mining expansion. Although the available evidence is derived primarily from health reports, environmental monitoring, and investigative journalism rather than epidemiological research, multiple independent sources consistently identify deteriorating health conditions in both study areas.

In Halmahera, rapid expansion of nickel processing has been accompanied by increasing air pollution associated with coal-fired power plants and industrial emissions (Astuti et al., 2025; Fünfgeld & Kammler, 2025). Residents describe persistent dust settling on houses, schools, and public facilities, while local health data indicate a substantial increase in respiratory diseases during the period of industrial expansion (Jacobson, 2025). Investigations also report growing community concerns regarding deteriorating air quality and prolonged exposure to industrial emissions surrounding the Indonesia Weda Bay Industrial Park (Fünfgeld & Kammler, 2025; Jacobson, 2025). Although multiple factors may influence public health outcomes, the temporal coincidence between rapid industrial growth and worsening air quality has generated widespread concern among local communities and environmental researchers (Astuti et al., 2025; Jacobson, 2025).

In Kabaena, health concerns are associated primarily with water pollution resulting from mining runoff and sedimentation (Astuti et al., 2025; Gokkon, 2025). Communities report skin irritation following contact with contaminated seawater, while environmental investigations have detected elevated concentrations of heavy metals, including nickel, cadmium, and lead, in water and sediment samples collected from coastal areas (Gokkon, 2025). Declining water quality has affected not only marine ecosystems but also the safety of water used for daily household activities and seaweed cultivation (Gokkon, 2025; Jong, 2025). These findings have heightened community concerns regarding long-term exposure to environmental contaminants and their potential implications for human health (Astuti et al., 2025; Gokkon, 2025).

Taken together, the evidence from both islands suggests that environmental degradation produces cumulative health risks rather than isolated environmental incidents. Pollution affects daily activities, including fishing, farming, bathing, and household water use, thereby increasing the frequency with which communities encounter contaminated environments (Astuti et al., 2025; Jacobson, 2025). Consistent with the environmental justice literature, prolonged exposure to environmental hazards disproportionately affects communities with limited economic resources and restricted access to healthcare and environmental protection (Cutter et al., 2003; Mohai et al., 2009). These health impacts reinforce existing livelihood vulnerabilities by increasing household expenditures, reducing labour productivity, and contributing to long-term social insecurity (Astuti et al., 2025; Cutter et al., 2003).

***Governance, participation, and unequal decision-making***

Beyond environmental and economic impacts, the comparative analysis highlights significant governance challenges associated with Indonesia's nickel expansion. Both case studies reveal limited participation of Indigenous and local communities in decisions concerning mining development, environmental management, and land-use planning. These findings are consistent with broader studies of extractive industries, which show that environmental conflicts frequently arise when local communities have limited influence over resource governance despite bearing the greatest environmental risks (Bebbington et al., 2008; Mohai et al., 2009).

Several studies report that communities have had limited opportunities to influence decisions regarding mining concessions, environmental monitoring, or mitigation measures (Astuti et al., 2025; Owen & Kemp, 2014). Although Indonesian regulations formally recognise community participation in environmental governance, implementation appears uneven, particularly in remote mining regions (Carona, 2025). Communities frequently report inadequate access to environmental information, limited legal assistance, and restricted opportunities to express concerns during project planning (Astuti et al., 2025; Fünfgeld & Kammler, 2025). These procedural limitations reduce the capacity of affected communities to participate effectively in decisions that directly affect their livelihoods and environments.

The principle of ***Free, Prior and Informed Consent (FPIC)***, widely recognised as an important mechanism for protecting Indigenous rights in extractive industries, also appears to have been implemented inconsistently. Existing literature suggests that consultation processes often emphasise procedural compliance rather than meaningful community participation, particularly where substantial asymmetries of information, bargaining power, and technical expertise exist between corporations and local communities (Owen & Kemp, 2014). As a consequence, affected communities may formally participate in consultation while exercising little substantive influence over development decisions. Such procedural shortcomings have been widely identified as indicators of environmental injustice because they weaken recognition of Indigenous rights and limit democratic participation in environmental governance (Cutter, 1995; Mohai et al., 2009).

Power asymmetries further reinforce these governance challenges. Mining companies generally possess greater financial resources, technical expertise, legal capacity, and political influence than local communities (Bebbington et al., 2008; Juskus, 2023). Reports also indicate that community protests have occasionally encountered legal pressure, security responses, or criminalisation, thereby reducing opportunities for constructive dialogue and independent environmental advocacy (Fünfgeld & Kammler, 2025). These governance conditions contribute to persistent inequalities between industrial actors and communities experiencing the environmental consequences of mining expansion. They also illustrate how unequal decision-making processes can reinforce the concentration of environmental burdens in politically and economically marginalised regions.

From an ESG perspective, these findings suggest that governance failures extend beyond environmental management to include inadequate stakeholder engagement, weak accountability mechanisms, and insufficient protection of Indigenous and local communities. Strengthening participatory governance and implementing FPIC more effectively are therefore essential not only for environmental justice but also for improving the social legitimacy and long-term sustainability of Indonesia's nickel industry.

***Unequal distribution of benefits and burdens***

The comparative evidence consistently demonstrates an uneven distribution of the benefits and burdens associated with Indonesia's nickel industry. This imbalance reflects a broader challenge in resource-dependent development, where the economic gains generated by extractive industries are frequently distributed across national and global markets, while environmental and social costs are concentrated in local mining communities (Bebbington et al., 2008; Mohai et al., 2009).

At the national level, downstream industrialisation has contributed significantly to economic growth, export earnings, foreign direct investment, and Indonesia's strategic position within global electric vehicle (EV) supply chains (Lahadalia et al., 2024; Sasongko, 2024; Sunuhadi et al., 2024). Since the implementation of the nickel export ban in 2020, the expansion of domestic processing and smelting industries has strengthened Indonesia's industrial development strategy and increased its importance in the global transition toward low-carbon technologies (Lahadalia et al., 2024; Sunuhadi

et al., 2024). These developments have positioned Indonesia as one of the world's most influential suppliers of critical minerals for the global energy transition.

At the local level, however, communities experience a markedly different reality. Environmental degradation, declining livelihoods, health risks, and social disruption are concentrated within mining regions, while many of the economic benefits are realised elsewhere (Astuti et al., 2025; Fünfgeld & Kammler, 2025). Although mining projects generate employment opportunities and stimulate local economic activity, these benefits appear unevenly distributed and are often insufficient to offset the broader environmental and social costs experienced by affected communities (Astuti et al., 2025; Bebbington et al., 2008). Existing studies further suggest that the unequal distribution of development benefits is reinforced by disparities in political influence, institutional capacity, and access to environmental decision-making, limiting the ability of Indigenous and local communities to negotiate more equitable development outcomes (Mohai et al., 2009; Owen & Kemp, 2014).

The comparative findings are summarised in Tables 1 and 2. Table 1 provides an overview of the key characteristics of the two case studies, highlighting their different ecological settings, mining configurations, and principal socio-environmental impacts. Building on this comparison, Table 2 synthesises the uneven distribution of the benefits and burdens associated with Indonesia's nickel expansion, illustrating how national economic gains contrast with the environmental, social, and governance challenges experienced by Indigenous and local communities. Together, the two tables provide a concise overview of the empirical patterns that emerge consistently across both cases.

**Table 1. Profile of the Two Case Studies**

| Characteristic | Kabaena | Halmahera |
|---|---|---|
| Main mining activity | Open-pit nickel mining | Integrated mining and smelting (IWIP) |
| Main affected communities | Bajau and coastal villages | Indigenous and local villages |
| Dominant environmental impact | Marine sedimentation and water pollution | Air pollution, deforestation, industrial emissions |
| Main livelihood affected | Fisheries and seaweed farming | Agriculture, fisheries, and forest resources |
| Major health concerns | Skin irritation, heavy-metal exposure | Respiratory diseases and dust pollution |
| Key governance issue | Limited participation in mining decisions | Limited participation and industrial expansion |

**Table 2. Unequal Distribution of Benefits and Burdens in Indonesia's Nickel Expansion**

| Dimension | National and Industrial Benefits | Community-Level Burdens |
|---|---|---|
| Economic | Higher GDP growth; increased export earnings; foreign direct investment; growth of downstream industries | Declining household income; reduced fisheries and seaweed production; livelihood insecurity |
| Environmental | Expansion of industrial infrastructure supporting the EV supply chain | Water and air pollution; deforestation; coastal degradation; biodiversity loss |
| Social | Employment creation and industrial development | Respiratory and skin diseases; loss of traditional livelihoods; declining community resilience |

| Dimension | National and Industrial Benefits | Community-Level Burdens |
|---|---|---|
| Governance | Stronger national industrial competitiveness and strategic control over critical minerals | Limited community participation; weak FPIC implementation; unequal access to environmental information and legal protection |
| Strategic | Enhanced position in global EV battery supply chains and energy transition | Concentration of environmental risks in Indigenous and local communities |

The comparison does not imply that mining development generates no local benefits or that all communities are affected equally. Rather, the evidence demonstrates a persistent imbalance in the spatial distribution of development outcomes. While national and industrial actors capture most economic gains, communities located nearest to extraction and processing activities bear a disproportionate share of environmental and social costs. This imbalance constitutes one of the central empirical findings of the study and provides the basis for interpreting the cases through the integrated framework of Environmental Justice, Sacrifice Zones, and Slow Violence in the following discussion.

***Comparative synthesis of the findings***

Despite differences in ecological settings, mining configurations, and local livelihood systems, Kabaena and Halmahera exhibit remarkably consistent socio-environmental trajectories. Across both islands, rapid nickel expansion has been accompanied by ecosystem degradation, declining natural resource-based livelihoods, increasing health concerns, and governance arrangements that provide limited opportunities for meaningful community participation. These impacts are mutually reinforcing. Environmental degradation reduces livelihood opportunities, declining livelihoods increase household vulnerability, and governance constraints limit communities' capacity to influence decisions affecting their environment and future development.

The comparative evidence further demonstrates that these outcomes are not isolated environmental problems but interconnected dimensions of a broader development pattern. While Indonesia's nickel industry has generated substantial national economic benefits through downstream industrialisation, export growth, and integration into global electric vehicle supply chains, the environmental and social costs remain disproportionately concentrated within mining regions. Communities located closest to extraction and processing activities bear the greatest exposure to pollution, ecosystem degradation, livelihood disruption, and health risks, despite receiving comparatively fewer long-term development benefits. This asymmetry represents the principal empirical finding of the study.

Importantly, the comparison also reveals striking similarities in governance across the two cases. In both Kabaena and Halmahera, Indigenous and local communities face limited access to environmental information, constrained participation in decision-making, and unequal bargaining power relative to mining companies and state institutions. Although the specific environmental impacts differ between the two islands, the underlying governance dynamics remain remarkably consistent. These findings suggest that the challenges observed in Kabaena and Halmahera are unlikely to be isolated local anomalies but instead reflect broader governance issues associated with Indonesia's critical mineral development.

Taken together, the comparative findings indicate that Indonesia's nickel expansion involves not only environmental change but also the redistribution of environmental risks and development opportunities across different groups and places. The following discussion interprets these empirical patterns through the integrated framework of Environmental Justice, Sacrifice Zones, and Slow Violence to explain how unequal governance, spatial concentration of environmental burdens, and cumulative socio-environmental change contribute to the human costs of Indonesia's nickel-driven development; and what these findings imply for the governance of critical mineral extraction within the global energy transition.

**Discussion**

The findings demonstrate that the socio-environmental impacts of Indonesia's nickel expansion extend beyond local environmental degradation to reveal broader governance challenges associated with the global energy transition. While previous studies have documented pollution, livelihood disruption, and industrial expansion in Indonesia's nickel sector (Astuti et al., 2025; Fünfgeld & Kammler, 2025), this study shows how these impacts are interconnected through patterns of unequal distribution, spatial concentration, and cumulative environmental change. By integrating Environmental Justice, Sacrifice Zones, and Slow Violence, the findings provide a more comprehensive understanding of the human costs accompanying critical mineral extraction.

From an Environmental Justice (EJ) perspective, the evidence indicates that the costs and benefits of Indonesia's nickel industry are distributed unevenly across different groups. National economic growth, export earnings, foreign investment, and industrial upgrading have strengthened Indonesia's position within global electric vehicle supply chains. In contrast, Indigenous and local communities in Kabaena and Halmahera bear disproportionate environmental and social burdens, including ecosystem degradation, declining livelihoods, health risks, and reduced environmental quality. These findings are consistent with the *distributive dimension of environmental justice*, which emphasises that environmental benefits and burdens should be shared equitably (Mohai et al., 2009; Schlosberg, 2007).

The study also highlights important issues of *procedural justice*. Across both case studies, communities reported limited opportunities to influence decisions regarding mining development despite being those most directly affected. Although Indonesia's legal framework formally recognises community participation, implementation remains inconsistent, particularly regarding Free, Prior and Informed Consent (FPIC). Existing consultation mechanisms appear to prioritise regulatory compliance over meaningful stakeholder engagement. This finding supports Owen and Kemp's (2014) argument that FPIC should be understood not merely as a legal requirement but as a governance mechanism that enables affected communities to participate effectively in decisions concerning resource extraction. Weak procedural participation therefore reinforces distributive inequalities by limiting communities' capacity to negotiate more equitable development outcomes.

The concept of Sacrifice Zones provides a complementary explanation for the spatial distribution of these environmental burdens. The comparison between Kabaena and Halmahera suggests that environmental degradation is not randomly distributed but concentrated in regions where communities possess comparatively limited political, economic, and institutional influence. Although the two islands differ in ecological characteristics and industrial configurations, both have become locations where environmental risks are disproportionately concentrated while economic benefits are largely realised elsewhere. This pattern corresponds closely with Juskus' (2023) description of sacrifice zones as places where environmental degradation becomes normalised in pursuit of broader economic objectives. Rather than viewing pollution as an unintended by-product of industrialisation, the findings suggest that governance arrangements may permit environmental burdens to accumulate disproportionately in peripheral regions that possess relatively weak bargaining power.

The temporal dimension of these findings is best understood through Nixon's (2011) concept of Slow Violence. The empirical evidence indicates that environmental harm has not occurred primarily through sudden environmental disasters but through gradual and cumulative processes. Water pollution, air pollution, declining fisheries, deteriorating public health, and livelihood insecurity have accumulated over time, progressively reducing the resilience of affected communities. Importantly, these impacts reinforce one another. Environmental degradation undermines livelihoods, declining livelihoods increase household vulnerability, and governance constraints reduce communities' ability to respond effectively. This cumulative interaction illustrates how slow violence operates not as a single event but as an incremental process through which environmental risks become embedded in everyday life.

Taken together, the three theoretical perspectives are mutually reinforcing rather than competing. Environmental Justice explains ***who*** bears the unequal distribution of benefits and burdens. Sacrifice Zones explain ***where*** environmental risks become spatially concentrated. Slow Violence explains ***how*** environmental harm accumulates over time through gradual ecological and social change. Their integration therefore provides a more comprehensive analytical framework than any single theory alone. Rather than treating pollution, governance failure, or livelihood decline as separate issues, the integrated framework demonstrates that these phenomena are interconnected dimensions of a broader socio-environmental process associated with critical mineral extraction. Their integration therefore provides

a multi-dimensional explanation of how critical mineral extraction produces persistent environmental inequalities.

These findings also have important implications for ESG and sustainable resource governance. Indonesia's success in developing downstream nickel industries has strengthened its economic competitiveness and strategic importance within global clean-energy supply chains. However, the findings suggest that the long-term sustainability of this development model depends not only on economic performance but also on governance quality, stakeholder participation, and environmental accountability. From an ESG perspective, the governance dimension extends beyond regulatory compliance to include transparent environmental management, meaningful community engagement, and effective protection of Indigenous and local rights. Without stronger governance mechanisms, environmental conflicts may undermine both the social legitimacy and long-term sustainability of Indonesia's critical mineral industry.

Several policy implications emerge from this analysis. First, FPIC should be implemented as a substantive participatory process rather than a procedural requirement, ensuring that Indigenous and local communities can influence decisions throughout the mining lifecycle. Second, environmental monitoring should become more transparent and involve independent scientific institutions together with community representatives. Third, greater attention should be given to protecting and restoring livelihoods affected by mining activities through ecological rehabilitation, fair compensation, and community development programmes. Finally, ESG frameworks adopted by mining companies and investors should incorporate environmental justice indicators that assess not only environmental performance but also the equitable distribution of development benefits and the quality of stakeholder participation.

Overall, this study demonstrates that achieving a just energy transition requires more than expanding the supply of critical minerals. It also requires governance systems capable of ensuring that the economic opportunities created by the transition do not come at the expense of the environmental rights, livelihoods, and well-being of communities located at the beginning of global supply chains.

**Conclusion**

Indonesia's rapid expansion of the nickel industry has become a cornerstone of the country's industrial development strategy and its contribution to the global transition toward low-carbon technologies. While this transformation has generated substantial national economic benefits, this study demonstrates that its environmental and social consequences have been distributed unevenly. Through a comparative analysis of Kabaena and Halmahera, the findings reveal that Indigenous and local communities experience disproportionate environmental degradation, declining livelihoods, increasing health risks, and limited participation in decisions affecting their environment. These impacts suggest that the human costs of Indonesia's nickel expansion are concentrated within mining regions, whereas many of the economic benefits accrue primarily at national and industrial levels.

The study contributes to the literature by integrating the perspectives of Environmental Justice, Sacrifice Zones, and Slow Violence into a single analytical framework. Rather than treating pollution, livelihood decline, or governance challenges as separate issues, the integrated framework demonstrates how unequal governance arrangements, spatial concentration of environmental burdens, and cumulative ecological change interact to produce persistent socio-environmental inequalities. Environmental Justice explains the unequal distribution of environmental costs and benefits, Sacrifice Zones illuminate the geographical concentration of these burdens, and Slow Violence reveals how their impacts accumulate gradually over time. Together, these perspectives provide a more comprehensive understanding of the human dimensions of critical mineral extraction in the Global South.

The findings also have important implications for sustainable resource governance and ESG implementation. As global demand for critical minerals continues to increase, the legitimacy of the green transition will depend not only on reducing carbon emissions but also on ensuring that its social and environmental costs are shared more equitably. Strengthening community participation, implementing Free, Prior and Informed Consent (FPIC) more substantively, improving environmental transparency, and enhancing corporate accountability are essential for building a more inclusive and sustainable mining sector. ESG frameworks should therefore extend beyond environmental performance to include meaningful stakeholder engagement, procedural justice, and the protection of Indigenous and local communities.

This study is subject to several limitations. It relies on secondary data and therefore cannot capture the full diversity of community experiences or establish causal relationships between mining activities and specific socio-environmental outcomes. Future research could build on these findings through field-based studies, longitudinal analyses, and comparative research across other nickel-producing regions in Indonesia and the Global South.

Indonesia's experience demonstrates that the success of the global energy transition should be measured not only by reductions in carbon emissions, but also by the extent to which the extraction of critical minerals respects environmental justice, protects community livelihoods, and promotes inclusive governance.

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# MINIMUM DIGITAL TRACEABILITY FOR POST INDUSTRIAL GARMENT WASTE IN INDONESIA

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***Abstract***
*This study develops a minimum digital traceability specification for identifiable post-industrial garment waste, including cutting scraps, roll ends, production samples, yarn waste, and products that fail to meet specifications. The system boundary starts when waste is identified and grouped into a batch at a garment factory and ends when the batch is received at the recycler gate. The study uses an exploratory qualitative design based on document analysis and process mapping. Academic literature was searched in Google Scholar in July 2026 using seven search strings and a 2018-2026 publication window. The search produced 55 record occurrences and 47 unique journal articles. After title and abstract screening, 34 articles moved to full-text assessment plus three additional non-journals. Twenty-two were used in the main synthesis, twelve as supporting literature. The analysis also used Indonesia's Circular Economy Roadmap and National Action Plan 2025-2045 and operational documents from Reverse Resources and Closed Loop Fashion. The study proposes nine material events, twelve minimum data groups, four batch-lineage rules, and a responsibility matrix for five actor groups. These outputs can support waste-generation data for indicator 2.1.c and upstream provenance and feedstock-receipt evidence for 2.3.a. They cannot verify recycled content in a final product because the study stops at the recycler gate. Since the study does not include interviews, field observation, or a system pilot, the specification should be treated as a document-based proposal that needs pilot testing before wider use as guidance or a standard.*
***Keywords****: Digital traceability; post-industrial garment waste; batch lineage; chain of custody; circular economy; Indonesia*

## 1. Introduction

Post-industrial garment waste is generated before products are used by consumers and may include cutting scraps, roll ends, production samples, yarn, or products that fail to meet specifications. Compared with post-consumer waste, these materials are generally cleaner and easier to link to production records. Their value nevertheless depends on the ability of actors to preserve information on material origin, fibre composition, colour, condition, and quantity. When waste is mixed or transferred without adequate records, the range of possible recovery options narrows and its value tends to decline (Akter et al., 2022).

Post-industrial garment waste is generated during garment manufacturing before products are used by consumers. It may include cutting scraps, roll ends, production samples, yarn waste, and products that fail to meet specifications. Compared with post-consumer waste, these materials are usually cleaner and can often be linked to production records. Their reuse or recycling value depends on information about origin, category, material composition, condition, the reason for non-conformity when relevant, and quantity. When material moves, mixes, or is processed without adequate records, traceability falls and reuse or recycling options become more limited (Akter et al., 2022).

Indonesia's Circular Economy Roadmap and National Action Plan 2025-2045 lists textiles as a priority sector. Strategy 2 focuses on reducing textile waste through four action plans: zero-waste technology in garment manufacturing, Green Industry Standards, higher recycled content, and textile eco-design. This study focuses on the data needs of indicator 2.1.c and on upstream evidence that is relevant to indicator 2.3.a. For 2.1.c, the roadmap reduces average textile waste from 15% of total production in 2025-2029 to 10%, 5%, and 2% in later periods. For 2.3.a, the average recycled-content milestone rises from 10% to 15%, 20%, and 25% (Kementerian PPN/Bappenas, 2024).

The two indicators need evidence at different points. Indicator 2.1.c needs factory-level waste weight that can be matched with a production denominator for the same period or unit. Upstream support for 2.3.a needs continuous information on material origin, characteristics, quantity, transfers,

and receipt as recycling feedstock. The core issue is therefore not only which digital technology to use. It is also what data must be recorded, when records are created, how batch relationships change, and who is responsible for each record.

The scale of the Indonesian problem is becoming clearer. Nurkomariyah et al. (2026) estimated that about 572 kilo tonnes of post-industrial polyester waste were generated in 2023. The study identified 19 waste types, and 61% were fibre blends that limit textile-to-textile recycling. This work is important for understanding volume, characteristics, and end-of-life routes, but it does not define how a batch identity should be kept when waste is sorted, transferred, split, or merged across several actors.

Textile traceability studies show that physical material can be connected to digital records through identifiers, tags, batch records, activity records, or traceability platforms (Agrawal et al., 2018; Alves et al., 2022, 2024). Reverse-supply-chain studies also show that factories, collectors, waste handlers, sorters, logistics providers, and recyclers perform different physical functions (Akter et al., 2025; Sandberg & Pal, 2024; Do & Stevenson, 2026). However, these two groups of literature do not directly provide a minimum specification that links material events, minimum data, batch relationships, and recording responsibilities for post-industrial garment waste in Indonesia.

The start of this study is the point where waste is formed into a batch, given an identity, and weighed/recorded at a garment factory. The end is the point where the batch is received, inspected, weighed, and accepted or rejected at the recycler gate. Recycling after receipt is outside the study. The study can therefore support evidence of origin and feedstock receipt, but it cannot verify recycled content in a final product.

Based on this boundary, the study asks two research questions:

1. Which material events and minimum data need to be kept from batch creation at a garment factory to receipt at the recycler gate?
2. What batch-lineage rules and actor responsibilities are needed to keep records consistent and support measurement under Strategy 2?

## 2. Literature Review

The theoretical foundation of this study draws on Indonesia’s Circular Economy Roadmap and National Action Plan, Green Industry Standards, studies on material flows and digitalization in Indonesia, and published textile-waste mapping reports.

### *2.1 Strategy 2 of Indonesia’s Textile Circular Economy Roadmap as the policy basis for data needs*

Indonesia's Circular Economy Roadmap and National Action Plan 2025-2045 is the main policy reference because it provides indicators, baselines, milestones, and responsible agencies for the textile sector. Of the four action plans in Strategy 2, this study focuses on the data needs of 2.1.c and upstream support for 2.3.a. Action 2.2 on the Green Industry Standard and Action 2.4 on eco-design remain part of the policy context, but they are not measured because they need company- and product-level data beyond a waste-batch unit.

For 2.1.c, traceability can help build a consistent waste numerator by facility and period. The indicator still needs a comparable production denominator. For 2.3.a, this study only provides evidence up to the recycler gate. Origin, composition, weight, transfer, lineage, and receipt can be traced, but final-product recycled content needs additional data on recycling processes, yield, losses, blending, and later manufacturing.

This position is consistent with the roadmap's wider data-management direction, which stresses resource tracking, supply-chain transparency, data integration, and verification/validation. Traceability is therefore treated as an information function, not as a reason to require one specific technology.

### *2.2 Manufacturing waste and material flows*

Manufacturing studies show that pre-consumer or post-industrial textile waste is created at several production stages and has different characteristics. Dissanayake and Weerasinghe (2021), Li et al. (2021), Haslinger et al. (2019), and Määttänen et al. (2021) show that waste type, quantity, condition,

and treatment route affect later recovery options. Akter et al. (2022) add a material-flow and waste-trading perspective across textile and apparel manufacturing.

For Indonesia, Nurkomariyah et al. (2026) provide the most direct material-flow evidence. Because this study covers several identifiable forms of post-industrial garment waste, the unit of analysis is a batch: a quantity of waste managed as one unit because its origin, category, and characteristics are similar enough to be recorded together. A batch can be a container, bag, bale, or lot, including a grouped set of production samples or products that fail to meet specifications. Individual pieces or products do not need separate identities as long as the batch relationship is preserved.

Reverse-flow literature shows that material can be sorted, stored, repacked, consolidated, transferred, and processed by more than one actor (Akter et al., 2025; John & Rahman, 2025; Do & Stevenson, 2026). Traceability must therefore be able to reconstruct relationships when one batch stays intact, is split into child batches, or is merged into an aggregate batch.

### *2.3 Material traceability and continuity of batch identity*

Material traceability needs a stable link between physical material and digital records. Agrawal et al. (2018) demonstrate a secured tag for identification in the textile and clothing supply chain. Alves et al. (2022) review blockchain and Internet of Things functions for recording activities on traceable items and linking them to digital representations. Alves et al. (2024) present a platform that traces product batches and related activities at batch level.

This study takes the functional idea but does not require those technology architectures. A structured spreadsheet, mobile form, company database, QR code, or digital platform can be used if it can keep batch identity, event sequence, custody transfers, batch relationships, and correction history. This technology-neutral position is also consistent with literature that treats digitalization as an enabler of visibility and coordination rather than an end in itself (Antikainen et al., 2018).

The harder problem appears when material change structure or is mixed. Carlsson and Nevzorova (2025) explain how traceability can be lost when materials mix in warehouses or industrial processes. Cross-sector mass-balance and chain-of-custody studies help explain the need for input-output reconciliation when physical identity can no longer be fully maintained (Schumacher & Beers, 2024; Caraceni et al., 2024; Krueger et al., 2026). In this study, these cross-sector sources only support the reconciliation logic. They are not used as evidence that the same practices already operate in Indonesian garment waste flows.

### *2.4 Intermediary functions and operational documents*

A textile reverse supply chain includes more than factories and recyclers. Sandberg and Pal (2024) separate capabilities in collection, sorting, and recycling. John and Rahman (2025) describe acquisition, collection, inspection and sorting, and disposition. Do and Stevenson (2026) show that digital platforms can change intermediation without removing the need for actors who collect, inspect, sort, store, consolidate, and move material. Teixeira et al. (2026) also show the diversity of actors and relationships in textile reverse supply chains.

Reverse Resources is used as an operational comparator, not as independent evidence of industry-wide practice. Its platform describes tracking by waste type, composition, colour, location, origin, volume, and chain-of-custody documentation. Closed Loop Fashion is used in a limited way as an industry source describing waste-mapping work in Bangladesh, Indonesia, and Sri Lanka with Reverse Resources. These sources help show how academic functions can appear in operations, but they are not used to claim platform effectiveness or national adoption (Reverse Resources, n.d.; Closed Loop Fashion, n.d.).

### *2.5 Study system boundary*

The system boundary as in Table 1 is set so that the proposed specification stays within evidence that can be built from documents. The focus is the flow of identifiable post-industrial garment-waste batches from batch creation at a garment factory to receipt at the recycler gate.

In this study, yarn waste means yarn or thread waste generated during garment manufacturing. Waste from yarn production at a spinning mill is outside the system boundary. Production samples and products that fail to meet specifications may contain trims or accessories; these components should be recorded when they affect sorting, acceptance, or recycling options.

To maintain analytical clarity and avoid claims beyond the available evidence, this study defines specific boundaries for the materials, process stages, actors, digital functions, and policy relevance as summarized in Table 1.

**Table 1. System boundary and scope decisions**

| Dimension | Included | Excluded |
|---|---|---|
| Material | Identifiable post-industrial garment waste generated during garment manufacturing, including cutting scraps, roll ends, production samples, yarn waste, and products that fail to meet specifications. | Post-consumer waste, wastewater, sludge, chemicals, packaging waste, and waste generated upstream during fibre, yarn, fabric, dyeing, or finishing production before garment manufacturing. |
| Start boundary | Material is formed into a batch, given an ID, and weighed/recorded at the garment factory. | Fibre, yarn, and fabric production and upstream process details before the material becomes waste. |
| End boundary | The batch is received, inspected, weighed, and accepted or rejected at the recycler gate. | Recycling operations, production of new fibre/fabric, and recycled-content claims in final products. |
| Core actors | Garment factory, collector/waste handler, logistics provider, recycler, and digital system operator. | Consumers, retailers, post-consumer facilities, and regulators as transaction operators. |
| Information functions | Batch identity, material events, transfers, batch relationships, weighing/handover evidence, and correction history. | A specific technology choice, blockchain architecture, complex IoT, or a national dashboard. |
| Policy link | Direct support for data needs under 2.1.c and upstream provenance/feedstock evidence for 2.3.a. | Assessment of Green Industry Standard compliance, CAD/zero-waste effectiveness, or final-product recycled-content verification. |

*Sources:* Research boundaries established by the author based on Kementerian PPN/Bappenas (2024), Akter et al. (2022), and Nurkomariyah et al. (2026).

## 3. Research Method

This study uses an exploratory qualitative approach based on document analysis and process mapping. Document analysis supports a systematic review of document content, context, and relationships that can be checked again (Bowen, 2009). The study does not test causal relationships, assess company compliance, or evaluate the effectiveness of a specific platform.

The research process has five stages: (1) identify literature with seven search strings; (2) screen titles and abstracts; (3) assess full text against four research functions; (4) assign each source as main synthesis, supporting literature, or pending; and (5) extract evidence and triangulate across document types.

In this paper, minimum means the smallest proposed group of information needed to reconstruct identity, movement, batch relationships, and material receipt within the system boundary. It does not mean a legal minimum or an approved national standard.

### *3.1 Academic literature search*

The search was conducted in July 2026 using Google Scholar as the only academic search engine. The substantive publication window was 2018-2026. Method references such as Bowen (2009) were not limited by this window. Google Scholar was used to build a corpus that could be checked through

titles and DOIs, but this study does not claim to be a systematic review that captures every relevant publication.

Seven search strings were designed around the information needs of RQ1 and RQ2. The source string for each article was retained so that search provenance could be audited.

**Table 2. Google Scholar academic search strategy**

| ID | RQ | Search purpose | Search string | Information sought |
|---|---|---|---|---|
| S1 | RQ1 | Material events in manufacturing | ("textile waste" OR "garment waste" OR "apparel waste") AND ("manufacturing waste" OR "post-industrial waste" OR "pre-consumer waste") | Waste activities and material changes at the manufacturing stage. |
| S2 | RQ1 | Indonesian post-industrial waste flows | ("post-industrial textile waste" OR "garment manufacturing waste") AND Indonesia AND ("material flow" OR "waste flow" OR recycling) | Material flows, transfer points, changes, and actors. |
| S3 | RQ1 | Traceability information needs | ("material traceability" OR "textile traceability") AND ("data requirements" OR "data elements" OR "minimum data" OR "information requirements") | Information needed to identify, reconcile, and trace material. |
| S4 | RQ1/ RQ2 | Handover and information continuity | ("material traceability" OR "chain of custody") AND (handover OR transfer OR transaction OR custody) AND (waste OR recycling) | Transfer, confirmation, and handover evidence. |
| S5 | RQ2 | Batch identity continuity | ("chain of custody" OR "material lineage" OR "batch tracking" OR "batch traceability") AND (textile OR recycling OR "recycled material") | Batch relationships and continuity of material identity. |
| S6 | RQ2 | Batch structure change and reconciliation | (traceability OR "chain of custody") AND (splitting OR merging OR aggregation OR segregation OR reconciliation) AND (material OR recycling) | Split, merge, aggregation, segregation, and reconciliation. |
| S7 | RQ2 | Actor functions in reverse supply chains | ("reverse supply chain" OR "reverse logistics") AND (textile OR garment OR apparel) AND (collector OR aggregator OR intermediary OR recycler) | Collection, transfer, consolidation, receipt, and processing functions. |

In Stage 1, all S1-S7 results were collected and deduplicated using DOI as the main identifier. The search produced 55 record occurrences and 47 unique journal articles after deduplication. The original search string was kept for each article.

### *3.2 Title, abstract, and full-text screening*

In Stage 2, the title and abstract of all 47 unique articles were read. An article was retained when the abstract contained extractable information for the purpose of the relevant search string. This step retained 34 articles and excluded 13. To keep the protocol sequential, articles that failed abstract screening were not brought back at the full-text stage.

In Stage 3, the 34 retained articles were assessed using full text or an available full-text version against four research functions: C1 covers material waste in textile/apparel manufacturing; C2 provides evidence on post-industrial waste flows in Indonesia; C3 explains traceability or digitalization functions relevant to material flow; and C4 covers intermediary functions in textile reverse supply chains. One article could meet more than one function.

In Stage 4, direct evidence that could be separated within the system boundary was assigned to the main synthesis. Relevant cross-sector, post-consumer, or broader lifecycle evidence was kept as supporting literature. One early-access article remained pending because full text could not be confirmed.

**Table 3. Summary of literature selection**

| Stage | Result | Main decision |
|---|---|---|
| Stage 1 | 55 record occurrences; 47 unique journal articles after DOI deduplication. | All unique articles moved to title and abstract screening. |
| Stage 2 | 47 articles screened; 34 substantive journal articles retained; 13 excluded. | Only retained articles moved to full-text assessment. |
| Stage 3 | 34 articles assessed against C1-C4 | Assessment used research function and system-boundary relevance. |
| Stage 4 | 22 main-synthesis journal articles; 12 supporting articles. | The main synthesis formed the primary evidence base. |

### *3.3 Academic evidence extraction*

Structured extraction was carried out for the 22 main-synthesis articles. The unit of extraction was not an article summary. It was the evidence needed to answer RQ1 and RQ2. The extraction categories were material event/process, material-state change, actor, data or information element, transfer/custody mechanism, batch relationship, traceability function, and relevance to Strategy 2.

Supporting literature was used to clarify transferable concepts, especially material mixing, reconciliation, digitalization, and chain of custody. It was not used as the main evidence for claims about actual post-industrial garment-waste flows in Indonesia.

### *3.4 Policy and operational-document extraction*

Indonesia's Circular Economy Roadmap and National Action Plan 2025-2045 was purposively selected as the primary policy source. Extraction focused on textile Strategy 2, especially 2.1.c and 2.3.a, and on data-management themes related to resource tracking, supply-chain transparency, data integration, and verification/validation.

Reverse Resources and Closed Loop Fashion were purposively selected as operational/industry documents. Their information was used as a comparator for data categories and operational functions stated explicitly by these organizations. It was not used to claim system effectiveness or adoption across all actors in Indonesia.

### *3.5 Triangulation and specification development*

Triangulation in this study is limited to triangulation across document sources. Academic evidence, policy needs, and operational documents were compared for convergence and difference. Candidate requirements then received three analytic labels: E1 for requirements stated explicitly in one or more sources; E2 for requirements synthesized from relationships across sources; and E3 for proposed rules or indicators needed for consistent lineage and reconciliation but not yet stated as explicit requirements or tested in practice.

E1, E2, and E3 are labels created for this study, not an external evidence-grading system. The triangulation produced four main outputs: a material-event map, minimum data groups, batch-lineage rules, and actor responsibilities.

### *3.6 Method limitations and position of the results*

The study does not include interviews, field observation, or a system pilot. The term validation is therefore not used to mean empirical validation. The result is a document-based minimum specification that can support a future pilot; it is not a validated national standard.

Using only one academic search engine also limits corpus coverage. In addition, abstract screening was deliberately strict and sequential. Some papers that might have become relevant after full-text review were not reintroduced after failing Stage 2. This choice improves protocol consistency but may reduce literature recall.

The recycler-gate boundary also limits policy claims. The study can support waste-generation records for 2.1.c and provide provenance and feedstock-receipt evidence relevant to upstream support for 2.3.a. It does not verify that the material was recycled or became recycled content in a final textile product.

## 4. Research Findings and Discussion

### *4.1 Position of the results and evidence level*

Evidence strength is different across the four research functions. C1 has many sources on waste type, generation point, management, and material transformation. C3 also has several sources on identification, batch/activity records, material identity, and digital traceability. C4 is supported by work on collection, sorting, transfer, recycling, brokerage, and actor roles. C2 has less direct empirical evidence; Nurkomariyah et al. (2026) is the main source for Indonesian post-industrial waste flows.

For this reason, evidence from Bangladesh, India, Europe, Sri Lanka, and other settings is only used to understand functions that may be transferable. The paper does not state that the same practices are already used by all actors in Indonesia.

**Table 4. Evidence position of result components**

| Result component | Main basis | Dominant status | Meaning |
|---|---|---|---|
| Basic material attributes and actor functions | Category, weight, composition, origin, condition, batch/activity records, and collection/sorting/recycling functions are stated in sources. | E1 | Explicit evidence forms the base of the specification. |
| Nine-event material map | Built from evidence on waste generation, sorting, collection, storage, transfer, receipt, and batch/activity records. | E2 | The event sequence is a synthesis for this system boundary. |
| Twelve minimum data groups | Combines explicit attributes with identification, reconciliation, and handover needs. | E2 | The minimum set is a synthesis; several components have E1 support. |
| Transfer, split, merge, correction, and tolerance rules | Derived from continuity, mixing, and reconciliation needs. | E3 | Proposed for pilot testing and not validated as a standard. |
| Actor responsibility matrix | Actor functions are supported by C4; data assignments are based on each actor's position in an event. | E1 for functions; E2 for assignment | Actor functions have direct support; field assignment is a synthesis. |

| Result component | Main basis | Dominant status | Meaning |
|---|---|---|---|
| Link to 2.1.c and 2.3.a | Derived from policy data needs and the boundary of data that can be produced. | E2 | Shows possible support and claim limits. |
| Pilot indicators | Proposed to test feasibility and data quality. | E3 | Not implementation results. |

E1 = explicit evidence; E2 = cross-source synthesis; E3 = proposed rule/indicator that has not been tested.

**Table 5. Research-function crosswalk and main sources**

| Function | Use in synthesis | Main sources |
|---|---|---|
| C1 - Manufacturing waste & transformation | Waste types, generation points, management, and material transformation. | Li et al. (2021); Akter et al. (2022); Nurkomariyah et al. (2026); Haslinger et al. (2019); Määttänen et al. (2021); Simonetti et al. (2024); de Lima et al. (2025); and Ramzan et al. (2025). |
| C2 - Indonesian waste flow | Direct empirical evidence on Indonesian post-industrial textile waste volumes and flows. | Nurkomariyah et al. (2026) is the main and most direct source. |
| C3 - Traceability/digitalization | Identification, batch/activity records, material identity, traceability, and data continuity. | Agrawal et al. (2018); Alves et al. (2022, 2024); Moora et al. (2026); Do & Stevenson (2026). |
| C4 - Intermediary functions | Collection, sorting, transfer, processing, brokerage, and reverse-chain actor roles. | Akter et al. (2022, 2025); Sandberg & Pal (2024); John & Rahman (2025); Do & Stevenson (2026); Teixeira et al. (2026). |

### *4.2 Material-event map from garment factory to recycler gate*

Process mapping produced nine types of material event that should be recordable when they occur. The map is an E2 synthesis based on evidence about waste generation, weighing, sorting, collection, storage, transport, batch/activity records, and recycler/intermediary functions (Akter et al., 2022, 2025; Alves et al., 2022, 2024; Sandberg & Pal, 2024; John & Rahman, 2025; Do & Stevenson, 2026; Nurkomariyah et al., 2026).

**Table 6. Nine material events and minimum records**

| No | Event | Main change | Minimum record | Evidence basis |
|---|---|---|---|---|
| 1 | Batch creation | Waste is identified and grouped as one traceable unit. | Batch ID, source facility, date, category, composition, color when relevant, container, and reason for becoming waste when relevant. | Identity/attributes E1; sequence and classification reason E2 |
| 2 | Initial weighing | The starting quantity of the batch is set. | Gross, tare, net weight, unit, weighing method/equipment, evidence when available. | Weight E1; metadata E2 |

| No | Event | Main change | Minimum record | Evidence basis |
|---|---|---|---|---|
| 3 | Source sorting/inspection | Material is kept together or sorted by category, characteristics, condition, or conformity. | Sorting criteria, condition/contamination, reason for non-conformity when relevant; if batch structure changes, use the split/merge event. | Sorting E1; ID rule and non-conformity reason E2 |
| 4 | Outbound handover | Custody moves from the factory to the next actor. | Sender, receiver, time, location, dispatch weight, handover evidence. | Transfer E1; record structure E2 |
| 5 | Receipt by collector/waste handler | Weight, condition, and conformity are checked again. | Receipt weight, condition, discrepancy, accepted/conditional/rejected status. | Receipt/inspection E1; status E2 |
| 6 | Split or merge | The relationship between batches changes. | Parent/source IDs, child/aggregate IDs, source/result weights, reason for change. | Lineage E2; rule E3 |
| 7 | Storage or repackaging | Location, container, or packaging changes without necessarily changing the material. | Location, time, new container, unchanged/linked ID. | Storage E1; linkage E2 |
| 8 | Dispatch to recycler | Custody and location move toward the recycler. | Batch list, sender, receiver, time, dispatch weight, transport/handover document. | Transport/transfer E1; structure E2 |
| 9 | Recycler-gate receipt | The final weight within the study boundary and feedstock conformity are confirmed. | Receipt weight, inspection/test result if available, acceptance/rejection, discrepancy. | Recycler/inspection E1; structure E2 |

The nine events are not nine compulsory steps for every batch. A batch sent directly from a factory to a recycler may pass through fewer events. The rule is simpler: any change in identity, quantity, characteristics, location, custody, or receipt status should be recordable.

Dispatch and receipt are separate events so that a sender's weight does not automatically replace the receiver's measured weight. Weight differences should be kept as reconciliation information. They should not automatically be treated as non-compliance because scales, moisture, packaging, or transport conditions can affect the result.

### *4.3 Twelve minimum data groups*

The event needs were combined into twelve minimum data groups. Several attributes are explicit in the literature or operational documents, but grouping them into exactly twelve categories is a study synthesis. The full minimum data set is therefore treated as E2.

**Table 7. Twelve minimum data groups**

| No | Data group | Use status | Short definition | Evidence basis |
|---|---|---|---|---|
| 1 | Unique batch ID | Required | A unique code that is not reused and stays linked to the physical label or identifier. | E1 |
| 2 | Event ID, time, and location | Required | Event identity, date/time, and the location where the event occurred. | E2 |
| 3 | Source facility and production link | Required | The facility that created the batch plus a period, order, material, or product reference that can link the waste to production data. | Origin E1; production link E2 |
| 4 | Material category | Required | Cutting scraps, roll ends, production samples, yarn waste, products that fail to meet specifications, or another agreed subcategory. | E1 |
| 5 | Material composition and information basis | Required | Main fibre type/percentage plus components or accessories that matter for sorting or recycling; the information source may be a declaration, checked document, or test result when available. | Composition E1; component detail and evidence basis E2 |
| 6 | Colour or colour group | Conditional | Dominant colour or colour group when it affects sorting, value, or recycler acceptance. | E1 |
| 7 | Net weight and measurement basis | Required | Gross, tare, net weight, unit, and weighing method/equipment. | Weight E1; metadata E2 |
| 8 | Actor and custody | Required | Who creates the record, holds the material, sends it, and receives it. | Actor function E1; custody structure E2 |
| 9 | Event type | Required | Creation, weighing, sorting, transfer, receipt, split, merge, storage/repackaging, rejection, correction. | E2 |
| 10 | Batch relationship | Conditional | Parent-child IDs or source IDs when batch structure changes. | E2 |
| 11 | Condition/contamination | Conditional | Wet/dry condition, contaminants, accessories or trims, and relevant quality deviations or reasons for failing specifications. | Condition E1; non-conformity detail E2 |
| 12 | Evidence, discrepancy, and correction history | Event-based | Handover photo/document, inspection result, discrepancy note, and correction/reversal record without deleting the original record. | Evidence E1/E2; correction trail E3 |

Two points need clarification. First, composition data should show the basis of the information. A supplier declaration, a checked document, and a laboratory test do not have the same level of certainty.

The specification does not require laboratory testing for every batch, but it should show where the composition value came from. For production samples and products that fail to meet specifications, relevant trims or non-textile components should also be recorded when they may affect recycling.

Second, commercial data such as price, final buyer identity, or production formulas do not need to be part of the shared minimum data set. For 2.1.c, the factory only needs to keep a link between the waste batch and a period/order/material/product reference that lets the waste numerator be matched with a production denominator without exposing all commercial data to every actor.

### *4.4 Batch relationships and reconciliation rules*

Traceability is easiest when a batch moves without changing. Risk increases when material is split, merged, or corrected. Material-traceability and mass-balance literature shows the importance of keeping input-output relationships and preventing double counting after mixing (Schumacher & Beers, 2024; Caraceni et al., 2024; Carlsson & Nevzorova, 2025; Krueger et al., 2026).

The study therefore proposes four minimum rules. All rules in this subsection are E3. The study does not set a universal weight-difference tolerance because the evidence base does not support one value for all cases. A tolerance should be set in a pilot and should consider scale type, batch size, moisture, packaging, and transport conditions.

**Table 8. Proposed batch-lineage and reconciliation rules**

| Situation | Proposed rule | Reconciliation | Status |
|---|---|---|---|
| One-to-one transfer | Keep the same batch ID when physical identity stays intact; create a new event ID for the transfer. | Store dispatch and receipt weights separately. Record the difference and review it when it exceeds the pilot tolerance. | E3 |
| Splitting | Close the parent batch as an active unit; give each part a child ID linked to the parent. | Compare total child weight with parent weight; record any loss/gain as a discrepancy. | E3 |
| Merging | Create a new aggregate ID that lists all source IDs; close source batches as active units to prevent double counting. | Store each source weight and the aggregate total and reconcile them. | E3 |
| Rejection/correction | Do not delete the old record. Create a new rejection, reversal, or correction event. | Keep the original and corrected values with reason, time, and the actor who made/confirmed the correction. | E3 |

### *4.5 Responsibilities across actors*

C4 literature supports different functions across the reverse supply chain. The responsibility principle used here is simple: create data as close as possible to the physical event, and let the receiving party confirm handover data. The digital system operator manages ID structure, access rights, format validation, and audit trails, but it does not replace the physical actor's responsibility for material weight, condition, or composition.

Actor functions have E1 support from the literature. Assigning specific data fields to particular actors is E2 because the study maps the fields to each actor's position in an event.

**Table 9. Recording and confirmation responsibilities**

| Actor | Data created | Data confirmed | Main use |
|---|---|---|---|
| Garment factory | Initial batch ID, category, composition, color when relevant, initial weight, sorting, outbound handover. | Corrections to source data and resolution of issues linked to production data. | Measure waste generation and provide origin evidence. |
| Collector/waste handler | Receipt, inspection, split/merge, storage/repackaging, shipment. | Weight/condition at receipt and the next handover data. | Keep lineage and match material with recycler needs. |
| Logistics provider | Transport time, sender, receiver, transport document, pickup/delivery evidence when relevant. | Physical pickup and delivery. | Show continuity of custody during transport. |
| Recycler | Receipt weight, inspection/test when available, acceptance/rejection. | Batch conformity with feedstock specification. | Supply planning, quality control, and feedstock receipt evidence. |
| Digital system operator | ID structure, actor registration, access rights, format validation, audit trail, and data export. | Technical record consistency, not the physical truth of the material. | Maintain information integrity and support reporting. |

Government does not need to operate every transaction. A more proportionate policy role is to define material categories, units, minimum rules, indicator definitions, audit mechanisms, and formats for aggregated data export. Commercial data can remain protected, while third-party verification can be used for claims linked to certification, incentives, or market access.

### *4.6 Link to indicator 2.1.c and upstream support for 2.3.a*

For 2.1.c, batch data can provide a waste numerator by facility, category, and period. The waste-generation percentage still needs a production denominator using the same period or measurement unit. Traceability can therefore improve the consistency of waste records, but it cannot calculate the complete indicator without factory production data.

For 2.3.a, the study ends at the recycler gate. The records can show material origin, composition, weight, transfer, lineage, and receipt as feedstock. This is not enough to claim recycled content in a final product. Final verification needs additional information on recycling processes, yield, losses, blending, and later manufacturing.

**Table 10. How the traceability outputs relate to Strategy 2**

| Indicator/need | Data that can be produced | Support provided | Claim limit |
|---|---|---|---|
| 2.1.c - Waste-generation percentage | Waste weight by facility, category, period, and production/order/material/product reference. | Provides the waste numerator and trend data; can be matched with a consistent production denominator. | Does not directly assess CAD/zero-waste technology and cannot calculate the ratio without production data. |

| Indicator/need | Data that can be produced | Support provided | Claim limit |
|---|---|---|---|
| Upstream support for 2.3.a | Origin, composition, weight, transfer, lineage, and recycler-gate receipt. | Traceable feedstock volume, provenance, and weight reconciliation up to the recycler gate. | Does not verify that the feedstock was recycled or became recycled content in a final product. |

### *4.7 Implications for a pilot*

Because the study is document-based, the next step should be a limited pilot. The simplest pilot could include one garment factory, one collector or waste handler, and one recycler that already have material transactions. The first system does not need to be complex. A structured spreadsheet, mobile form, simple database, or QR label can be used if it keeps batch IDs, event records, batch relationships, handover evidence, access control, and correction history.

The pilot indicators below are E3 proposals. Their purpose is to test feasibility, data quality, and operational burden before wider use. The pilot should also examine protection of commercial information, willingness to share data, cost allocation, and benefits for each actor.

**Table 11. Proposed pilot indicators**

| Pilot indicator | Purpose |
|---|---|
| Completeness of required data fields | Test whether the minimum fields can be completed consistently. |
| Share of batches traceable to the source facility | Test lineage continuity. |
| Dispatch-receipt weight difference | Identify discrepancy patterns and a basis for tolerance. |
| Recording time per event | Measure administrative burden. |
| Completeness of parent-child/source relationships | Test split and merge mechanisms. |
| Number of correction/dispute records | Find the data points that create the most problems. |
| Recycler-gate acceptance/rejection rate | Test the link between batch information and feedstock specification. |
| Share of batches whose composition has an evidence basis | Assess composition-data quality. |
| Share of labels/identifiers still readable at receipt | Test physical-identity durability during storage and transport. |

Notes: All indicators in Table 11 are E3 proposals for future research/piloting and are not current implementation results.

## 5. Conclusion

This study develops a minimum digital traceability specification for identifiable post-industrial garment waste, including cutting scraps, roll ends, production samples, yarn waste, and products that fail to meet specifications, from batch creation at a garment factory to receipt at the recycler gate. The specification connects policy needs, literature evidence, material events, minimum data groups, batch-lineage rules, and actor responsibilities in one consistent framework.

The main outputs are nine material events, twelve minimum data groups, four batch-lineage rules, and a responsibility matrix for five actor groups. The evidence level is not the same for all outputs. Basic attributes and actor functions have explicit support. The event sequence and field assignments are cross-source syntheses. Detailed split, merge, correction, and tolerance rules remain E3 proposals that need testing.

For indicator 2.1.c, the specification can support more structured waste-generation data when waste batches are linked to a matching production denominator. For 2.3.a, it can provide upstream evidence on provenance, characteristics, quantity, lineage, and feedstock receipt up to the recycler gate. It does not verify recycled content in a final product.

The main limitations are the absence of interviews, field observation, and system testing; the use of Google Scholar as the only academic search engine; and the limited direct Indonesian empirical evidence, which relies heavily on one national-level material-flow study. The results should therefore not be treated as a description of practice across the whole Indonesian supply chain or as a validated standard.

Future research should test the specification in a pilot and assess data completeness, traceability back to origin, weight differences, composition-data quality, label durability, recording time, actor acceptance, commercial-data protection, and costs and benefits. Pilot results can then be used to refine the data groups, set operational tolerances, and assess whether the specification is ready to become broader guidance or a standard.

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# THE ROLE OF THE TOURISM SECTOR IN THE GROSS REGIONAL DOMESTIC PRODUCT OF BALI PROVINCE

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## Abstract
*Bali is a province whose economy is most dependent on the tourism sector in Indonesia. When the COVID-19 pandemic hit in 2020 to 2021, foreign tourists almost completely stopped visiting, and Bali Province's economy slumped sharply. This condition encourages research to examine the role of the tourism sector in Bali Province's Gross Regional Domestic Product (GRDP) for the period from 2017 to 2025, specifically analysing the influence of the number of foreign tourists and the number of restaurants on Bali Province's GRDP. This study uses a multiple linear regression method with annual data from BPS Bali Province. The results show that foreign tourists have a positive and significant effect on Bali Province's GRDP, and the number of restaurants also has a positive and significant effect on Bali Province's GRDP. Simultaneously, foreign tourists and the number of restaurants have a positive and significant effect on Bali Province's GRDP. This research shows that the tourism sector and the culinary industry are the two main pillars of Bali's economy. The local government is advised to strengthen the tourism ecosystem as a whole, not only in terms of the number of tourist visits but also by strengthening the local culinary industry as a distribution channel for economic benefits for the Balinese people at large.*
***Keywords**: GRDP, foreign tourists, restaurants, tourism, Bali Province*

## 1. Introduction

Gross Regional Domestic Product (GRDP) is the most comprehensive indicator for assessing regional economic performance, representing the accumulation of gross added value generated by all economic sectors in a region for one year (Widiani & Rustariyuni, 2025). The tourism sector has long been recognized as one of the main pillars of Indonesia's economic growth, with a widespread impact on the hospitality industry, transportation, culinary, trade, and the creative economy (Simatupang, 2024). Among all provinces, Bali is the region that relies the most on tourism as the main driver of its economy, supported by the natural beauty, rich Balinese Hindu culture, and the friendliness of the locals (Shanti & Nasikh, 2023; Putra & Astawa, 2022)

Before the pandemic, Bali Province's GRDP grew from Rp144.93 trillion (2017) to Rp162.69 trillion (2019), in line with the increase in foreign tourists from 5.69 million to 6.27 million and the number of restaurants from 2,251 to 2,864 units. When the COVID-19 pandemic hit in 2020, tourist visits plummeted to only 51 people in 2021, and GRDP slumped to Rp143.87 trillion, even lower than the 2017 base year. In the 2022–2025 period, Bali's economy will bounce back with the opening of international flights, with foreign tourists reaching 6.94 million people and the number of restaurants jumping to 10,448 units by 2025, pushing GRDP to reach a record high of IDR 177.99 trillion.

Behind these achievements, Bali's tourism sector still faces problems in the governance of accommodation and culinary business licensing, which risks causing economic leakage and bias in the calculation of GRDP. Previous research has consistently shown the positive influence of the tourism sector on GRDP (Widiani & Rustariyuni, 2025; Simatupang, 2024), but most of them have not integrated the variables of foreign tourists and the number of restaurants simultaneously in one model and have not covered the period before, during, and after the COVID-19 pandemic at the same time. The novelty of this research lies in the use of the latest data for the 2017–2025 period, which covers the three phases. Based on this description, this study aims to analyze the influence of the number of foreign tourists and the number of restaurants, both partially and simultaneously, on the GRDP of Bali Province.

## 2. Literature Review

GRDP based on Constant Prices measures the total gross value added of all economic sectors of a region after being adjusted for inflation, thus reflecting real economic growth (Calero & Turner, 2020; Wasani & Purwanti, 2022). The Regional Economic Base Theory explains that the base sector or the leading sector of a region, in this case international tourism, brings capital injection from outside the region, which then moves the non-base sectors through a multiplier effect, namely labor absorption, increasing community income, and strengthening local supply chains (Gkouzos & Christofakis, 2018).

Widiani and Rustariyuni (2025) found that tourism indicators have a positive and significant effect on the GRDP of Bali Province. Simatupang (2024) shows that the tourism industry in various provinces of Indonesia produces a large multiplier effect of output and labor. Mukaffi and Tri Haryanto (2022) show that the number of restaurants has a positive effect on the GDP of Banyuwangi Regency, while Apriyanti and Hatmoko (2024) affirm the role of tourism in GDP and labour absorption in Bali Province. However, most studies have not integrated foreign tourist numbers and the number of restaurants simultaneously in a single model, covering the period before, during, and after the COVID-19 pandemic, as was done in this study.

Based on the review of theory and previous research, three research hypotheses were formulated: H1: The number of foreign tourists has a positive effect on the GRDP of Bali Province. H2: The number of restaurants has a positive effect on the GRDP of Bali Province. H3: The number of foreign tourists and the number of restaurants simultaneously have a positive effect on the GRDP of Bali Province.

## 3. Research Methods

### 3.1 Design, Data, and Research Variables

This study uses a quantitative approach with an explanatory design to explain the causal relationship between variables through hypothesis testing (Lim, 2025). The data used is secondary, in the form of annual time series data for the Province of Bali for the period 2017–2025 sourced from the Central Statistics Agency (BPS) of Bali Province. The research variables and their operational definitions are presented in Table 1.

**Tabel 1. Operational Definition of Research Variables**

| Variables | Operational Definition | Units | Data Source |
|---|---|---|---|
| PDRB (Y) | Gross Regional Domestic Product is the total value of the real economic output of Bali Province. | Billion Rupiah | BPS Bali Province, |
| Wisman (X1) | The number of foreign tourists entering Bali Province. | People | BPS Bali Province, |
| Restoran (X2) | The number of business units providing food and beverages officially registered in Bali Province, in units per year. | Unit | BPS Bali Province, |

Source : *Data processed* (2026).

### 3.2 Data Analysis Techniques

The main analysis technique used is multiple linear regression, with the following model:

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon}$$

Description :

- $Y$ = Bali Province GRDP (Billion Rupiah)
- $\alpha$ = Constant (Y value when $X_1$ and $X_2$ are zero)
- $\beta_1$ = Variable regression coefficient $X_1$
- $\beta_2$ = Variable regression coefficient $X_2$
- $X_1$ = Wisman or Foreign tourists (people per year)
- $X_2$ = Restoran or Restaurants (units per year)
- $\varepsilon$ = Error term

The regression coefficients of $\beta_1$ and $\beta_2$ were estimated using the Ordinary Least Squares (OLS) method, which is by minimizing the sum of squared residuals between the actual value and the predicted value of the dependent variable. The OLS method was chosen because it has the property of BLUE (Best Linear Unbiased Estimator) based on the Gauss-Markov theorem, as long as classical assumptions are fulfilled (Gkouzos & Christofakis, 2018; (Mukaffi & Tri Haryanto, 2022). The classical assumption test is a series of tests to ensure that the linear regression model meets the basic assumptions, so that the results are valid and reliable. This regression analysis includes tests for normality, multicollinearity, autocorrelation, and heteroscedasticity. The advantage of using time series data is that researchers can identify patterns and trends in changes in variables. This can result in estimates and predictions related to future values. Therefore, it is very useful for research analysis.

## 4. Results and Dicussion

### 4.1 Overview of Research Variables

During the 2017–2025 period, Bali Province's GRDP showed three contrasting phases: stable growth in the pre-pandemic period (2017–2019), sharp contraction during the COVID-19 pandemic (2020–2021) to a low of Rp143871.68 billion in 2021, and recovery that surpassed the pre-pandemic record in the post-pandemic period (2022–2025) to reach Rp177992.95 billion in 2025 (Figure 1).

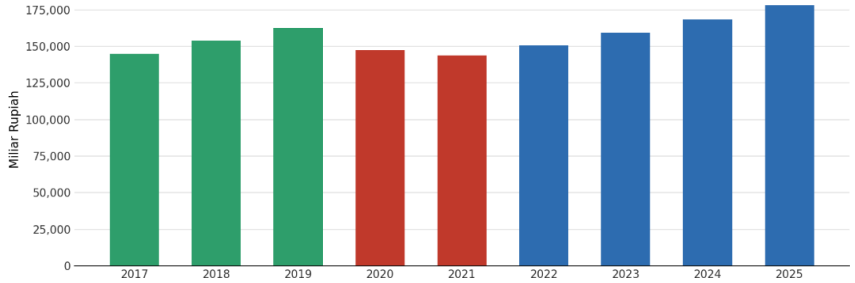



**Figure 1. Trend of Bali Province's GDDP in 2017–2025 (Billion Rupiah)**

*Source: BPS Bali Province (2026)*

The same pattern is reflected in the number of foreign tourists (Figure 2), which moved steadily in the range of 5.7–6.3 million people per year before the pandemic, plummeting drastically from 6.27 million people (2019) to only 51 people (2021) due to the closure of international flights, then gradually recovering to reach 6.95 million people by 2025, the highest record in the history of Bali tourism.

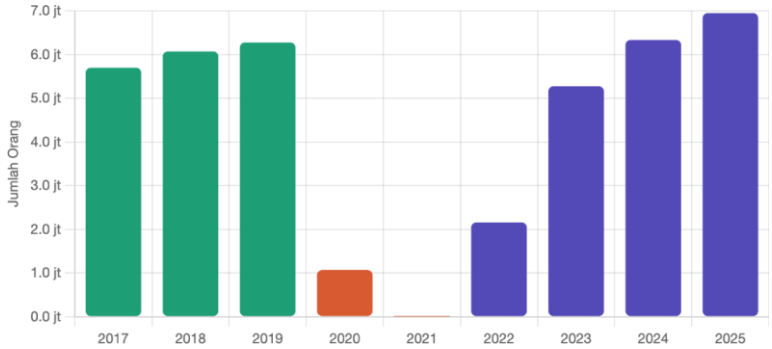



**Figure 2. Trend of the Number of Foreign Tourists to Bali Province in 2017–2025 (People)**

*Source: BPS Bali Province (2026)*

In contrast to foreign tourists, the number of restaurants (Figure 3) continued to grow relatively steadily throughout the observation period, even growing during the pandemic as culinary business actors adapted to the domestic market. The number of restaurants increased from 2251 units (2017) to 10448 units (2025), with the sharpest surge occurring in 2023–2025 as tourist flows recovered and investment in the culinary sector increased.

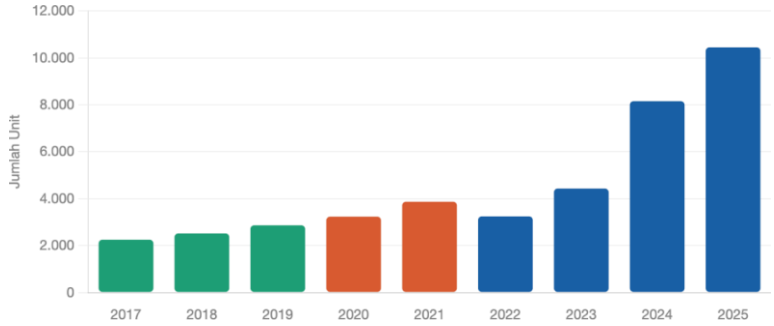



**Figure 3. Trend of the Number of Restaurants in Bali Province in 2017–2025 (Units)**
*Source: BPS Bali Province (2026)*

### 4.2 Descriptive Statistics

**Tabel 2. Descriptive Statistical Analysis Results**

| Variable | N | Minimum | Maksimum | Mean | Std Deviation |
|---|---|---|---|---|---|
| PDRB (Miliar Rp) | 9 | 143871.68 | 177992.95 | 156614.15 | 11498.66 |
| Foreign Tourists (People) | 9 | 51 | 6948754 | 4424896.11 | 2609374.47 |
| Number of Redtaurants (Units) | 9 | 2251 | 10448 | 4556.44 | 2826.986 |

Source : Data processed, 2026.

Bali Province's GRDP has an average of IDR 156614.15 billion with a standard deviation of IDR 11498.66 billion. This relatively moderate standard deviation indicates that despite significant fluctuations due to the pandemic, Bali's GRDP has not been shaken to the extreme, as non-tourism sectors such as agriculture, information, and government services continue to contribute to stabilising regional economic output. The maximum GRDP is IDR 177992.95 billion, achieved in 2025, while the minimum is IDR 143871.68 billion, recorded in 2021.

The number of foreign tourist visits in Bali Province averages 4424896 people per year, with a standard deviation of 2609374 people. This standard deviation is due to extreme fluctuations in visits during the pandemic; the maximum number of foreign tourist visits is 6948754 people recorded in 2025, while the minimum is 51 people recorded in 2021.

The variable number of restaurants has an average of 4556.44 units with a standard deviation of 2826985 units. The sizable standard deviation values reflect uneven growth throughout the observation period, with the most significant spikes concentrated in 2024 to 2025. The maximum number of restaurants is 10448 units recorded in 2025, while the minimum is 2251 units recorded in 2017.

### 4.3 Classic Assumption Test

The results of the Kolmogorov-Smirnov test show an Asymp. Sig. (2-tailed) of 0.200 (> 0.05), so the residual model is normally distributed. The multicollinearity test showed a Tolerance value of 0.852 (> 0.10) and a VIF of 1.173 (< 10) for both independent variables, indicating that the model was free of multicollinearity. The Glejser test showed that the significance values of Tourists (0.267) and Restaurants (0.140) were both greater than 0.05, so the model was homoskedastic. The Run Test produced a significance value of 0.968 (> 0.05), indicating no autocorrelation. Thus, all classical assumptions are fulfilled, and the regression model is worthy of further interpretation.

### 4.4 Regression Results and Hyporhesis Testing

**Table 3. Results of Multiple Linear Regression Analysis**

| Variable | B | Std. Error | Beta | t hit | Sig. |
|---|---|---|---|---|---|
| (Constant) | 135451.363 | 3614.078 | - | 37.479 | 0.000 |
| Foreign Tourists (People) | 0.002 | 0.001 | 0.458 | 2.960 | 0.025 |
| Number of Restaurants (Units) | 2.686 | 0.629 | 0.660 | 4.271 | 0.005 |

Source: *Data Processed*, 2026.

The regression equation is

**PDRB = 135.451,363 + 0,002 Wisman + 2,686 Restoran + ε**

Where PDRB is Gross Regional Domestic Product, Wisman is the number of foreign tourists, Restoran is the number of Restaurants, and ε is the error term. The interpretation of the equation is as follows. First, the constant value is 135451.363, which means that when the number of foreign tourists and the number of restaurants are zero, the GRDP of Bali Province is Rp135451.363 billion. Second, the regression coefficient of the foreign tourists variable ($\beta_1$) of 0.002 shows that each additional foreign tourist will increase the GRDP of Bali Province by Rp0.002 billion, assuming a constant restaurant variable (ceteris paribus). Third, the variable regression coefficient of the number of restaurants ($\beta_2$) of 2.686 shows that each addition of one new restaurant unit will increase the GRDP of Bali Province by IDR 2.686 billion, assuming a constant tourist variable (ceteris paribus).

### 4.5 Discussion

The positive influence of foreign tourists on GRDP is in line with the Economic Base Theory, where international tourism plays a role as a base sector that injects foreign exchange into the local economy. The strongest empirical evidence appears in the 2020–2021 period, when border closures due to the COVID-19 pandemic caused tourist visits to plummet and were followed by a sharp contraction in GRDP. These findings strengthen the results of Iswardhani et al. (2025), Widiani and Rustariyuni (2025), and Shanti and Nasikh (2023).

The positive influence of the number of restaurants on GRDP reflects the characteristics of the culinary industry as a labour-intensive sector with strong backward supply chain linkages, absorbing local labour and increasing demand for raw materials from Balinese farmers and fishermen. These findings are consistent with Putra and Astawa (2022) and Apriyanti and Hatmoko (2024). Simultaneously, foreign tourists represent the demand side, while restaurants represent the supply side in Bali's tourism ecosystem; the synergy of the two optimizes the multiplier effect of tourism, as affirmed by Simatupang (2024) and Tantra and Murthi (2025).

## 5. Conclusion

The number of foreign tourists and the number of restaurants, both partially and simultaneously, have a positive and significant effect on the GRDP of Bali Province during the period 2017–2025. These findings confirm that the tourism sector and the culinary industry are the two main pillars of Bali's economic drive that complement each other through the multiplier effect mechanism. Local governments are advised to strengthen the tourism ecosystem as a whole, including the governance of accommodation and culinary business licensing. In contrast, culinary business actors are advised to improve service standards and strengthen local supply chain partnerships. Future research is suggested to add other variables such as the length of stay of tourists, hotel occupancy rates, and tourism investment realisation, as well as expand the analysis

unit to the district/city level.

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# ESG DISCLOSURE, GREEN ACCOUNTING, INTELLECTUAL CAPITAL AND FIRM VALUE: THE MODERATING ROLE OF FINANCIAL PERFORMANCE

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## Abstract
*This study examines the effect of Environmental Disclosure, Social Disclosure, Governance Disclosure, Green Accounting, and Intellectual Capital on firm value, and analyzes the moderating role of financial performance. This study uses a quantitative approach using panel data from IDXESGL companies during the 2021–2024 period, with 40 observations from 10 firms selected through purposive sampling. Data are analyzed using Multiple Linear Regression Analysis and Moderated Regression Analysis using EViews 13. The results show that Intellectual Capital has a significant positive effect on firm value, whereas other independent variables do not have a significant effect. Financial performance strengthens the positive effect of Social Disclosure on firm value, weakens the effect of Environmental Disclosure on firm value, and does not significantly moderate the effects of Governance Disclosure, Green Accounting, and Intellectual Capital. The results show that strengthening intellectual capital and credible social initiatives supported by strong financial performance offers greater value-creation potential.*
***Keywords**: Environmental, Social, and Governance (ESG) Disclosure, Green Accounting, Intellectual Capital, Financial Performance, Firm Value*

## 1. Introduction

Firm value has become an increasingly important indicator for assessing a company's long-term performance, market perception, and ability to generate sustainable returns. Firm value reflects investors' perspectives on the company, where rising stock prices signal improved corporate performance and investor confidence (Sinaga et al., 2025). In recent years, global awareness of sustainability has grown rapidly, driven by concerns over climate change, inequality, and environmental degradation. These issues not only threaten ecological stability, economic resilience, and social well-being but also shape how investors evaluate firm value. One key way companies are able to demonstrate their commitment is through sustainability reporting. Integrating ESG into corporate strategy is able to enhance competitiveness, strengthen stakeholder trust, and create long-term value which is able to enhance firm value (ESG Indonesia Capital Market, 2025). For investors, ESG-oriented investments have proven more resilient during global crises and more competitive in generating sustainable long-term returns.

The adoption of ESG practices among Indonesian companies has continued to increase, supported by a stronger regulatory framework established by the Financial Services Authority (OJK). Through POJK No. 51/POJK.03/2017 and SEOJK No. 16/SEOJK.04/2021, OJK requires financial institutions, issuers, and public companies to integrate sustainability principles into their business operations and publish sustainability reports. This action is expected to enhance firm value by providing investors with more credible, consistent, and transparent information regarding a company's long-term risks, strategic direction, and operational accountability, thereby strengthening market confidence. Following the implementation of these regulations, companies have demonstrated greater compliance and commitment to sustainability reporting, reflected in the increasing percentage of IDX-listed companies disclosing sustainability reports, which rose from 80% in 2021 to 88% in 2022, 94% in 2023, and 97% in 2024 (Andy, 2023; Nurahmad, 2025; Redaksi Shift Indonesia, 2025; Shafira, 2025).

Although ESG adoption among Indonesian companies continues to increase, several

challenges still limit its effectiveness in enhancing firm value, including high implementation costs, limited understanding of ESG standards, and data constraints. A more serious concern is the risk of greenwashing, where firms exaggerate sustainability performance for reputational or financial gain (Olivia et al., 2025). For example, PT Kalimantan Industrial Park Indonesia (KIPI) promoted its operations as environmentally friendly, although reports indicated unresolved ecological and social impacts and limited transparency (CELIOS, 2024). Similar concerns arise in Indonesia's retail sector, where companies such as PT Matahari Department Store Tbk, PT Ramayana Lestari Sentosa Tbk, and PT Sona Topas Tourism Industry Tbk reported emission reductions without clear methodological justification (Aptasari et al., 2024). These examples illustrate the continuing credibility risk surrounding ESG disclosures in Indonesia, which may lower investor confidence and weaken their firm value.

Previous studies have reported mixed findings regarding the relationship between sustainability-related factors and firm value. While ESG disclosure, green accounting, and intellectual capital are generally associated with higher firm value, several studies have reported insignificant or even negative effects, indicating that the benefits of sustainability initiatives depend on firm-specific conditions and suggesting that financial performance may play an important moderating role. These mixed findings highlight an important gap in the literature, particularly in the Indonesian context, where empirical evidence on the combined effects of ESG disclosure, green accounting, and intellectual capital on firm value remains limited. Existing research has primarily examined these variables separately or focused only on aggregate ESG scores, with limited attention to the moderating role of financial performance (Angela & Sari, 2023; Christy & Sofie, 2023; Jayanti et al., 2024).

Furthermore, few studies have specifically focused on companies listed in the IDX ESG Leaders Index (IDXESGL), despite these firms' representing companies with relatively stronger sustainability commitments. Therefore, this study investigates the effects of ESG disclosure, green accounting, and intellectual capital on firm value, with financial performance as a moderating variable, using IDXESGL-listed companies as the research sample. By focusing on firms with established sustainability commitments, this study provides empirical evidence on whether sustainability-related initiatives create greater firm value when supported by strong financial performance. The findings are expected to enrich the literature and offer practical insights for regulators, investors, and companies in promoting a more transparent, accountable, and sustainable capital market in Indonesia.

## 2. Literature Review

### *2.1 Signalling Theory*

Signalling theory explains that firms use voluntary disclosure to reduce information asymmetry (Connelly et al., 2011), where ESG disclosure and green accounting act as strategic signals to communicate sustainability commitment and shape investor perceptions of long-term value.

### *2.2 Legitimacy Theory*

From the legitimacy theory perspective, firms adopt ESG and green accounting practices to align their activities with social norms and regulatory expectations, securing legitimacy as a key resource for survival and reputation enhancement (Del Gesso & Lodhi, 2025).

### *2.3 Stakeholder Theory*

Stakeholder theory emphasizes that firms must manage relationships with all actors who affect or are affected by corporate activities, as stakeholder alignment supports long-term performance and value creation (Freeman et al., 2021).

### *2.1 Environmental, Social, and Governance (ESG) Disclosure*

*Environmental, Social, and Governance (ESG) represents an integrated framework of environmental, social, and corporate governance factors that influence a company's ability to*

*create long-term value and manage sustainable development (Sustainability Nasdaq, 2019).*

#### *2.1.1 Environmental Disclosure*

Environmental disclosure refers to the disclosure of information regarding a company's environmental performance, including its management of natural resources, emissions, energy, waste, biodiversity, and other environmental impacts (Kaźmierczak, 2022).

#### *2.1.2 Social Disclosure*

Social disclosure refers to the disclosure of information regarding a company's relationships with stakeholders, including employees, customers, suppliers, and communities, through responsible social and labor practices (Kaźmierczak, 2022).

#### *2.1.3 Governance Disclosure*

Governance disclosure refers to the disclosure of information regarding the systems, structures, and practices that guide corporate governance, accountability, transparency, and stakeholder protection (Kaźmierczak, 2022).

### *2.2 Green Accounting*

Green accounting is an accounting approach that integrates environmental assets, resource use, and ecological impacts into financial reporting. It aims to incorporate environmental costs into a company's financial outcomes, allowing organizations to recognize the economic implications of their environmental activities (Rounaghi, 2019).

### *2.6 Intellectual Capital*

Intellectual capital is broadly defined as a company's knowledge-based resources that generate value, enhance performance, and sustain competitive advantage through intangible assets such as employee expertise, organizational systems, innovation capability, and relational networks that are not captured in traditional financial statements but significantly shape long-term success (Aryanti & Mertha, 2022).

### *2.7 Firm Value*

Firm value is broadly defined as the market's perception of a company's overall performance and future prospects that determines shareholder welfare, commonly reflected through stock prices and emphasizing its link to market returns (Astari et al., 2023; Perihati & Putri, 2023).

### *2.8 Financial Performance*

Financial performance reflects a company's ability to effectively utilize its resources to generate profits and achieve sustainable growth. It can be measured using various financial indicators, with Return on Assets (ROA) being one of the most widely used proxies for profitability.

### *2.9 Firm Size*

Firm size refers to the scale of a company's operations, typically measured by its total assets. Larger firms generally possess greater financial resources, managerial capacity, and visibility, enabling them to implement sustainability initiatives more effectively and create long-term value.

### *2.10 Leverage*

Leverage refers to the extent to which a company uses debt to finance its assets and operations. It reflects a firm's financial risk and capital structure, which may influence its ability to sustain operations and create firm value (Hulster, 2009).

### *2.11 Conceptual Framework*

This study examines one dependent variable, five independent variables, one moderating variable, with two control variables. The dependent variable is firm value, measured using Tobin's Q. The independent variables consist of environmental disclosure (ED), social disclosure (SD), governance disclosure (GD), green accounting (GA), and intellectual capital (IC). Environmental, social, and governance disclosure are measured using the Global Reporting Initiative (GRI) Standards 2021 disclosure index, green accounting is measured by the ratio of environmental costs to net profit, and intellectual capital is measured using the Modified Value Added Intellectual Coefficient (MVAIC). Financial performance, represented by Return on Assets (ROA), serves as the moderating variable. In addition, firm size (FS) and leverage (LEV) are included as control variables, measured by the natural logarithm of total assets (LnTA) and the Debt-to-Equity Ratio (DER), respectively.

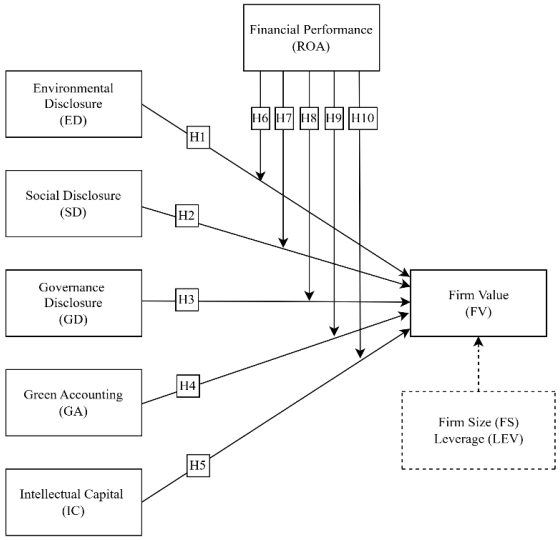



Figure 1 Conceptual Framework

Based on the conceptual framework and supported by theoretical foundations and prior studies, the research hypotheses can be formulated as below :

HI : Environmental Disclosure is expected to enhance firm value.
H2 : Social Disclosure is expected to enhance firm value.
H3 : Governance Disclosure is expected to enhance firm value.
H4 : Green Accounting is expected to enchance firm value.
H5 : Intellectual Capital is expected to enhance firm value.
H6 : Financial Performance positively moderates the association between Environmental Disclosure and Firm Value.
H7 : Financial Performance positively moderates the association between Social Disclosure and Firm Value.
H8 : Financial Performance positively moderates the association between Governance Disclosure and Firm Value.
H9 : Financial Performance positively moderates the association between Green Accounting and Firm Value.
H10 : Financial Performance positively moderates the association between Intellectual Capital and Firm Value

## 3 Research Methods

### *3.1 Research Methodology*

This study employs a quantitative research approach using a causal research design that focuses on cause-and-effect relationships. Quantitative data are used to measure and analyze the relationship between Environmental, Social, and Governance (ESG) disclosure, green

accounting, and intellectual capital on firm value, as well as the moderating role of financial performance. This study employs panel data regression analysis, which combines cross-sectional and time-series data to provide a more comprehensive and robust analytical framework. The data for this study were sourced from the Indonesia Stock Exchange (IDX) official website (www.idx.co.id) and the official website of the company, including the company annual reports, sustainability reports, and other supporting data of the companies listed on the IDX. These sources are selected for the reliability in providing comprehensive financial, ESG, green accounting, and intellectual capital-related information.

### *3.2 Population and Sample*

The population of this study consists of 53 IDXESGL companies listed on the Indonesia Stock Exchange (IDX) during 2021-2024 period. The observation period of this study begins in 2021, following the launch of the IDX ESG Leaders index (IDXESGL) in December 2020, which marks the first year of complete annual report and sustainability report disclosures. Accordingly, the study covers four years observations during the 2021–2024 period, excluding the year of 2025 due to the unavailability of finalized annual reports from the companies. The sampling process conducted using purposive sampling method involved several filtering stages.

**Table 1 Purposive Sampling Criteria**

| No | Criteria | Total |
|---|---|---|
| 1. | Research population | 53 |
| 2. | Companies whose inclusion in the IDXESGL index was not maintained throughout the 2021–2024 observation period | (35) |
| 3. | Companies that failed to provide annual reports and sustainability reports consistently and completely for each year from 2021 to 2024 | 0 |
| 4. | Companies that do not disclose their environmental cost in sustainability report consecutively during 2021-2024 period | (8) |
| | **Number of companies** | **10** |
| | **Time series (2021 – 2024)** | **4 years** |
| | **Total of samples** | **40** |

The use of purposive sampling in this study is consistent with prior empirical research. Previous studies employing purposive sampling have similarly obtained relatively small samples due to strict selection criteria, such as ESG data availability and complete sustainability reporting. This is particularly evident in research on IDXESGL constituent companies, where purposive sampling resulted in 14 firms with 42 observations over three years (Putri et al., 2025), demonstrating that sustainability-based research naturally involves limited observations. Based on the purposive sampling criteria, the final sample of this study is presented in Table 2.

**Table 2 List of Research Samples**

| No | Code | Company Name |
|---|---|---|
| 1. | BBCA | Bank Central Asia Tbk. |
| 2. | BBNI | Bank Negara Indonesia (Persero) Tbk |
| 3. | BBRI | Bank Rakyat Indonesia (Persero) Tbk |
| 4. | BMRI | Bank Mandiri (Persero) Tbk |
| 5. | BSDE | Bumi Serpong Damai Tbk |
| 6. | CTRA | Ciputra Develompment Tbk |
| 7. | ERAA | Erajaya Swasembada Tbk |
| 8. | JSMR | Jasa Marga (Persero) Tbk |
| 9. | PWON | Pakuwon Jati Tbk |
| 10. | TOWR | Sarana Menara Nusantara Tbk |

### *3.3 Operational Definition of Variables*

Table 3 presents the operational definitions and measurement proxies of the variables used in this study.

**Table 3 Operational Definition of Variables**

| Variables | Operational Definition | Measurement Scale |
|---|---|---|
| Environmental Disclosure (ED) | Measured by the proportion of disclosed environmental items on sustainability report or disclosed sustainability information in annual report to the total GRI Standard 2021 300 series with total of 31 indicators. | ED= Sum of Company's Environmental Disclosure Item Total of GRI's Environmental Disclosure Standard Item<br>Source: Christy & Sofie (2023) |
| Social Disclosure (SD) | Measured by the proportion of disclosed social items on sustainability report or disclosed sustainability information in annual report to the total GRI Standard 2021 400 series with total of 36 indicators. | SD= Sum of Company's Social Disclosure Item Total of GRI's Social Disclosure Standard Item<br>Source: Christy & Sofie (2023) |
| Governance Disclosure (GD) | Measured by the proportion of disclosed governance items on sustainability report or disclosed sustainability information in annual report to the total GRI 2 and GRI 205 standard items on GRI Standard 2021 with total of 33 indicators. | GD= Sum of Company's Governance Disclosure Item Total of GRI's Governance Disclosure Standard Item<br>Source: Christy & Sofie (2023) |
| Green Accounting (GA) | Calculated as environmental expenditure relative to the company's net profit. | GA= Total Environmental CostNet Profit<br>Source: Perihati & Putri (2023) |
| Intellectual Capital (IC) | The measurement is based on the Modified Value-Added Intellectual Coefficient (MVAIC) approach. | MVAIC = HCE + SCE + RCE + CEE<br>Source: Pramesti et al. (2024) |
| Firm Value (FV) | Asessed through Tobin's Q, reflecting the relationship between the market value and the book value of the company's assets | Tobin's Q Ratio = Total Market Value+ Total Book Value of Liabilities Total Book Value of Assets<br>Source: Christy & Sofie (2023) |
| Firm Size (FS) | Determined using the natural logarithm of the company's total assets. | FS = Ln(Total Assets)<br>Source: Kumar & Firoz (2022) |
| Leverage (LEV) | Represented by the Debt-to-Equity Ratio (DER), calculated from total debt relative to total equity. | DER= Total DebtTotal Equity<br>Source: Mauliddin & Subardjo (2023) |
| Financial Performance (ROA) | Determined from the proportion of profit after tax generated from the company's total assets. | ROA= Profit After Tax (PAT)Total Assets<br>Source: Kumar & Firoz (2022) |

### *3.4 Data Analysis Method*

The relationship between the independent and dependent variables in this study is analyzed using multiple regression models, and further assessed through Moderated Regression Analysis to evaluate the moderating role of financial performance. The research is conducted through EViews 13. The stages of data analysis include descriptive analysis, regression panel data model estimation, selection of panel data regression model, classical assumption test, regression analysis, and hypothesis test. The following is the regression model equation used :

$$FV = c + \beta 1ED + \beta 2SD + \beta 3GD + \beta 4GA + \beta 5IC + \beta 6FS + \beta 7LEV + \varepsilon \ldots\ldots (1)$$

$$FV = c + \beta 1ED + \beta 2SD + \beta 3GD + \beta 4GA + \beta 5IC + \beta 6ROA + \beta 7FS + \beta 8LEV + \varepsilon \ldots\ldots (2)$$

$$FV = c + \beta 1ED + \beta 2SD + \beta 3GD + \beta 4GA + \beta 5IC + \beta 6ROA + \beta 7FS + \beta 8LEV + \beta 9ED*ROA + \beta 10SD*ROA + \beta 11GD*ROA + \beta 12GA*ROA + \beta 13IC*ROA + \varepsilon \ldots\ldots (3)$$

## 4 Research Findings and Discussion

The results and analysis describing the relationship between the Environmental Disclosure, Social Disclosure, Governance Disclosure, Green Accounting and Intellectual Capital as independent variables and firm value as dependent variable with financial performance as moderating variable are presented in this section. These relationships are examined using multiple regression models and further evaluated through Moderated Regression Analysis (MRA) to assess the moderating role of financial performance. Each stage of the results and analysis is explained in the following sections.

### *4.1 Descriptive Statistic Analysis*

**Table 4 Descriptive Statistic Result**

| Variable | Mean | Median | Max | Min | Std. Dev. | Observation |
|---|---|---|---|---|---|---|
| **ED** | 0.4694 | 0.4033 | 0.8710 | 0.0323 | 0.2305 | 40 |
| **SD** | 0.4563 | 0.4306 | 0.8611 | 0.1389 | 0.1677 | 40 |
| **GD** | 0.8485 | 0.8940 | 1.0000 | 0.4242 | 0.1624 | 40 |
| **GA** | 0.0255 | 0.0014 | 0.2479 | 0.0000 | 0.0663 | 40 |
| **IC** | 5.7844 | 5.1994 | 13.6546 | 2.4395 | 2.9001 | 40 |
| **ROA** | 0.0397 | 0.0389 | 0.0983 | 0.0086 | 0.0189 | 40 |
| **FS** | 19.0735 | 18.2490 | 21.6100 | 16.2467 | 1.7933 | 40 |
| **LEV** | 0.7050 | 0.3317 | 2.3277 | 0.1509 | 0.6711 | 40 |
| **FV** | 0.0606 | 0.0033 | 0.5239 | -0.4452 | 0.2464 | 40 |

Table 4 presents the descriptive statistics of the study variables. Governance disclosure (GD) has the highest average value, while green accounting (GA) records the lowest mean, indicating that governance practices are more extensively disclosed than environmental cost allocation. In addition, intellectual capital (IC) exhibits the highest variability, suggesting considerable differences across firms. Overall, the results indicate adequate variation in the data for further panel regression analysis.

### *4.2 Regression Panel Data Model Estimation*

**Table 5 Regression Panel Data Model Estimation Result**

| Variable | CEM | | FEM | | REM | |
|---|---|---|---|---|---|---|
| | Coefficient | Prob. | Coefficient | Prob. | Coefficient | Prob. |
| **C** | -2.448879 | 0.0002 | 8.448318 | 0.0003 | 1.094085 | 0.2913 |
| **ED** | -0.408681 | 0.0457 | 0.005127 | 0.9674 | -0.229357 | 0.0378 |
| **SD** | 0.169752 | 0.4303 | 0.069620 | 0.5554 | 0.153193 | 0.1770 |
| **GD** | -0.365035 | 0.0509 | -0.104339 | 0.2622 | -0.232982 | 0.0090 |
| **GA** | 0.016672 | 0.9677 | 1.462806 | 0.1146 | 0.060484 | 0.9343 |
| **IC** | 0.058826 | 0.0007 | 0.035700 | 0.0455 | 0.031440 | 0.0534 |
| **ROA** | 2.755177 | 0.3355 | 2.188262 | 0.1618 | 2.519664 | 0.0929 |
| **FS** | 0.128904 | 0.0000 | -0.444616 | 0.0003 | -0.049899 | 0.3495 |
| **LEV** | 0.035352 | 0.7036 | -0.260539 | 0.0611 | -0.183954 | 0.1035 |

Table 5 presents the estimation results of the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Since the estimated coefficients differ across models, panel model selection tests are conducted to identify the most appropriate model for further analysis.

#### *4.2.1 Chow Test*

**Table 6 Chow Test Result**

| Effects Test | Statistic | d.f. | Prob. |
|---|---|---|---|
| **Cross-section F** | 17.88864 | (9,22) | 0.0000 |
| **Cross-section Chi-square** | 84.73726 | 9 | 0.0000 |

Based on the results in Table 6, both the F-statistic and Chi-square statistic produce probability values of 0.0000, which are below the 0.05 significance level. This indicates that the regression coefficients differ significantly across cross-sections, and therefore the Fixed Effect Model (FEM) is preferred over the Common Effect Model (CEM).

#### *4.2.2 Hausman Test*

**Table 7 Hausman Test Result**

| Test Summary | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
|---|---|---|---|
| **Cross-section random** | 32.0986 | 8 | 0.0001 |

Table 7 shows a Chi-square probability value of 0.0001, which is lower than 0.05. This result indicates that the Fixed Effect Model (FEM) is more appropriate because the assumption required for the Random Effect Model (REM) is violated.

Based on the Chow Test and Hausman Test, the Fixed Effect Model (FEM) is selected as the most suitable model for this study. The LM test is not required because it is only used to choose between the Random Effect Model (REM) and the Common Effect Model (CEM). Since both the Chow and Hausman tests consistently direct the selection toward the Fixed Effect Model (FEM), additional LM testing becomes unnecessary (Basuki, 2021).

### 4.3 *Classical Assumption Testi*

#### 4.1.1 *Normality Test*

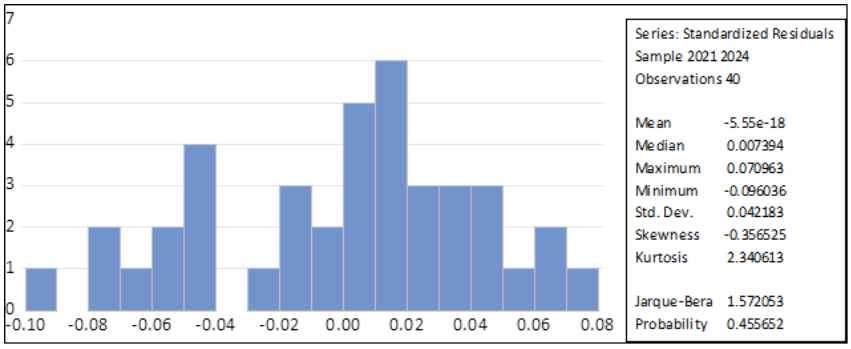



Figure 2 Normality Test Result

The normality test in Figure 2 indicates that the residuals are normally distributed. This is shown by the Jarque-Bera probability of 0.455652, which is higher than 0.05, meaning the residuals do not significantly differ from a normal distribution. The Skewness value of -0.356525 and the Kurtosis value of 2.340613 are also within the acceptable ranges for a normal distribution. Based on these results, the data can be concluded to meet the normality assumption.

#### *4.1.2 Multicollinearity Test*

**Table 8 Multicollinearity Test Result**

| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| **ED** | 0.0385 | 19.7905 | 3.7689 |
| **SD** | 0.0451 | 20.0661 | 2.3359 |
| **GD** | 0.0323 | 45.4650 | 1.5678 |
| **GA** | 0.1667 | 1.5519 | 1.3466 |
| **IC** | 0.0002 | 19.3488 | 3.8087 |
| **ROA** | 7.9301 | 28.7421 | 5.2039 |
| **FS** | 0.0007 | 516.7498 | 4.4156 |
| **LEV** | 0.0085 | 14.9720 | 7.0234 |

Based on Table 8, all variables show Centered VIF values below the acceptable threshold (VIF<10), indicating that the regression model is generally free from multicollinearity issues.

#### *4.1.3 Heteroscedasticity Test*

**Table 9 Heteroscedasticity Test Result**

| **F-statistic** | **0.922397** | **Prob. F** | **0.5117** |
|---|---|---|---|
| Obs*$R^2$ | 7.690815 | Prob. Chi-Square | 0.4642 |
| Scaled explained SS | 6.206877 | Prob. Chi-Square(8) | 0.6241 |

Based on Table 9, the heteroscedasticity test using the Glejser method shows probability values of Prob. F = 0.5117 and Prob. Chi-Square (Obs*$R^2$) = 0.4642, indicate that the regression model does not exhibit heteroscedasticity, meaning that the residual variance is constant (homoscedastic).

### 4.2 *Refression Analysis & Hypothesis Test*

Regression analysis in this study was conducted through Multiple Linear Regression Analysis to test the direct effect of each independent variable on firm value and Moderated Regression Analysis (MRA) by including interaction terms with ROA to examine whether financial performance moderates the relationship between the independent variables and firm value. The regression analysis of this study are shown in table 10.

**Table 10 Regression Analysis Result**

| Variable | Cofficient | Std. Error | t-Statistic | Prob. | $R^2$ | Adjusted $R^2$ |
|---|---|---|---|---|---|---|
| **Model 1** | | | | | | |
| **C** | 8.345986 | 2.020272 | 4.131120 | 0.0004 | 0.967908 | 0.945583 |
| **ED** | -0.007831 | 0.126613 | -0.061847 | 0.9512 | | |
| **SD** | 0.091808 | 0.117950 | 0.778367 | 0.4443 | | |
| **GD** | -0.075134 | 0.090474 | -0.830452 | 0.4148 | | |
| **GA** | 1.223764 | 0.895407 | 1.366712 | 0.1849 | | |
| **IC** | 0.047627 | 0.015029 | 3.169008 | 0.0043 | | |
| **FS** | -0.443509 | 0.107636 | -4.120462 | 0.0004 | | |
| **LEV** | -0.152335 | 0.111389 | -1.367597 | 0.1847 | | |
| **Model 2** | | | | | | |
| **C** | 8.448318 | 1.975074 | 4.277469 | 0.0003 | 0.970699 | 0.948057 |
| **ED** | 0.005127 | 0.124024 | 0.041341 | 0.9674 | | |
| **SD** | 0.069620 | 0.116252 | 0.598873 | 0.5554 | | |
| **GD** | -0.104339 | 0.090666 | -1.150799 | 0.2622 | | |
| **GA** | 1.462806 | 0.890263 | 1.643117 | 0.1146 | | |
| **IC** | 0.035700 | 0.016837 | 2.120344 | 0.0455 | | |
| **FS** | 2.188262 | 1.511635 | 1.447612 | 0.1618 | | |
| **LEV** | -0.444616 | 0.105163 | -4.227877 | 0.0003 | | |
| **Model 3** | | | | | | |
| **C** | 2.211955 | 3.352368 | 0.659819 | 0.5182 | 0.988168 | 0.972856 |
| **ED** | 0.343010 | 0.157770 | 2.174119 | 0.0441 | | |
| **SD** | -0.282147 | 0.197067 | -1.431734 | 0.1703 | | |
| **GD** | 0.000829 | 0.186402 | 0.004446 | 0.9965 | | |
| **GA** | 3.891612 | 1.637451 | 2.376628 | 0.0295 | | |
| **IC** | 0.002616 | 0.037052 | 0.070601 | 0.9445 | | |
| **ROA** | -5.145660 | 3.894071 | -1.321409 | 0.2039 | | |
| **FS** | -0.097038 | 0.183929 | -0.527587 | 0.6046 | | |
| **LEV** | -0.588955 | 0.174335 | -3.378290 | 0.0036 | | |
| **ED*ROA** | -14.668300 | 4.598193 | -3.190014 | 0.0054 | | |
| **SD*ROA** | 14.417230 | 6.234291 | 2.312569 | 0.0335 | | |
| **GD*ROA** | 0.454251 | 3.950311 | 0.114991 | 0.9098 | | |
| **GA*ROA** | -78.136970 | 36.628320 | -2.133239 | 0.0478 | | |
| **IC*ROA** | 1.055583 | 0.643161 | 1.641241 | 0.1191 | | |

Model 1 shows that Environmental Disclosure (ED) has a coefficient of -0.007831 with a p value of 0.9512, showing a negative and statistically insignificant effect on firm value, therefore **H1 is rejected**. Social Disclosure (SD) also shows a positive yet insignificant effect, with a coefficient of 0.091808 and a p value of 0.4443, indicating that SD does not contribute meaningfully to changes in firm value, therefore **H2 is rejected**. Governance Disclosure (GD) has a negative coefficient of –0.075134 with a p value of 0.4148, meaning the variable does not significantly affect firm value, therefore **H3 is rejected**. Green Accounting (GA) has a coefficient of 1.223764 with a p value of 0.1849, also indicating a positive but insignificant

impact, therefore **H4 is rejected**. However, Intellectual Capital (IC) has a coefficient of 0.047627 with a p value of 0.0043, which is below the 0.05 threshold. This result means that IC has a positive and statistically significant effect on firm value, therefore **H5 is accepted**. The $R^2$ value of 0.967908 and adjusted $R^2$ value of 0.945583 indicates that Model 1 feasible to use in predicting the firm value variable.

Model 2 includes financial performance (ROA) as an additional independent variable. The results show that IC remains significantly positive, whereas ED, SD, GD, and GA continue to show no significant effect on firm value. ROA itself has a probability value of 0.1618 > 0.05, meaning that it does not directly influence firm value. The $R^2$ and adjusted $R^2$ value slightly increases to 0.970699 and 0.948057, indicating that Model 2 remains feasible for predicting firm value, although financial performance does not contribute a significant direct effect in this model.

Model 3 adds interaction terms between ROA and each independent variable to test the moderating effect of financial performance. The results show that the interaction between Environmental Disclosure and ROA (ED*ROA) has a coefficient of –14.66883 with a p-value of 0.0054, indicating a statistically significant moderating effect. The negative coefficient shows that ROA weakens the influence of environmental disclosure on firm value, therefore **H6 is rejected**. The interaction between Social Disclosure and ROA (SD*ROA) has a coefficient of 14.41723 and a p-value of 0.0335, demonstrating a significant positive moderating effect, which means ROA strengthens the relationship between social disclosure and firm value, therefore **H7 is accepted**. The interaction between Governance Disclosure and ROA (GD*ROA) has a coefficient of 0.454251 with a p-value of 0.9098, indicating no significant moderating role, therefore **H8 is rejected**. The interaction term for Green Accounting and ROA (GA*ROA) also shows a significant result, with a coefficient of –78.13697 and a p-value of 0.0478. However, the negative direction suggests that ROA weakens the impact of green accounting on firm value rather than strengthening it, therefore **H9 is rejected**. The interaction between Intellectual Capital and ROA (IC*ROA) has a coefficient of 1.055583 and a p-value of 0.1191, indicating that ROA does not significantly moderate the effect of intellectual capital on firm value, therefore **H10 is rejected**. The $R^2$ value and adjusted $R^2$ value increases substantially to 0.988168 and 0.972856, demonstrating that the model's predictive ability improves when the moderating variable and interaction terms are included. Therefore, Model 3 is considered highly feasible for explaining variations in firm value.

The moderating variable, ROA (Financial Performance), functions as a pure moderator. This means that the pure moderator influences the relationship between the predictor and the dependent variable without acting as a predictor itself (Solimun, 2011). In this study, ROA as moderating variable does not have a significant direct effect on firm value (Prob. = 0.2039 > 0.05), but its interaction with several independent variables (ED, SD, GA) significantly affects firm value, confirming its role as a pure moderator.

### 4.3 *Simultaneous Test*

**Table 11 Simultaneous Test Result**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.35909 | 0.09570 | 14.20116 | 0.00000 |
| ED | -0.14213 | 0.15971 | -0.88994 | 0.38136 |
| SD | 0.10451 | 0.17141 | 0.60971 | 0.54715 |
| GD | -0.28861 | 0.11086 | -2.60342 | 0.01482 |
| **Effects Specification** | | | | |
| **Cross-section fixed (dummy variables)** | | | | |
| R-squared | 0.92868 | Mean dependent var | 1.09517 | R-squared |
| Adjusted R- | 0.89699 | S.D. dependent | 0.28250 | Adjusted R- |

| | | | | |
|---|---|---|---|---|
| squared | | var | | squared |
| S.E. of regression | 0.09066 | Akaike info criterion | -1.70624 | S.E. of regression |
| Sum squared resid | 0.22196 | Schwarz criterion | -1.15735 | Sum squared resid |
| Log likelihood | 47.12485 | Hannan-Quinn criter. | -1.50778 | Log likelihood |
| F-statistic | 29.30026 | Durbin-Watson stat | 1.57278 | F-statistic |
| Prob(F-statistic) | 0.00000 | | | Prob(F-statistic) |

Based on Table 11, the F-test produces a probability value of 0.0000 (<0.05), indicating that Environmental Disclosure, Social Disclosure, and Governance Disclosure simultaneously have a significant effect on firm value. These findings suggest that ESG disclosure, when measured as an aggregate index, significantly influences firm value, although its individual dimensions may exhibit mixed results in the partial test. This result is consistent with Aydoğmuş et al. (2022), who found that the overall ESG score positively affects firm value despite inconsistent effects across individual ESG dimensions.

### *4.4 Discussion*

The results show that environmental, social, and governance disclosures do not individually have a significant effect on firm value. These findings suggest that investors do not consider ESG disclosures alone as sufficient indicators of firm value, particularly when the information is largely compliance-driven or lacks direct economic relevance. This result is consistent with previous studies reporting that ESG disclosure often serves as a legitimacy mechanism rather than a value-creating signal unless it provides credible and decision-useful information. From the perspectives of signalling and legitimacy theories, ESG disclosure influences market valuation only when it effectively reduces information asymmetry and demonstrates substantive sustainability performance.

Similarly, green accounting is found to have no significant effect on firm value, indicating that environmental cost disclosures are not yet perceived by investors as value-relevant information. In contrast, intellectual capital has a positive and significant effect on firm value, implying that knowledge-based resources are recognized as important drivers of competitiveness, innovation, and long-term corporate performance. These findings support previous studies suggesting that while sustainability-related disclosures may not immediately influence market valuation, intellectual capital provides a stronger strategic signal regarding a firm's future growth and value creation.

Regarding the moderating effect, financial performance weakens the relationships between environmental disclosure and firm value as well as between green accounting and firm value, while strengthening the relationship between social disclosure and firm value. However, financial performance does not significantly moderate the effects of governance disclosure and intellectual capital on firm value. These findings indicate that profitability does not uniformly enhance the value relevance of sustainability initiatives. Instead, financial performance appears to strengthen disclosures that directly reflect stakeholder engagement, such as social disclosure, while reducing the importance of environmental disclosures when investors place greater emphasis on financial outcomes.

## 4 Conclusion

This research examines the effect of Environmental Disclosure, Social Disclosure, Governance Disclosure, Green Accounting, and Intellectual Capital on firm value, with financial performance as a moderating variable from IDXESGL companies during the 2021–2024 period, with 40 observations from 10 firms selected through purposive sampling. This research was

conducted with data analysis techniques using Multiple Linear Regression Analysis and Moderated Regression Analysis (MRA). The results show that Environmental Disclosure, Social Disclosure, Governance Disclosure, and Green Accounting do not significantly affect firm value, indicating that these disclosures have not yet been perceived as value-relevant by the market. In contrast, Intellectual Capital has a significant positive effect on firm value, confirming the importance of knowledge-based resources in creating competitive advantage. Financial performance weakens the relationship between Environmental Disclosure and Green Accounting with firm value, does not moderate Governance Disclosure or Intellectual Capital, but strengthens the influence of Social Disclosure on firm value. Overall, these findings suggest that intellectual capital and socially oriented initiatives supported by strong financial performance contribute more to firm value than ESG disclosure or green accounting practices.

This study provides theoretical and managerial insights for IDXESGL companies by showing that Environmental, Social, and Governance Disclosures, along with Green Accounting, do not significantly affect firm value, challenging signaling theory and suggesting these disclosures may lack strategic depth or credibility (Connelly et al., 2011). From a legitimacy perspective, the findings indicate that such reporting may be symbolic rather than substantively value-creating (Burlea & Popa, 2013), while stakeholder theory is refined by the significant positive effect of Intellectual Capital, highlighting knowledge-based resources as the most credible signal for long-term value (Freeman et al., 2021). Financial performance moderates these relationships selectively, strengthening Social Disclosure but weakening Environmental Disclosure and Green Accounting, implying that sustainability impacts depend on profitability, disclosure type, and perceived credibility. Managerially, firms should enhance ESG and green accounting reporting by linking initiatives to measurable outcomes, invest in intellectual capital development, and ensure environmental and social programs demonstrate clear value, as only substantive, performance-integrated practices are likely to improve stakeholder trust and firm value.

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# TRANSFORMATIONAL LEADERSHIP OF THE SCHOOL PRINCIPAL IN ACHIEVING ORGANIZATIONAL CULTURE CHANGE: A CASE STUDY OF SMKN 10 SEMARANG

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**Abstract**
*Transformational leadership has been widely recognized as a key factor in driving organizational change within educational institutions. This study aims to examine how the transformational leadership of the principal contributed to organizational culture change at SMKN 10 Semarang. The school previously faced various challenges, including high levels of student misconduct, frequent student violence, weak discipline, and limited academic and non-academic achievement. Under the leadership of Principal Ardan, significant changes were observed in school management practices, organizational culture, student behavior, and school performance. This research employs a qualitative case study approach, using interviews, observations, and document analysis as the primary data collection techniques. The study focuses on identifying the principal's transformational leadership practices and their influence on discipline, achievement, collaboration, and innovation within the school environment. Preliminary findings indicate that visionary leadership, inspirational motivation, intellectual stimulation, and individualized consideration played important roles in transforming the school into a more disciplined, achievement-oriented, and innovative institution. The school is currently developing toward an EduTourism (Edu Wisata) model and has begun sharing its transformation experiences with other schools. The results of this study are expected to contribute to the literature on educational leadership and organizational culture transformation in vocational schools*
***Keywords***: *transformational leadership, organizational culture, school transformation, vocational school, educational leadership*

## 1. Introduction

Educational institutions are increasingly required to adapt to rapid social, technological, and organizational changes. In this context, school leadership plays a crucial role in determining whether a school is able to improve its performance, strengthen its organizational culture, and create a sustainable learning environment. Among various leadership approaches, transformational leadership has received significant attention because of its ability to inspire followers, encourage innovation, and create meaningful organizational change.

Transformational leadership refers to a leadership style that motivates members of an organization to transcend personal interests and work toward collective goals through vision, inspiration, intellectual stimulation, and individualized consideration. In educational settings, transformational leaders are expected not only to manage schools administratively but also to build a positive culture, develop teachers and students, and create a shared commitment to school improvement. Previous studies have shown that transformational leadership is associated with stronger organizational commitment, improved school effectiveness, and higher student achievement.

Organizational culture is another important factor influencing school performance. Organizational culture consists of shared values, norms, beliefs, and behaviors that guide the actions of members within an institution. A positive school culture is often characterized by discipline, collaboration, mutual respect, innovation, and a strong orientation toward achievement. Conversely, a weak organizational culture may contribute to behavioral problems, low motivation, and poor institutional performance. Therefore, changing organizational culture is frequently a central objective of educational reform.

The case of SMKN 10 Semarang provides an important example of leadership-driven school transformation. Prior to the current leadership period, the school was widely perceived as a relatively underperforming vocational school. The institution faced various challenges, including frequent student misconduct, student violence, weak discipline, and limited academic and non-academic achievement. These conditions affected the school's reputation and reduced public confidence in the institution

SMKN 10 Semarang experienced several incidents of student violence that attracted widespread public attention and negatively affected the school's public image. One of the most prominent incidents occurred in December 2022, when several students from SMKN 10 Semarang were involved in a violent attack against a student from SMKN 3 Semarang. According to police investigations reported by the media, the assault was motivated by an act of retaliation, resulting in the victim sustaining injuries from a sharp weapon. The case also involved several students and alumni of SMKN 10 Semarang, highlighting serious challenges related to student behavior and school culture.

A major transformation began after the appointment of Principal Ardan. Under his leadership, substantial changes were introduced in school management, disciplinary systems, student development programs, and organizational practices. The school gradually developed a culture emphasizing discipline, achievement, collaboration, and continuous improvement. Reports from school stakeholders indicate that student violations decreased significantly, while the number of students achieving academic and non-academic recognition increased. In addition, the school has progressed toward becoming an Edu Wisata (Edu-Tourism) school, and its leadership has started providing training and sharing best practices with other educational institutions.

The transformation of SMKN 10 Semarang is noteworthy because it demonstrates how leadership can influence not only administrative performance but also the deeper cultural dimensions of a school. Although many studies have examined transformational leadership in education, relatively few have explored how a principal's transformational leadership contributes to organizational culture change in Indonesian vocational schools undergoing substantial institutional transformation. This gap highlights the need for an in-depth case study focusing on the processes, strategies, and impacts of leadershipdriven cultural change.

Based on this background, the present study seeks to answer the following research question: How does the transformational leadership of the principal contribute to organizational culture change at SMKN 10 Semarang? Specifically, the study aims to identify the transformational leadership practices implemented by the principal, examine the resulting changes in organizational culture, and analyze the implications of these changes for student discipline, achievement, and school development.

The findings of this study are expected to provide both theoretical and practical contributions. Theoretically, the study will enrich the literature on transformational leadership and organizational culture in educational organizations. Practically, it may offer insights for school leaders, policymakers, and educational practitioners seeking to transform underperforming schools into effective and achievement-oriented institutions through leadership and cultural change.

## 2. Literature Review

### *2.1 Leadership Skill*

Transformational Leadership Theory is one of the most influential leadership theories in organizational behavior and management. It was first introduced by James MacGregor Burns (1978) and later developed into a comprehensive leadership model by Bernard M. Bass (1985) and Bass & Avolio (1994). According to Bass (1985) "Transformational leaders stimulate and inspire followers to achieve extraordinary outcomes while developing their own leadership capacity"

### *2.2 The Four Components (The Four I's)*

#### *2.2.1 Idealized Influence (Charisma)*

Idealized Influence refers to a leader's ability to become a role model who is admired, respected, and trusted by followers. According to Bass and Avolio (1994), transformational leaders demonstrate high ethical standards, integrity, and commitment to organizational goals, thereby earning the confidence and respect of organizational members. Leaders exhibiting idealized influence consistently align their International Conference on Economics, Business, and Management Research (ICEBMR) © 2026 actions with organizational values and inspire followers through exemplary behavior rather than authority alone. By modeling ethical conduct and organizational commitment, transformational leaders foster trust, loyalty, and a shared sense of purpose, encouraging followers to emulate these behaviors in their daily work.

#### *2.2.2 Inspirational Motivation*

Inspirational Motivation describes a leader's ability to articulate a clear and compelling vision that inspires followers to pursue shared organizational goals. Bass and Avolio (1994) argue that transformational leaders motivate employees by communicating meaningful objectives, creating optimism, and encouraging enthusiasm toward organizational success. Through inspirational communication, leaders help followers understand the significance of their roles and develop a strong commitment to achieving the organization's vision. As a result, followers become more motivated to exceed expectations, maintain a positive outlook, and actively contribute to organizational improvement.

#### *2.2.3 Intellectual Stimulation*

Intellectual Stimulation refers to the leader's ability to encourage innovation, creativity, and critical thinking among followers. Transformational leaders challenge existing assumptions, invite diverse perspectives, and motivate organizational members to seek new solutions to organizational problems (Bass & Avolio, 1994). Rather than relying on conventional approaches, leaders promote continuous learning and encourage employees to question established practices in order to improve organizational effectiveness. This dimension creates an environment where experimentation, knowledge sharing, and problem-solving are valued, enabling organizations to adapt more effectively to changing internal and external conditions.

#### *2.2.4 Individualized Consideration*

Individualized Consideration emphasizes the leader's attention to the unique needs, abilities, and aspirations of each follower. According to Bass and Avolio (1994), transformational leaders act as coaches and mentors by providing individualized support, recognizing personal differences, and facilitating followers' professional and personal development. Leaders who demonstrate individualized consideration actively listen to employees' concerns, provide constructive feedback, and create opportunities for continuous learning and career growth. By fostering supportive relationships and addressing individual development needs, transformational leaders enhance employee satisfaction, commitment, and organizational performance.

### *2.3 Organizational Culture*

Organizational culture is a pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration, which has worked well enough to be considered valid and therefore taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein, 2017). Schein (2017) proposes that organizational culture consists of three interconnected levels.

#### **2.3.1 Artifacts**

Artifacts are the visible and observable elements of organizational culture.

#### 2.3.2 Espoused Values

Espoused values represent the organization's stated beliefs and principles.

#### 2.3.3 Basic Underlying Assumptions

Basic assumptions are unconscious beliefs that have become taken-for-granted truths within the organization.

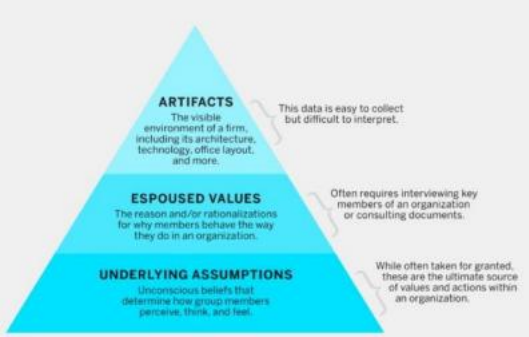



Figure 1. Organizational Culture
Source : MIT Sloan School of Management

According to Schein and Schein (2017), organizational culture develops through a process of collective learning. As members work together to solve problems of external adaptation and internal integration, they gradually develop shared assumptions that become accepted as the "correct" way of perceiving, thinking, and acting. Over time, these assumptions become taken for granted and are rarely questioned, making them highly resistant to change.

### *2.4* The Process of Organizational Culture Change

Schein (2017) explains that organizational culture change generally occurs through several interconnected stages.

#### 2.4.1 Recognition of the Need for Change

Culture change begins when organizational members realize that existing cultural assumptions are no longer effective in responding to environmental challenges. External pressures such as technological developments, market competition, policy reforms, or declining organizational performance often trigger this realization.

#### 2.4.2 Psychological Safety and Learning Anxiety

One of Schein's unique contributions is the distinction between learning anxiety and psychological safety. Learning anxiety refers to employees' fear of losing competence, status, identity, or relationships when adopting new ways of working. Psychological safety refers to creating an environment in which employees feel secure enough to experiment, make mistakes, ask questions, and learn without fear of punishment or embarrassment.

#### 2.4.3 Cognitive Redefinition

After recognizing the need for change and feeling psychologically safe, employees begin to reinterpret organizational realities.

#### 2.4.4 Internalization of New Assumptions

As employees repeatedly practice new behaviors and observe positive outcomes, the new values gradually become shared assumptions.

## 3. Research Methods

This study employs a qualitative case study approach to explore how the transformational leadership implemented by the school principal contributes to organizational culture change at SMKN 10 Semarang. A qualitative case study approach is deemed appropriate because the research aims to gain an in depth understanding of a unique organizational transformation phenomenon within a real-life context (Yin, 2018).

SMKN 10 Semarang was purposively selected as the research site because the school has undergone a significant transformation shifting from an institution previously notorious for frequent student violence and disciplinary issues to one recognized for academic achievement, student discipline, and a positive organizational culture.

The primary data in this study is the school principal, who plays a pivotal role in driving transformation. The principal was selected using purposive sampling due to their direct involvement in planning, implementing, and sustaining the organizational culture change process. Additional informants such as teachers familiar with the cultural shifts within the organization were included as part of a triangulation method to enhance the credibility of the findings.

Data were collected using semi-structured interviews based on Edgar Schein's framework of organizational culture change. The interview protocol was designed to align with the stages of organizational culture change outlined by Schein. Furthermore, the interviews explored transformational leadership behaviors, drawing upon the theory of Bass and Avolio (1994).

The questionnaire data were analyzed using thematic analysis following the procedures proposed by Braun and Clarke (2006). The analysis began by identifying key interview findings and supporting them with participant quotations to ensure transparency and credibility (Creswell & Poth, 2018). The researcher then interpreted the findings and mapped them onto Schein and Schein's (2017) Organizational Culture Change framework and Bass and Avolio's (1994) Transformational Leadership theory. Subsequently, the findings were compared with previous empirical studies to identify similarities, differences, and contextual insights.

Finally, the researcher highlighted the theoretical and practical contributions of the study to educational leadership and organizational culture literature.To ensure research credibility, member checking, source triangulation.

### *3.1 Member Checking*

To enhance the credibility of this study, member checking was conducted by returning the interview transcripts and the researcher's interpretations to the informants for verification. The participants confirmed that the interpretations were accurate and aligned with the meanings, intentions, and experiences documented in the questionnaires, and that no substantial revisions were required. This process enhances the study's credibility and trustworthiness (Lincoln & Guba, 1985; Creswell & Poth, 2018).

### *3.2 Source Triangulation*

To strengthen the credibility of the findings, source triangulation was conducted through interviews with two teachers who were privy to the organizational transformation at SMKN 10 Semarang. Their perspectives were used to verify whether the principal's leadership practices and the changes in organizational culture actually took place and were adopted by other members of the school community.

**Teacher 1**

Teacher 1 confirmed that the principal played a central role in initiating organizational culture change by consistently communicating the school's vision, encouraging collaboration, and demonstrating exemplary leadership. According to the teacher, the principal did not merely introduce new policies but also provided continuous mentoring and motivation, enabling

teachers to gradually embrace innovation, discipline, and professional development. The teacher further observed that the principal's consistency in modeling positive behaviors increased trust among school members and encouraged active participation in the cultural transformation process.

**Teacher 2**

Teacher 2 similarly stated that the principal successfully transformed the school's organizational culture through a combination of clear direction, continuous support, and participative leadership. The teacher explained that changes were reflected not only in administrative practices but also in the daily attitudes and behaviors of teachers and students. The establishment of learning, collaboration, innovation, and mutual support as shared values contributed to improved school performance and created a more positive working environment. The teacher believed that the principal's leadership was instrumental in embedding these values into the school's organizational culture.

## 4. Results and Discussion

This section presents an integrated analysis of Schein's (2017) Organizational Culture Change and Bass and Avolio's (1994) Transformational Leadership Theory. The findings are organized according to Schein's four stages of organizational culture change while simultaneously identifying the transformational leadership behaviors demonstrated by the school principal during each stage.

### *4.1 Recognizing the Need for Organizational Culture Change Deceloping a Shared Vision through Inspirational Motivation*

According to Schein (2017), organizational culture change begins when organizational members recognize that the existing culture is no longer capable of supporting organizational goals. During this stage, leaders create awareness regarding the urgency of change.

From the questionnaire findings revealed that:

The principal explained that when he first assumed leadership at SMKN 10 Semarang, the school's organizational culture was characterized by a fixed mindset, where teachers and staff were comfortable with existing routines and showed limited motivation to innovate or pursue professional development. Recognizing that this culture could hinder educational quality and organizational adaptability, he introduced a vision of transforming the school into a high-achieving institution. To achieve this, he implemented gradual changes through facilitation, mentoring, and coaching, encouraging teachers and staff to embrace continuous learning and remain open to change.

The principal further emphasized that successful transformation required the collective commitment of teachers, students, parents, and the broader school community. He therefore adopted a leadership-by-example approach by consistently demonstrating discipline, integrity, a strong work ethic, and a commitment to learning and innovation. According to the principal, this combination of exemplary leadership, continuous guidance, and collaborative engagement gradually strengthened trust among school members and enabled SMKN 10 Semarang to transform into a competitive, highachieving school with a positive organizational culture.

This finding supports Schein's (2017) argument that organizational culture change begins when organizational members recognize that existing assumptions are no longer effective in addressing organizational challenges. The principal's recognition of the need to change the school's violent culture represents the initial stage of organizational culture transformation.

From the perspective of transformational leadership, the principal demonstrated inspirational motivation by communicating a compelling vision that encouraged stakeholders to believe that the school could become a high-achieving institution despite its previous reputation.

### *4.2* Creating Psychological Safety through Individualized Consideration

Schein argues that organizational members will not abandon old assumptions unless they experience sufficient psychological safety. Employees often experience learning anxiety because cultural change threatens familiar routines and identities.

From the questionnaire findings revealed that:

The principal explained that organizational change inevitably generated challenges and resistance among members of the school community. To address this, he prioritized open, persuasive, and continuous communication to clarify the objectives, benefits, and expected outcomes of the transformation. He also emphasized collaboration by actively involving teachers, educational staff, students, and other stakeholders in the change process, fostering a shared sense of responsibility and reducing resistance. Furthermore, he highlighted that the transformation was not based on personal preferences but was aligned with government regulations and educational policies, enabling school members to recognize the necessity of the change and ultimately support the organizational transformation at SMKN 10 Semarang.

The principal further stated that building mutual trust was achieved through leading by example, demonstrating discipline, commitment, openness to change, and continuous learning. In addition to serving as a role model, he consistently provided mentoring, intensive communication, and regular evaluations to ensure that teachers and staff received guidance throughout the transformation process. He also acknowledged and appreciated individuals who actively contributed to the implementation of change, not only through formal recognition but also by valuing their efforts in strengthening the school's positive culture. According to the principal, this combination of exemplary leadership, continuous support, and appreciation fostered trust, strengthened a sense of ownership, and encouraged active participation in sustaining the school's organizational culture change.

These leadership practices illustrate Individualized Consideration, where the leader recognizes the different needs, concerns, and capacities of organizational members. Personalized mentoring, encouragement, and emotional support reduced resistance and increased teachers' willingness to adopt new practices.

Consequently, the school established an environment characterized by mutual trust, collaboration, and openness, which facilitated the learning process necessary for organizational culture change.

### *4.3 Cognitive Redefinition through Intellectual Stimulation*

Once organizational members feel psychologically safe, Schein proposes that they begin to reinterpret organizational realities by adopting new assumptions and learning alternative ways of thinking.

From the questionnaire findings revealed that:

The principal explained that changing the mindset of teachers and students began with fostering a shared commitment to improving the school through collective responsibility. He emphasized that school success is not solely the responsibility of the principal but the result of collaboration among teachers, educational staff, students, and other stakeholders. To support this transformation, he promoted a culture of innovation by encouraging every member of the school community to contribute ideas and initiatives that would benefit students, the school, and the wider community. This approach gradually shifted the organizational mindset from routine-oriented practices toward a culture focused on achievement, discipline, innovation, and positive character development.

To sustain this cultural transformation, the principal cultivated a culture of continuous

learning by encouraging teachers and educational staff to regularly update their knowledge, improve their competencies, and adapt to educational and technological developments. He also motivated them to document their learning experiences, share best practices, and participate in collaborative discussions as a means of reflection and innovation. According to the principal, this culture of learning, writing, and knowledge sharing strengthened collaboration, encouraged creativity and openness to new ideas, and created a school environment that continuously supports innovation, academic excellence, discipline, and positive organizational culture.

This stage reflects Intellectual Stimulation, whereby the principal encouraged innovation, critical thinking, and continuous improvement. Rather than maintaining traditional practices, organizational members were encouraged to develop creative solutions to long-standing disciplinary and academic problems.

As organizational members repeatedly experienced successful outcomes, new beliefs gradually replaced previous assumptions regarding what the school represented.

### *4.4 Institutionalizing New Organizational Culture through Idealized Influence*

According to Schein, sustainable culture change occurs only when new assumptions become embedded within everyday organizational practices.

From the questionnaire findings revealed that:

The principal emphasized that organizational culture change begins with exemplary leadership. He believed that leaders must first demonstrate the attitudes and behaviors they expect from teachers, staff, and students, including discipline, responsibility, continuous learning, strong work ethics, and a commitment to innovation. By consistently aligning his actions with the school's vision and values, he sought to build trust and credibility among members of the school community. According to the principal, this consistency encouraged teachers, staff, and students to accept and internalize new values, making cultural transformation a shared commitment rather than merely compliance with administrative directives.

To sustain the newly established organizational culture, the principal consistently implemented several practices that became part of the school's daily routines. He promoted a culture of continuous learning by encouraging professional development, a culture of writing through documenting experiences and best practices, a culture of sharing by exchanging knowledge and ideas among colleagues, and a culture of innovation by supporting initiatives that improved teaching, school services, and management. According to the principal, the consistent implementation of these practices gradually embedded the new organizational values into everyday school life, enabling SMKN 10 Semarang to become a learning-oriented, adaptive, innovative, and high-achieving educational institution.

Such leadership reflects Idealized Influence, whereby the leader serves as a role model whose behavior becomes a reference for organizational members. The new organizational culture became institutionalized through revised school rules, recognition of academic and non-academic achievements, student leadership programs, teacher professional learning communities, regular evaluation of organizational values.

As these practices became routine, organizational members increasingly perceived academic excellence, discipline, collaboration, and mutual respect as the normal way of working within the school.

### *4.5 Organizational Culture Change Outcome*

Frim the questionnaire findings revealed that :

The principal explained that the implementation of the new organizational culture resulted in significant behavioral changes across the school community. A strong culture of continuous learning was established, encouraging teachers, educational staff, and students to improve their competencies and adapt to educational developments. This transformation was further strengthened by a culture of writing, in which teachers documented learning experiences and best practices, and a culture of sharing that promoted collaboration, knowledge exchange, and mutual support among school members. In addition, a culture of healthy competition emerged, motivating teachers and students to actively participate in academic and non-academic competitions while continuously striving for excellence.

According to the principal, these cultural changes had a substantial impact on both organizational performance and the school's public image. The strengthened learning, writing, sharing, and innovation cultures contributed to improved academic and non-academic achievements at the regional, national, and international levels. Moreover, SMKN 10 Semarang successfully transformed from a school previously associated with various challenges into an institution recognized for innovation, high achievement, and a positive organizational culture. These outcomes demonstrate that sustainable organizational culture change can enhance educational quality, strengthen organizational performance, and increase public trust in the school.

### *4.6 Integration of Transformational Leadership and Organizational Culture Change*

The findings suggest that transformational leadership functioned as the primary mechanism facilitating organizational culture change. Rather than changing organizational culture directly, the principal influenced stakeholders' values, beliefs, and behaviors through transformational leadership behaviors that corresponded closely with Schein's stages of cultural transformation.

**Table 1. Integration of Transformational Leadership and Organizational Culture Change**

| Schein's Organizational Culture Change Stage | Transformational Leadership Dimension | Expected Leadership Practies |
|---|---|---|
| Recognition of the need for change | Inspirational Motivation | Communicating urgency, developing a shared vision, inspiring commitment |
| Creating psychological safety | Individualized Consideration | Listening, mentoring, supporting teachers and students, reducing resistance |
| Cognitive redefinition | Intellectual Stimulation | Encouraging innovation, reflective thingking, collaborative problem-solving |
| Internalization of new assumptions | Idealized Influence | Modeling desired behaviors, reinforcing values, embedding new norms |

*Source* : Primary Data

This integration demonstrates that transformational leadership provides the behavioral mechanisms through which organizational culture change occurs. While Schein explains how organizational culture changes, Bass and Avolio explain how leaders influence individuals to make those changes possible.

### *4.7 Proposed Conceptual Model*

Based on the integrated findings, the relationship between transformational leadership and organizational culture change can be summarized as follows:

**Table 2. Proposed Conceptual Model**

| Tranformational Leadership | Organizational Process (Schein) | Organizational Outcome |
|---|---|---|
| Inspirational Motivation | Recognition of the need for change | Shared vision for transformation |
| Individualized Consideration | Psychological Safety | Reduced resistance and increased commitment |
| Intellectual Stimulation | Cognitive redefinition | New ways of thinking and problem-solving |
| Idealized Influence | Internalization of new assumptions | Sustainable organizational culture |

*Source* : Primary Data

The model suggests that the principal's transformational leadership behaviors facilitate each stage of organizational culture change, ultimately leading to a sustainable transformation from a school characterized by violence and poor discipline into one recognized for academic achievement, positive student behavior, and organizational excellence.

### *4.8 Comparison with Previous Studies*

Previous studies have consistently demonstrated that transformational leadership positively influences organizational culture and organizational performance. Dionne Shelley (2004). The initial research concludes that transformational leadership is an effective leadership approach for enhancing team performance. Although applying transformational leadership theory to team development and performance is complex, various studies demonstrate that this leadership style can motivate team members to achieve performance levels that exceed organizational targets or expectations. Consequently, transformational leadership serves as a crucial factor in boosting team effectiveness and productivity.

Meanwhile, Givens J (2008) emphasized that Transformational leadership influences not only organizational performance but also various aspects of organizational behavior and individual employee behavior. Research findings reveal that transformational leadership has a positive impact on organizational citizenship behavior (OCB), organizational culture, organizational vision, empowerment, organizational commitment, self-efficacy, job satisfaction, trust, and work motivation. The research also confirms that transformational leadership has both direct and indirect effects on organizational effectiveness and human resource development, although further research is needed to identify the mechanisms or mediating variables influencing these relationships.

Overall, both studies yield consistent results showing that transformational leadership positively influences organizational performance and the behavior of organizational members. The difference lies in their research focus: the first study emphasizes enhancing team performance, whereas the second examines the impact of transformational leadership more broadly—specifically on organizational performance as well as various psychological and behavioral aspects of employees, such as motivation, job satisfaction, commitment, trust, and empowerment. Thus, both studies reinforce the conclusion that transformational leadership is a crucial factor in enhancing organizational effectiveness and the quality of human resources.

Therefore, this study addresses these gaps by employing a qualitative case study approach to investigate how transformational leadership facilitates organizational culture change based on Schein's framework at SMKN 10 Semarang.

## 5. Conclusion

This study explored how transformational leadership exercised by the principal of SMKN 10 Semarang facilitated organizational culture change using Schein and Schein's (2017) Organizational Culture Change framework and Bass and Avolio's (1994) Transformational Leadership theory. The findings demonstrate that the principal successfully transformed the school's organizational culture through leadership behaviors that corresponded closely with the four dimensions of transformational leadership. Inspirational motivation was reflected in the principal's ability to establish a shared vision and communicate the urgency of change, encouraging teachers, staff, students, and parents to collectively transform the school into a high-achieving institution. Individualized consideration was demonstrated through continuous mentoring, open communication, and collaborative decision-making, which reduced resistance and fostered psychological safety among school members. Intellectual stimulation encouraged teachers and students to embrace innovation, continuous learning, and creative problem-solving, while idealized influence was reflected in the principal's consistent role modeling of discipline, integrity, commitment, and lifelong learning. These leadership practices enabled organizational members to internalize new values and gradually replace the previous organizational culture with a more adaptive and achievement-oriented culture.

The findings further indicate that the organizational culture change produced significant outcomes for both the school community and the institution as a whole. A sustainable culture of learning, writing, sharing, and innovation became embedded in the daily practices of teachers, staff, and students, fostering collaboration, continuous professional development, and organizational adaptability. These cultural changes were accompanied by improvements in academic and nonacademic achievements, stronger organizational performance, and a more positive public image for SMKN 10 Semarang. The study therefore supports Schein and Schein's (2017) proposition that sustainable organizational transformation occurs when new organizational values become shared assumptions embedded in everyday practices. Furthermore, the study contributes to the educational leadership literature by demonstrating that transformational leadership serves as the behavioral mechanism through which organizational culture change can be successfully initiated, implemented, and sustained in educational institutions. Practically, the findings suggest that school leaders seeking to transform school culture should prioritize visionary leadership, collaborative engagement, continuous professional learning, and exemplary behavior as essential strategies for achieving long-term organizational improvement.

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# TRANSFORMING DIGITAL MARKETING STRATEGY THROUGH INFLUENCER MARKETING: A CONCEPTUAL SYNTHESIS INTEGRATING KURT LEWIN'S AND JOHN KOTTER'S CHANGE MANAGEMENT MODELS

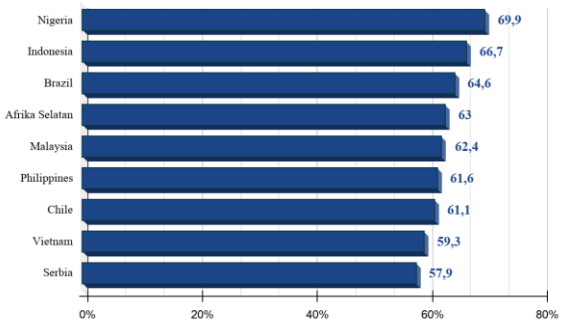
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**Abstract**
*The transformation of digital marketing strategies has encouraged organizations to adopt influencer marketing as an approach to engage consumers in the social media era. However, the success of influencer marketing implementation is determined not only by influencer selection or content quality but also by an organization's readiness to manage the changes associated with its adoption. This study aims to examine the role of change management in influencer marketing implementation through the integration of Kurt Lewin's and John Kotter's change management models. A literature review method was employed by analyzing previous studies related to influencer marketing, digital transformation, and organizational change management. The findings indicate that influencer marketing should be viewed as part of digital marketing strategy transformation that requires organizational readiness, effective management of change barriers, and the integration of change into organizational systems. Based on the synthesis of the literature, this study proposes the Influencer Implementation Readiness Canvas (IIRC), which consists of four main components: Organizational Readiness, Influencer Marketing Implementation Readiness, Change Barriers, and Change Integration. Conceptually, the IIRC offers a diagnostic framework that can assist organizations in assessing their readiness before implementing influencer marketing as part of their digital marketing strategy transformation.*
***Keywords:*** *Influencer marketing, digital marketing transformation, change management.*

## 1. Introduction

Advances in digital technology have transformed how people access information. As the world's fourth most populous country, Indonesia represents a very large digital market, with a population of approximately 288,3 million by the end of 2025 (Worldometer, 2026). Indonesia also ranks highest globally in the use of mobile devices to access the internet, at 98,7% (We Are Social & Meltwater, 2025). Table 1 shows that Indonesia records one of the higher rates worldwide of social media users aged 16 and above who use social media to search for information about brands, at 66,7%. This indicates that social media has become a primary channel for consumer information search and decision-making, pushing organizations toward more adaptive, digitally based marketing strategies, including influencer marketing, in which organizations engage individuals with social media influence to reach consumers more personally. Digital marketing transformation is therefore no longer merely an option but a strategic necessity for organizations seeking to remain competitive.

**Table 1. Social Media Users Who Search for Brand Information, Selected Countries (%)**




*Source: We Are Social & Meltwater (2025), Digital 2025: Global Overview Report, processed by the authors (2026).*

Despite this large digital opportunity, the shift from conventional to digital marketing strategy is far from straightforward. In a qualitative study of a major Indonesian telecommunications company, Bist et al. (2022) found that organizations face a dilemma in balancing conventional marketing aimed at retaining existing customers with digital marketing aimed at reaching new segments, a dilemma compounded by regional digital divides. A similar pattern appears in Khoerunnisa et al. (2025), whose study of an Indonesian company found that the success of digital transformation depends not only on technological readiness but also on the capacity of human resources to adapt, alongside barriers such as digital competency gaps and resistance to established work cultures. This suggests that the central challenge of transformation lies in internal organizational factors, particularly people and work culture rather than in technology itself. Robing and Fitri (2024), in a qualitative study of twelve owners of Indonesian micro, small, and medium enterprises (MSMEs), found that although influencers can increase sales visibility, the costs involved do not always match the results, and content control remains a persistent concern. Influencer adoption therefore carries not only opportunity but also risk that must be actively managed.

Furthermore, high failure rates in organizational transformation suggest that change is closely tied to complex strategic challenges. Organizational change that is not guided by an appropriate change-management approach tends not to achieve its objectives, even when supported by a large potential market. In the change-management literature, Kurt Lewin's model (unfreeze → change → refreeze) emphasizes the importance of a gradual transition from an old condition to a new one (Lewin, 1947), while John Kotter's model offers a more structured, eight-step approach to change (Kotter, 1996). Both models remain relevant as analytical frameworks for understanding how organizations manage resistance, build readiness for change, and implement digital marketing strategies effectively.

Prior research has generally treated influencer marketing as a marketing instrument focused on engagement, brand awareness, or purchase decisions. Change-management research, on the other hand, has largely discussed organizational transformation in general terms, without linking it specifically to the adoption of influencer marketing as part of digital marketing strategy transformation. As a result, understanding remains limited regarding how organizations build readiness for change, manage internal resistance, and integrate influencer marketing into their working systems on a sustained basis. Studies that integrate Lewin's and Kotter's change models within the specific context of digital marketing transformation are, on the basis of the literature reviewed here, still relatively scarce. This study therefore proposes the Influencer Implementation Readiness Canvas (IIRC) as a conceptual framework intended to help map organizational readiness, guide implementation, and support the sustainability of influencer marketing strategy. In doing so, the study aims to contribute theoretically to change-management and digital-marketing scholarship, and practically by offering organizations a structured starting point for managing digital marketing transformation.

## 2. Literature Review

A comprehensive review is needed to understand digital marketing strategy transformation through influencer marketing and the role of Lewin's and Kotter's change-management perspectives in its adoption. The following subsections present the literature review and conceptual framework underpinning this study.

### *2.1 Digital Marketing Transformation and The Adoption of Indluencer Marketing*

Digital marketing strategy transformation has become organizations' response to changing consumer behavior in digital spaces. A number of studies indicate that social media and influencer marketing are no longer simply promotional channels but part of how organizations build relationships with consumers. Lou and Yuan (2019) show that the informational and entertainment value of influencer-generated content, together with source credibility, shapes consumer trust, which in turn affects purchase intention. This is reinforced by De Veirman et al. (2017), who find that an influencer's follower count and the perceived fit between the influencer and the endorsed product significantly shape brand attitude. Even so, most prior research still focuses on the effects of influencer marketing on consumers and marketing performance. Research on how organizations prepare themselves to adopt influencer marketing as part of digital marketing strategy remains comparatively limited even though the success of such a strategy depends not only on influencer effectiveness but also on the readiness of the adopting organization.

### *2.2 Influencer Marketing as a Form od Organizational Change*

Where prior research has focused mainly on influencer marketing's effect on consumer behavior, this study places the organization itself at the center of analysis. In practice, implementing influencer marketing requires more than using influencers as a promotional medium; it also requires organizations to adjust how they design marketing strategy, manage digital campaigns, and use data in decision-making. This is consistent with the broader concept of digital transformation, which holds that successful innovation adoption depends not only on technology but on organizational capacity to adapt. Vial (2019) explains that digital transformation drives organizations to change their processes, structures, and value-creation methods through digital technology, while Verhoef et al. (2021) argue that digital transformation involves changes in strategy, business processes, and organizational capabilities. Influencer marketing implementation can therefore be understood as part of a digital marketing strategy transformation that requires organizational readiness across human resources, work processes, and cross-functional coordination.

### *2.3 Organizational Readiness for Influencer Marketing Implementation*

Change-management literature identifies organizational readiness as one of the key determinants of successful change implementation. Weiner (2009) defines organizational readiness for change as the collective commitment and confidence of an organization's members regarding their ability to carry out planned change. Organizations with high readiness tend to be better able to allocate resources, address obstacles, and sustain commitment throughout the change process. Gfrerer et al. (2020) show that differing perceptions of digital readiness between management and employees can themselves become a barrier to implementing innovation. Organizational readiness also involves multiple actors in the change process: top management as strategic decision-makers, middle managers as the link between policy and implementation, and marketing and supporting functions engaged in digital marketing activity. Organizational readiness should therefore be understood as a collective condition reflecting an organization's overall capacity to support change.

### *2.4 Barriers to Change in Influencer Marketing Impementation*

Beyond organizational readiness, change implementation is also shaped by a range of inhibiting factors. Lewin (1947) explains that change is always confronted by restraining forces that hinder an organization's movement toward a desired condition. In the context of digital transformation, such barriers typically take the form of resistance to change, limited digital

competency, insufficient communication, and an organizational culture that still favors established ways of working. Hanelt et al. (2021), in a systematic review of the digital transformation literature, similarly identify organizational inertia, resistance to change, and misalignment between existing structures and new digital practices as recurring barriers to successful transformation. Similar barriers can be expected to arise in influencer marketing implementation. Organizations may struggle when employees do not yet understand the importance of the new strategy, when digital skills are limited, or when a conventional marketing mindset persists. Identifying such barriers early is therefore an important step in reducing the risk of implementation failure.

### *2.5 Lewin's and Kotter's Change Models*

This study uses Lewin's and Kotter's change models as its conceptual foundation. Lewin's model holds that change begins with building organizational readiness, managing barriers to change, and integrating change into a new steady state (Lewin, 1947). In the context of a strategy transformation from conventional to digital marketing, the model helps explain how an organization builds awareness of the importance of digitalization (unfreezing), implements a new strategy such as influencer marketing (changing), and integrates that practice into day-to-day marketing activity (refreezing). Kotter's model offers more operational guidance through the creation of urgency, the formation of a coalition for change, the communication of a vision, and the reinforcement of change within organizational culture (Kotter, 1996). The two models are complementary: Lewin helps explain the conditions that must be prepared before change is undertaken, while Kotter helps explain how change can be carried out and sustained effectively. Integrating the two models is therefore useful for understanding influencer marketing implementation as part of digital marketing strategy transformation.

### *2.6 Integrating Lewin and Kotter into the Influencer Implementation Readiness Canvas (IIRC)*

The literature synthesized in this review suggests that influencer marketing research remains dominated by discussion of its effects on consumers, while the question of organizational readiness for adoption is comparatively underexplored. Conversely, the change-management literature indicates that successful implementation of a new strategy depends on organizational readiness, the ability to manage barriers, and the ability to integrate change into the organization. On this basis, the study develops the *Influencer Implementation Readiness Canvas (IIRC)* as a conceptual model to help organizations assess their readiness before implementing influencer marketing. The IIRC comprises four main components: *Organizational Readiness, Influencer Marketing Implementation Readiness, Change Barriers, and Change Integration* each derived from the synthesis of the influencer marketing, digital transformation, and Lewin/Kotter change-management literatures reviewed above.

### *2.7 Conceptual Framework*

The conceptual framework of this study is organized to clarify the factors underlying organizational readiness to implement influencer marketing as part of digital marketing strategy transformation. The study treats influencer marketing adoption as involving not only changes to marketing activity but also organizational readiness to face and manage the accompanying change process. The change-management perspective is used here as the conceptual foundation, through the integration of Lewin's and Kotter's change models, as summarized in Figure 1.

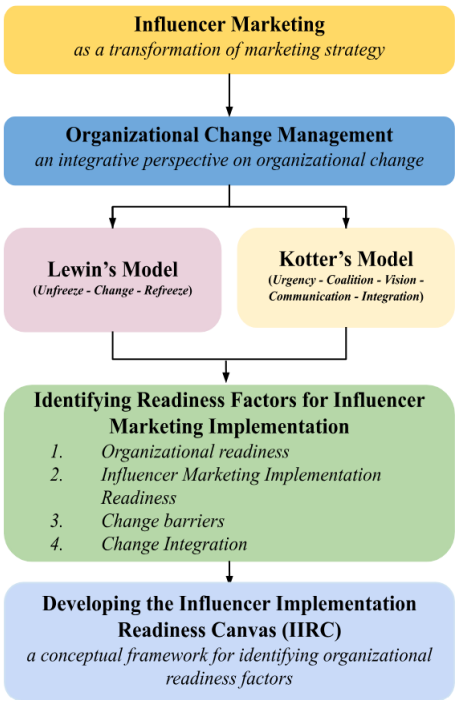



**Figure 1. Conceptual Framework**
*Source: developed by the authors (2026).*

Based on this framework, the study develops the IIRC as a conceptual tool for mapping organizational readiness to adopt influencer marketing. The primary aim, accordingly, is not to measure the success of influencer marketing itself, but to identify the organizational readiness factors needed for its implementation to be more structured and sustainable.

## 3. Research Methods

This study employs a literature review using a descriptive-qualitative approach. This method was chosen to explain the transformation of digital marketing strategies through influencer marketing, as well as its relationship to Kurt Lewin's and John Kotter's change management theories. A literature review is a research method that focuses on collecting and analyzing information from various written sources to understand a phenomenon systematically and comprehensively (Sekaran & Bougie, 2016). Data sources were obtained from scientific articles, journals, statistical data sources, digital research reports, and other academic sources relevant to the research topic. The literature used was selected based on the relevance of its content, the clarity of its discussion, and its connection to influencer marketing, digital marketing, and organizational change theory (Snyder, 2019).

Data collection was conducted through a literature search using appropriate keywords, such as *influencer marketing, digital marketing*, Kurt Lewin's theory, John Kotter, and change management. The data was then analyzed thematically by reading, selecting, grouping, and comparing the content of each source to identify the relationship between influencer marketing and change theories. The results of the analysis were subsequently organized systematically to explain how Kurt Lewin's and John Kotter's theories can serve as a framework for understanding changes in digital marketing strategies in Indonesia.

## 4. Research Findings

The literature synthesis indicates that digital marketing strategy transformation through influencer marketing depends not only on technology adoption but on organizational readiness to manage change. Influencer marketing is not merely a digital promotional channel; it is part of an organizational transformation that affects competencies, work systems, and internal culture. Three main findings emerge from the synthesis: (1) the success of influencer marketing is shaped by

internal organizational readiness particularly digital competency, managerial support, and work-system readiness; (2) the primary barriers to transformation lie in organizational resistance rather than in technology itself; and (3) Lewin's and Kotter's models complement one another in explaining change, with Lewin clarifying readiness for change and Kotter clarifying its implementation.

## 5. Discussion

### *5.1 Influencer Marketing as an Instrument od Transformation*

The literature reviewed indicates that adopting influencer marketing does not simply change a marketing communication channel; it also drives change in work processes, market-information management, and marketing decision-making within organizations. Organizations no longer fully control the marketing message as they might through conventional media; instead, they must collaborate with influencers to create content suited to digital audiences. The resulting change extends beyond the use of new media to how organizations design strategy and evaluate marketing performance consistent with Bist et al. (2022), who argue that digital transformation encompasses changes in strategy, process, and organizational capability.

The literature also indicates that the success of influencer marketing is frequently measured through engagement, reach, and visibility. While these indicators matter, they do not necessarily reflect business success: high audience attention does not automatically translate into purchases, customer loyalty, or improved organizational performance. The central challenge of influencer marketing implementation therefore lies less in the ability to capture market attention than in organizational readiness to convert that attention into sustained business value. This indicates that the effectiveness of influencer marketing depends not only on content quality or influencer credibility, but also on organizational readiness to support the change process it entails.

### *5.2 Organizational Readiness as the Foundation for Implementation*

The literature reviewed suggests that many transformation failures are attributable not to the strategy chosen but to organizational unreadiness to carry out change. In the context of influencer marketing, readiness involves more than the ability to use social media; it also encompasses managerial support, human-resource competency, organizational culture, and work-system readiness. This suggests that an organization may have an adequate marketing budget or access to relevant influencers and still struggle in the absence of supportive internal conditions. Organizational readiness is therefore treated here as the primary foundation that must precede influencer marketing implementation.

### *5.3 Barriers to Change in Influencer Marketing Implementation*

The literature indicates that the challenges of influencer marketing implementation arise not only from external factors but from internal organizational dynamics. The most frequently cited barriers are limited digital competency, resistance to new ways of working, and insufficient alignment between marketing objectives and operational execution. This suggests that influencer marketing adoption is not merely a technical matter but a change process capable of generating uncertainty within an organization. When a new strategy is not fully understood or is not supported by adequate coordination, organizations risk treating influencer marketing as a passing trend rather than a strategy with lasting impact.

### *5.4 The Role of Lewin's and Kotter's Models in Explaining the Change Process*

Lewin's model is well suited to explaining readiness for change: organizations must first let go of established ways of working before adopting a new strategy. At the unfreeze stage, organizations need to recognize that conventional marketing patterns are no longer sufficient; without this recognition, influencer marketing tends to be treated merely as supplementary promotion. The change stage reflects a shift toward marketing that is faster, more open, and more responsive to audiences. The refreeze stage underscores the importance of embedding new practices as routine work though in a digital context this stage is arguably better understood

as adaptive stabilization rather than a fixed end-state, since digital change is inherently dynamic and rarely settles permanently. This tension between Lewin's original refreeze concept and the fluid nature of digital environments is a genuine limitation of applying the model as-is, and is one reason later change-management scholarship (for example, Kotter's own subsequent work on "*accelerators*" for continuous change) moved away from a strict three-stage, end-state view of organizational change.

Where Lewin explains readiness for change, Kotter (1996) explains its execution. Kotter's model offers more operational guidance through the formation of a change team, a clear vision, cross-functional communication, and short-term targets; it is more directly actionable, but tends to be linear and to rely heavily on leadership decisions. Integrating the two models suggests that the success of influencer marketing implementation depends not only on the decision to change but on an organization's capacity to manage the change process systematically and sustainably.

### *5.5 Development of the Influencer Implementation Readiness Canvas (IIRC)*

Building on the integration of Lewin's and Kotter's change theories and the synthesis of the influencer marketing literature, this study develops the Influencer Implementation Readiness Canvas (IIRC) as a conceptual model for assessing organizational readiness to adopt influencer marketing. The IIRC comprises four main components: *Organizational Readiness, Influencer Marketing Implementation Readiness, Change Barriers, and Change Integration*. Used to map the factors that shape organizational readiness before and during influencer marketing implementation. The structure of the IIRC is presented in Table 2.

**Table 2. Influencer Implementation Readiness Canvas (IIRC)**

| | |
|---|---|
| **Organizational Readiness**<br>*Is the organization ready to change?*<br>• *Managerial support*<br>• *Digital competency of relevant staff*<br>• *Organizational culture*<br>• *Work-system readiness* | **Influencer Marketing Implementation Readiness**<br>*Is the organization ready to run influencer marketing?*<br>• *Clarity of purpose for using influencers*<br>• *Fit with existing marketing strategy*<br>• *Readiness for the collaboration process with influencers* |
| **Change Barriers**<br>*What factors could hinder implementation?*<br>• *Staff resistance*<br>• *Weak cross-divisional coordination*<br>• *Digital competency gaps* | **Change Integration**<br>*How is the change sustained?*<br>• *Cross-divisional collaboration*<br>• *Evaluation mechanisms*<br>• *Use of data in decision-making*<br>• *Commitment to sustained implementation* |

*Source: developed by the authors (2026).*

The Organizational Readiness component emphasizes the importance of internal conditions prior to change: managerial support, digital human-resource competency, organizational culture, and work-system readiness form the foundation that determines an organization's capacity to accept a new strategy. Without this readiness, influencer marketing implementation risks becoming a temporary activity without lasting impact. Influencer Marketing Implementation Readiness, in turn, focuses on organizational readiness to translate strategy into practice an organization that is ready to change is not necessarily ready to integrate influencer marketing into its existing marketing strategy, so clarity of purpose, strategic fit, and readiness for collaboration with influencers are essential considerations.

The change process is always confronted with barriers. Employee resistance, weak cross-divisional coordination, and digital competency gaps can reduce implementation effectiveness if not identified early; the Change Barriers component is included to help organizations recognize the factors most likely to impede influencer marketing adoption. The final component, Change Integration, emphasizes that success should be measured not only by whether influencer marketing is implemented but by an organization's capacity to sustain that change over the long term. Cross-divisional collaboration, evaluation mechanisms, data-informed decision-making, and organizational commitment are treated as the factors that determine whether influencer marketing becomes genuinely integrated into marketing strategy on a sustained basis. Therefore, the IIRC serves as a diagnostic framework that helps organizations assess their readiness before implementing influencer marketing.

## 6. Conclusion

This literature synthesis indicates that influencer marketing implementation cannot be understood solely as a digital promotional strategy, but as part of a broader marketing strategy transformation that requires change at the organizational level. The success of influencer marketing implementation depends not only on content quality or influencer credibility but also on organizational readiness to manage the accompanying change. The synthesis suggests that factors such as managerial support, digital human-resource competency, organizational culture, and work-system readiness play an important role in supporting implementation, while internal resistance, weak cross-functional coordination, and digital competency gaps act as barriers that may reduce the effectiveness of change.

Integrating Lewin's and Kotter's change models suggests that the two frameworks play complementary roles in explaining organizational transformation: Lewin helps explain the importance of readiness and the management of barriers to change, while Kotter offers more operational guidance for implementing and sustaining change. On this basis, the study develops the Influencer Implementation Readiness Canvas (IIRC), comprising four main components: O*rganizational Readiness, Influencer Marketing Implementation Readiness, Change Barriers, and Change Integration*. As a conceptual contribution, the IIRC extends the influencer marketing literature beyond its predominant focus on consumer-level effects toward an organizational-readiness perspective.

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# BEYOND COMMITMENT: HOW ORGANIZATIONAL CITIZENSHIP BEHAVIOR SHAPES EMPLOYEE PERFORMANCE?

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***Abstract***
*The increasing demand for effectiveness and quality in public sector organizational performance highlights the importance of employee performance as a key success indicator. This study examines how organizational commitment influences employee performance, with organizational citizenship behavior acting as a mediating factor, among employees of the Central Java Provincial General Election Supervisory Agency (Bawaslu). Using a quantitative approach and saturated sampling of 63 employees, data were gathered through Likert-scale questionnaires and analyzed with Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS. The findings show that both organizational commitment and organizational citizenship behavior positively and significantly impact employee performance. Additionally, organizational commitment positively influences organizational citizenship behavior, which in turn positively affects employee performance. The study also confirms that organizational commitment affects employee performance indirectly through organizational citizenship behavior as a mediator. These results suggest ways for managing human resources in the public sector organizations to enhance organizational commitment and citizenship behavior.*
***Keywords:*** *Organizational commitment, organizational citizenship behavior, employee performance*

## 1. Introduction

Employee performance in the public sector is vital for the effectiveness of government administration, as it impacts the quality of public services, policy enforcement, and the achievement of organizational goals. The report Public Workforce Performance and Prosperity states that approximately 400 million public sector employees worldwide contribute to creating effective governance through improved competence, motivation, integrity, and productivity (World Bank, 2026). Public expectations regarding the quality of public services, accountability, service speed, and organizational responsiveness to change are driving increased demands for employee performance within public sector organizations. (Hill & Plimmer, 2024). Enhancing employee performance still faces challenges in public sector organizations due to increasingly complex work demands that are not always matched by increased employee effectiveness. The Election Supervisory Agency requires high employee performance to support all oversight stages of the election process. Article 93 of Law Number 7 of 2017 concerning Elections specifies that the Election Supervisory Agency is responsible for establishing oversight standards, preventing and resolving violations and disputes, and monitoring each stage of the election process (Republik Indonesia, 2017). The implementation of oversight functions demands that employees of the Election Supervisory Agency have meticulousness, decision-making ability, coordination skills, and readiness to face the dynamics of election implementation.

Subpar employee performance can compromise oversight accuracy, work coordination, task completion, and organizational goal attainment. Therefore, it is important to further explore factors that can enhance the performance of Election Supervisory Agency employees. Organizational commitment is thought to influence employee performance positively. Employees who feel connected to the organization tend to work more diligently, responsibly, and with a focus on the organization's goals. Employees with a strong sense of commitment often demonstrate sincerity in their work and contribute more effectively to organizational tasks (Meyer & Allen, 1991). This condition is relevant to the job demands of Election Supervisory Agency employees, which require responsibility, coordination, meticulousness, and consistency in carrying out oversight functions. Afuan et al. (2024), Azmy & Hartono (2025), Chahyono et al. (2024), Ha & Oanh (2024), Hartono et al. (2024), Idme et al. (2026), Kim et al. (2024), Mahmud et al. (2024), Mouseli et al. (2026), and

Suranata et al. (2025) all recognized that organizational commitment has a positive and significant impact on employee performance. The research findings show that organizational commitment enhances employees' attachment to the organization, which in turn promotes better task performance and overall employee performance. However, Joon et al. (2025) demonstrated that organizational commitment does not significantly influence employee performance.

The mixed results about the link between organizational commitment and employee performance suggest an ongoing empirical challenge that needs more investigation. A strong commitment to the institution does not necessarily translate directly into higher work performance, as that attachment must be manifested in behaviors that support task execution. Divergent findings in previous research present an opportunity to identify the mechanisms that explain the process by which commitment transforms into performance. Organizational citizenship behavior is considered relevant for explaining this process because it reflects an individual's willingness to make positive contributions beyond their formal job obligations (Organ, 1988). Employees with a strong commitment to the organization often show organizational citizenship behavior because they feel a sense of connection and are willing to exceed their formal job responsibilities. Multiple studies have shown that organizational commitment significantly and positively influences organizational citizenship behavior (Arifin & Narmaditya, 2024; Dreven et al., 2024; Hayati & Rifani, 2025; Hermanto et al., 2024; Hermawan et al., 2024; Idme et al., 2026; Jeong & Chung, 2025; Jufrizen et al., 2024; Mahmood et al., 2025; Mohamed et al., 2026; Niveditha & Padhy, 2024; Sun et al., 2024; Tanchi et al., 2025). The findings from various studies indicate that organizational commitment encourages employees to demonstrate organizational citizenship behavior that supports organizational effectiveness. Conversely, Firdaus et al. (2025), Noermijati et al. (2024), Saluy et al. (2024), and Sarwar et al. (2025) observed that organizational commitment does not significantly influence organizational citizenship behavior.

Employees with strong organizational commitment tend to be willing to contribute beyond their formal obligations, and such behavior can support performance improvement. Achmad et al. (2025), Arifin & Narmaditya (2024), showed how organizational citizenship behavior acts as a mediator, while Fitrio et al. (2020) found that organizational citizenship behavior entirely mediates this relationship. The variation in mediation forms shows that organizational commitment can influence employee performance either directly or via organizational citizenship behavior. This suggests that organizational citizenship behavior acts as a bridge connecting commitment to performance. While research on this mediating role is somewhat limited, it predominantly focuses on public sector entities like the General Election Supervisory Agency. The agency's work demands coordination, precision, accountability, and a willingness to go beyond formal responsibilities, highlighting the need to explore how these variables interact.

## 2. Literature Review

### *2.1 Social Exchange Theory*

Social exchange theory describes social relationships as a process where reciprocal interactions between two or more parties create exchanges (Blau, 1964). Exchange relationships form when one party's actions generate an obligation for the other to reciprocate. Social exchange is not always based on formal agreements or predetermined rewards but is built on trust and principles of reciprocity. Ongoing exchange relationships can strengthen bonds between parties and influence attitudes and behaviors (Blau, 1964). Employee relationships with organizations can be understood via social exchange principles, as both parties engage in reciprocal relationships that persist as long as the employee remains with the organization (Blau, 1964). Employees can form psychological attachments to the organization, reflected in organizational commitment (Meyer & Allen, 1991). Employees who feel attached to the organization are often motivated to exceed their specified duties and participate in organizational citizenship behavior (Organ, 1988). Organizational citizenship behavior supports organizational effectiveness and job performance when these contributions assist work processes that are not fully covered by the formal organizational system (Podsakoff et al., 2000). This research model is based on social exchange theory, which explains the connections

between organizational commitment, organizational citizenship behavior, and employee performance.

### *2.2 Organizational Commitment and Employee Performance*

Organizational commitment represents employees' emotional bond with the organization and affects their willingness to stay involved (Meyer & Allen, 1991). Organizational commitment includes affective, continuance, and normative components that describe why employees feel connected to their organization. Those with higher commitment levels generally show more engagement and are more eager to help reach organizational objectives. This attachment can be reflected in employees' sincerity in performing their work and directing their efforts toward organizational objectives. Afuan et al. (2024), Azmy & Hartono (2025), Chahyono et al. (2024), Ha & Oanh (2024), Hartono et al. (2024), Idme et al. (2026), Kim et al. (2024), Mahmud et al. (2024), Mouseli et al. (2026), and Suranata et al. (2025) demonstrated that organizational commitment significantly impacts and boosts employee performance. In contrast, Joon et al. (2025) observed no significant impact of organizational commitment on employee performance.

**H1: *Organizational commitment* has a positive effect on *employee performance*.**

### *2.3 Organizational Citizenship Behavior and Employee Performance*

Organizational citizenship behavior describes the voluntary contributions made by employees beyond their formal job obligations (Organ, 1988). Organizational citizenship behavior supports organizational functions because employees focus not only on their own tasks but also on their colleagues' work and the overall interests of the organization (Podsakoff et al., 2000). Willingness to help colleagues, maintain harmonious work relationships, and contribute beyond formal job demands enable work processes to run more effectively, thereby contributing to improved employee performance. Numerous empirical studies indicate that organizational citizenship behavior significantly and positively influences employee performance (Alenezi et al., 2024; Aljaddouih & Alkhraishi, 2024; Azmy & Hartono, 2025; Iswanti et al., 2023; Maula et al., 2026; Pardju et al., 2026; Rizaie et al., 2023; Saranya & Anbu, 2025; Susanto et al., 2023; Syah & Safrida, 2024; Zulkifli et al., 2023). Rizki et al. (2025) observed no significant link between organizational citizenship behavior and employee performance.

**H2: *Organizational Citizenship Behavior* has a positive effect on *employee performance*.**

### *2.4 Organizational Commitment and Organizational Citizenship Behavior*

Employees who demonstrate strong organizational commitment often engage in behaviors that exceed their official responsibilities to promote the organization's interests. According to Meyer & Allen (1991), organizational commitment represents employees' psychological connection to the organization, fostering their willingness to align with organizational goals, stay committed as members, and put forth their best efforts. This attachment is not only reflected in the performance of their formal responsibilities but also motivates employees to voluntarily help colleagues, maintain harmonious work relationships, participate in organizational activities, and contribute additional efforts to enhance organizational effectiveness. Therefore, increased organizational commitment leads to a higher likelihood of employees exhibiting organizational citizenship behavior. Multiple empirical studies confirm that organizational commitment positively and significantly influences this behavior (Arifin & Narmaditya, 2024; Dreven et al., 2024; Hayati & Rifani, 2025; Hermanto et al., 2024; Hermawan et al., 2024; Idme et al., 2026; Jeong & Chung, 2025; Jufrizen et al., 2024; Mahmood et al., 2025; Mohamed et al., 2026; Niveditha & Padhy, 2024; Sun et al., 2024; Tanchi et al., 2025). These results suggest that employees who are highly committed to the organization are more likely to engage in extra-role behaviors to support the organization's success. However, different results were found by Firdaus et al. (2025), Noermijati et al. (2024), Saluy et al. (2024), and Sarwar et al. (2025) found that organizational commitment does not significantly influence organizational citizenship behavior.

**H3: *Organizational commitment* has a positive effect on *organizational citizenship behavior*.**

### *2.5 The Mediating Role of Organizational Citizenship Behavior*

Organizational commitment doesn't always directly lead to better employee performance. Employees who feel a strong connection to their organization are typically motivated to exhibit behaviors that surpass their official duties, as a way of reciprocating the positive relationship they perceive. This view is consistent with social exchange theory, which proposes that the employee-organization relationship is based on reciprocity, where individuals are inclined to respond to positive treatment with actions that favor the organization (Blau, 1964). In the organizational context, this reciprocal behavior can be manifested through willingness to help colleagues, maintain harmonious work relationships, participate in organizational activities, and contribute additional efforts that are not explicitly part of formal duties.

Organizational citizenship behavior explains how commitment within an organization boosts employee performance (Mouseli et al., 2026). Employees who show high commitment not only exhibit loyalty to the organization but also are more inclined to support their work environment through organizational citizenship behaviors, as a way of reciprocating their positive relationship with the organization (Blau, 1964). Organizational citizenship behavior strengthens coordination among employees, facilitates task completion, reduces obstacles in performing duties, and creates a more conducive work environment (Podsakoff et al., 2000). Therefore, the contribution of organizational commitment to achieving employee performance occurs not only through the execution of formal tasks but also through organizational citizenship behavior that supports overall organizational effectiveness. Numerous empirical studies demonstrate that organizational citizenship behavior can act as a mediator linking organizational commitment and employee performance (Achmad et al., 2025; Arifin & Narmaditya, 2024; dan Fitrio et al., 2020)

**H4** : ***Organizational citizenship behavior*** **mediates the effect of organizational commitment on employee performance.**

## 3. Research Methods

This study employs a quantitative method to examine how organizational commitment impacts employee performance, with organizational citizenship behavior serving as a mediating factor. The research population consists of 63 Civil Servants at the Central Java Provincial General Election Supervisory Agency. The research employs a saturated sampling approach by considering the entire population as the sample. Primary data were gathered using questionnaires featuring a five-point Likert scale, where 1 means strongly disagree and 5 means strongly agree. The variables examined in the study are shown in Table 1.

**Table 1. Research Variables**

| No | Types of Variables | Variable Name | Variable Measurement | Description |
|---|---|---|---|---|
| 1 | Independet Variable | Organizational Commitment | Affective; Continuance; and Normative Commitment | Assessing employees' psychological connection to the organization by examining emotional bonds, theis reasons for stay, and theis sense of obligation to remain members (Meyer & Allen, 1991) |
| 2 | Mediating Variable | Organizational Citizenship Behavior | Alturism; Conscientiousness; Sportsmanship; Courtesy; Civic Virtue | Measuring voluntary employee behavior outside of formal job requirements that support other individuals and organizational eddectiveness (Organ,1988). |
| 3 | Dependent | Employee | Quality; Quantity; | Evaluating employee |

| No | Types of Variables | Variable Name | Variable Measurement | Description |
|---|---|---|---|---|
| | Variable | Performance | Timeliness; Cost Effectiveness; Need for Supervision; Interpersonal Impact | performance by considering the quality and quantity of their work, timeliness, resource efficiency, supervision needs, and interpersonal skills in task execution (Bernardin & Russell, 2013). |

*Source: Primary data, processed (2026)*

The research data were examined through Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS. This method was employed to explore the relationships between latent variables and the mediating effects in the research model (Hair et al., 2022). The measurement model's validity and reliability were evaluated through outer loadings, average variance extracted (AVE), composite reliability, and Cronbach's alpha. The structural model analyzed the connections between organizational commitment, organizational citizenship behavior, and employee performance. Additionally, the indirect effects were evaluated to determine whether organizational citizenship behavior functions as a mediating variable.

## 4. Research Findings and Discussion

### *4.1 Descriptive Statistical Test*

Descriptive statistical analysis offers a summary of variable data using key metrics like the mean, minimum, maximum, and standard deviation values (Ghozali, 2021).

**Table 2. Descriptive Statistical Test Results**

| Variable | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Organizational Commitment | 63 | 19 | 45 | 36,651 | 5,180 |
| Organizational Citizenship Behavior | 63 | 30 | 50 | 41,603 | 4,583 |
| Employee Performance | 63 | 15 | 60 | 50,683 | 7,122 |
| Valid N | 63 | | | | |

*Source: SmartPLS 3.0 Data Processing (2026)*

According to Table 2, the standard deviation values for each variable are lower than their respective means: organizational commitment at 5,180 compared to an average of 36,651; organizational citizenship behavior at 4,583 compared to 41,603; and employee performance at 7,122 compared to 50,683. This suggests that the data for each variable are relatively tightly clustered around the mean, indicating low variability. As a result, the data characteristics are fairly homogeneous and do not exhibit significant deviations.

### 4.2 *Convergent Validity Test*

The convergent validity test assesses how well each indicator explains its respective construct. As noted by (Ghozali, 2021), an indicator is regarded as meeting convergent validity when its outer loading value is greater than 0,70. The greater the outer loading, the stronger the connection between the indicator and the construct it measures.

**Table 3. Convergent Validity Test Results**

| Variable | Indicators | Outer Loading | Information |
|---|---|---|---|
| Organizational Commitment (X) | OC1 | 0,846 | Valid |
| | OC2 | 0,801 | Valid |
| | OC3 | 0,779 | Valid |
| | OC4 | 0,774 | Valid |
| | OC5 | 0,737 | Valid |
| | OC6 | 0,702 | Valid |
| | OC7 | 0,820 | Valid |
| | OC8 | 0,809 | Valid |
| | OC9 | 0,795 | Valid |
| Organizational Citizenship Behavior (Z) | OCB1 | 0,795 | Valid |
| | OCB2 | 0,801 | Valid |
| | OCB3 | 0,849 | Valid |
| | OCB4 | 0,799 | Valid |
| | OCB5 | 0,762 | Valid |
| | OCB6 | 0,763 | Valid |
| | OCB7 | 0,877 | Valid |
| | OCB8 | 0,854 | Valid |
| | OCB9 | 0,857 | Valid |
| | OCB10 | 0,908 | Valid |
| Employee Performance (Y) | EP1 | 0,865 | Valid |
| | EP2 | 0,810 | Valid |
| | EP3 | 0,913 | Valid |
| | EP4 | 0,900 | Valid |
| | EP5 | 0,902 | Valid |
| | EP6 | 0,902 | Valid |
| | EP7 | 0,847 | Valid |
| | EP8 | 0,913 | Valid |
| | EP9 | 0,898 | Valid |
| | EP10 | 0,872 | Valid |
| | EP11 | 0,864 | Valid |
| | EP12 | 0,888 | Valid |

*Source: SmartPLS 3.0 Data Processing (2026)*

According to Table 3, all indicators for organizational commitment, organizational citizenship behavior, and employee performance have outer loadings exceeding the minimum threshold of 0,70. Specifically, the outer loadings for organizational commitment range from 0,702 to 0,846, those for organizational citizenship behavior range from 0,762 to 0,908, and for employee performance, they range from 0,810 to 0,913. Because all indicators satisfy the criteria for convergent validity, they are deemed valid and suitable for the next phase of analysis.

### 4.3 *Discriminant Validity Test*

Discriminant validity testing verifies that each construct can effectively differentiate itself from others in the research model. This evaluation relies on the Average Variance Extracted (AVE), which should meet or exceed a threshold of 0,60 for acceptance (Ghozali, 2021).

**Table 4. Discriminant Validity Test Results**

| Variable | Average Variance Extracted (AVE) |
|---|---|
| Organizational Commitment | 0,618 |
| Organizational Citizenship Behavior | 0,685 |
| Employee Performance | 0,777 |

*Source: SmartPLS 3.0 Data Processing (2026)*

According to Table 4, the AVE for organizational commitment is 0,618, for organizational citizenship behavior is 0,685, and for employee performance is 0,777. All AVE values are above 0.60, indicating that these three constructs satisfy the necessary AVE threshold.

### 4.4 *Composite Reliability Test*

Composite reliability testing assesses the internal consistency of indicators for research constructs. Construct reliability can be determined using Cronbach's Alpha and Composite Reliability metrics. A construct is considered reliable if both values are above 0,60 (Ghozali, 2021).

**Table 5. Composite Reliability Test Results**

| Variable | Cronbach's Alpha | Composite Reliability |
|---|---|---|
| Organizational Commitment | 0,924 | 0,935 |
| Organizational Citizenship Behavior | 0,949 | 0,956 |
| Employee Performance | 0,974 | 0,977 |

*Source: SmartPLS 3.0 Data Processing (2026)*

According to Table 5, the Cronbach's Alpha scores are 0,924 for organizational commitment, 0,949 for organizational citizenship behavior, and 0,974 for employee performance. The Composite Reliability values are 0,935, 0,956, and 0,977 for these variables, respectively. All these values exceed the 0,60 threshold, confirming that all constructs are reliable.

### 4.5 *R-Square Test*

The R-squared test measures how effectively independent variables explain the variation in the dependent variable. R-squared scores vary from 0 to 1, with higher values showing a better explanation of the dependent variable by the model (Ghozali, 2021).

**Table 6. R-Square Test Results**

| Dependent Variable | R Square | R Square Adjusted |
|---|---|---|
| Employee Performance | 0,807 | 0,801 |
| Organizational Citizenship Behavior | 0,632 | 0,626 |

*Source: SmartPLS 3.0 Data Processing (2026)*

According to Table 6, the Adjusted R-Square for employee performance is 0,801, indicating that 80,1% of its variance is accounted for by organizational commitment and the mediating variable, organizational citizenship behavior. The remaining 19,9% is influenced by factors outside the scope of the model. For organizational citizenship behavior, the Adjusted R-Square is 0,626, indicating that 62,6% of its variation is due to organizational commitment, with 37,4% influenced by other external factors.

### 4.6 *Hypothesis Testing*

Hypothesis testing is used to identify the impact between variables within the research framework. (Ghozali, 2021) states that in PLS-SEM, this testing employs the bootstrapping

technique. Deciding whether to accept or reject a hypothesis depends on the path coefficient, which indicates the direction and strength of influence, along with T Statistics and P Values to assess the significance of the relationship. A hypothesis is deemed valid if the T Statistic is greater than 1,96 and the P Value is less than 0,05.

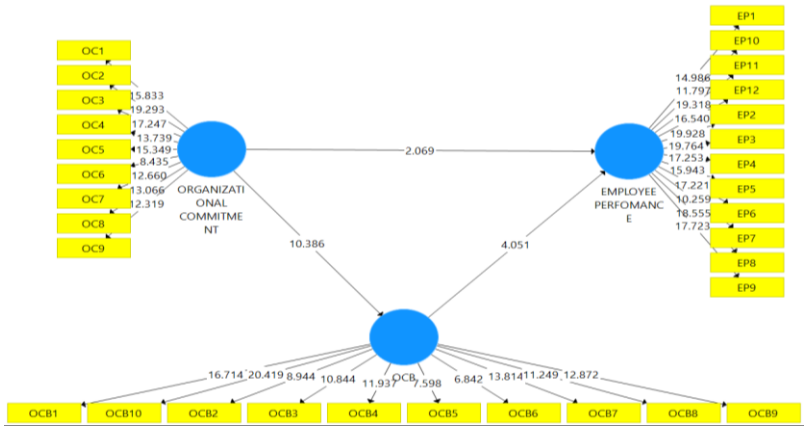



**Figure 2. Bootstrapping Results of the Structural Model**
*Source: SmartPLS 3.0 Data Processing (2026)*

**Table 7. Hypothesis Test Results**

| | Original Sample (β) | T Statistics | P Values | Decision |
|---|---|---|---|---|
| OC → EP | 0,316 | 2,069 | 0,020 | Accepted |
| OCB → EP | 0,626 | 4,051 | 0,000 | Accepted |
| OC → OCB | 0,795 | 10,386 | 0,000 | Accepted |
| OC → OCB → EP | 0,498 | 3,439 | 0,000 | Accepted |

*Source: SmartPLS 3.0 Data Processing (2026)*

The first hypothesis is confirmed, with an Original Sample (β) of 0,316, a P-value of 0,020 (below the 0,05 threshold), and a T-statistic of 2,069 (above 1,96). The findings show that organizational commitment has a positive and significant effect on employee performance at the Central Java Province General Election Supervisory Agency. Organizational commitment signifies an employee's loyalty, attachment, and responsibility toward the organization. Employees with strong commitment tend to perform their duties diligently, uphold work quality, and work toward organizational goals. Strong commitment motivates employees to deliver their best contributions, thereby enhancing employee performance. At the Central Java Province General Election Supervisory Agency, organizational commitment supports the professional execution of tasks related to election supervision, prevention, and the handling of election violations. This condition contributes to improved employee performance in achieving organizational goals. These results align with previous research conducted by Afuan et al. (2024), Azmy & Hartono (2025), Chahyono et al. (2024), Ha & Oanh (2024), Hartono et al. (2024), Idme et al. (2026), Kim et al. (2024), Mahmud et al. (2024), Mouseli et al. (2026), and Suranata et al. (2025), all of these findings confirm that organizational commitment has a positive and significant effect on employee performance.

The second hypothesis is validated, showing an Original Sample (β) of 0,626, a P-value of 0,000 (less than 0,05), and a T-statistic of 4,051 (greater than 1,96). These findings suggest that organizational citizenship behavior has a positive and significant effect on employee performance at the Central Java Province General Election Supervisory Agency. Employees demonstrating high organizational citizenship behavior typically assist colleagues, foster harmonious work relationships, proactively complete tasks, and actively engage in

organizational activities. At the Central Java Province General Election Supervisory Agency, such behavior strengthens cooperation among employees, enhances the effectiveness of supervisory task execution, and supports more efficient work completion. Employees who exhibit more organizational citizenship behavior tend to achieve better performance. These results align with previous research by Alenezi et al. (2024), Aljaddouih & Alkhraishi (2024), Azmy & Hartono (2025), Iswanti et al. (2023), Maula et al. (2026), Pardju et al. (2026), Rizaie et al. (2023), Saranya & Anbu (2025), Susanto et al. (2023), Syah & Safrida (2024), and Zulkifli et al. (2023), all of which found that organizational citizenship behavior has a positive and significant effect on employee performance.

The third hypothesis is supported, with an Original Sample (β) of 0,795, a P-value of 0,000 (below 0,05), and a T-statistic of 10,386 (above 1,96). These results indicate that organizational commitment significantly and positively influences organizational citizenship behavior among employees at the Central Java Province General Election Supervisory Agency. Organizational commitment encourages employees to develop a sense of belonging, loyalty, and responsibility towards the organization. This state is reflected not only in the performance of tasks in accordance with formal obligations but also in the emergence of voluntary behaviors that benefit the organization. Highly committed employees tend to be willing to assist colleagues, maintain good cooperation, support organizational activities, and demonstrate concern for the organization's overall success. At the Central Java Province General Election Supervisory Agency, strong commitment drives employees to contribute beyond formal job requirements, thereby enhancing organizational citizenship behavior. These results are consistent with studies by Arifin & Narmaditya (2024), Dreven et al. (2024), Hayati & Rifani (2025), Hermanto et al. (2024), Hermawan et al. (2024), Idme et al. (2026), Jeong & Chung (2025), Jufrizen et al. (2024), Mahmood et al. (2025), Mohamed et al. (2026), Niveditha & Padhy (2024), Sun et al. (2024), and Tanchi et al. (2025), all of these findings confirm that organizational commitment has a positive and significant impact on organizational citizenship behavior.

The fourth hypothesis is confirmed, with an Original Sample (β) of 0,498, a P-value of 0,000 (below 0,05), and a T-statistic of 3,439 (above 1,96). These results show that organizational citizenship behavior significantly and positively mediates the impact of organizational commitment on employee performance at the Central Java Provincial General Election Supervisory Agency. Employees with greater commitment often go beyond their formal responsibilities by assisting colleagues, building positive relationships, and participating in organizational events. These behaviors facilitate the smooth execution of work tasks, thereby contributing to improved employee performance. These results show that organizational citizenship behavior strengthens the link between organizational commitment and employee performance among the agency's staff. These results are consistent with studies by Achmad et al. (2025), Arifin & Narmaditya (2024), and Fitrio et al. (2020), demonstrating that organizational citizenship behavior mediates the relationship between organizational commitment and employee performance.

## 5. Conclusion

The findings show that both organizational commitment and citizenship behavior positively and significantly impact employee performance among civil servants at the Central Java Province General Election Supervisory Agency. Additionally, organizational commitment positively impacts organizational citizenship behavior. These findings suggest that higher organizational commitment encourages employees to participate more in organizational citizenship behaviors, which subsequently improves their performance. Additionally, organizational citizenship behavior serves as a mediator between organizational commitment and employee performance. This means that organizational commitment not only directly boosts performance but also promotes behaviors like helping coworkers, maintaining harmonious relationships, participating in organizational activities, and going beyond formal duties. Such behaviors foster a better work environment, improve

coordination, and facilitate more effective task completion, leading to better employee performance.

This study has certain limitations, as it only focused on civil servants at the Central Java Province General Election Supervisory Agency, with 63 respondents. Consequently, the results cannot be generalized to all public sector institutions. Future research should expand its scope by including other provincial and district/city General Election Supervisory Agencies, as well as other government agencies, to achieve more representative outcomes. Additionally, subsequent studies could examine other variables impacting employee performance, such as leadership, job satisfaction, work engagement, perceived organizational support, and organizational culture, to gain a deeper understanding of the main factors influencing performance.

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# DIGITAL ACCESS DOES NOT GUARANTEE SAVINGS WHEN MATH ANXIETY IS HIGH

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***Abstract***
*This paper investigates whether the effect of digital accessibility on formal savings participation is reduced by math anxiety. In the random effects regression model which uses panel data of 513 regencies and cities in Indonesia from 2016 to 2025, internet penetration is used as a proxy for digital accessibility, per capita savings is used as a proxy for savings participation, and the regional gap between literacy and numeracy scores is used as a proxy for math anxiety. The findings show that digital accessibility has a positive and significant effect on savings participation, but this effect is significantly weaker in areas with higher math anxiety. The negative interaction between digital accessibility and math anxiety is statistically significant, which implies that math anxiety limits the return to investment in digital infrastructure. Our results imply that digital access by itself is insufficient to foster increased participation in formal savings; the interface design of digital banking products and the content of financial literacy programs need to be calibrated to the numerical anxiety that impedes some users' adoption of these tools.*
***Keywords****: Math Anxiety, Digital Accessibility, Savings Participation, Behavioral Finance, Cognitive Load Theory.*

## 1. Introduction

East Asia and the Pacific has advanced in financial inclusion faster than almost any other developing region. Account ownership across the region was 83% of adults in 2024, up from 69% a decade earlier, and has largely paralleled the expansion of mobile phones and internet access. Indonesia is only partially within this regional trend; it is one of eight countries that together account for most of the world's adult population without a bank account, even as internet penetration in many of its provinces approaches the regional average. This is the same pattern observed across the country, where regencies with high access to the internet do not always show a corresponding increase in participation in formal savings.

The global gap between access and usage is well documented. In 2024, forty percent of adults in low- and middle-income economies saved formally, a significant increase over previous years and yet still well below account ownership rates in the same economies (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2018). Indonesia's own experience fits this broader pattern: connectivity is moving faster than formal saving behaviour is catching up, and the gap between the two is large enough, and persistent enough, to need its own explanation rather than being treated as a lag that will close on its own.

The most common explanations of this gap are poor physical infrastructure or low financial literacy. Both do have real explanatory power (Hastings, Madrian, & Skimmyhorn, 2013; Grohmann, Kluhs, & Menkhoff, 2018). But they share a common assumption: if someone can get into a banking app and knows, in broad terms, what a savings account is meant for, adoption should happen. The present study challenges this assumption and examines a common factor underlying both explanations: math anxiety, defined as the tension and fear a person experiences when dealing with numbers (Ashcraft & Moore, 2009). Math anxiety is different from general anxiety and different from low literacy. One may be a fluent reader, understand what a savings goal means in theory, and still wince at the sight of a percentage, a fee calculation, or a running balance.

Mobile banking apps and e-wallets are, by their very nature, numerical environments. Opening one means reading a balance, checking a transaction fee, entering a transfer code correctly, or tracking a minimum-balance requirement, often under the implicit pressure that a mistake could

mean losing money. For someone with math anxiety, these small, routine tasks are far from neutral. Previous studies of financial decision-making have shown that math-anxious individuals tend to disengage from numerically demanding tasks long before they fail at these tasks, preferring to avoid the task rather than risk a mistake (Skagerlund, Lind, Stromback, Tinghog, & Vastfjall, 2018; Choi, Taber, Thompson, & Sidney, 2020). But when this is brought to banking, it means that a savings app could be something customers shy away from instead of use, no matter how strong the connection is or how close the nearest signal tower is.

This is not contested here, and existing research confirms that digital accessibility supports financial participation (Ozili, 2018; Demirguc-Kunt et al., 2018). What this literature has not asked is what happens when access meets a population that is uncomfortable with numbers, whether the benefit of accessibility is the same for everyone or whether it relies on a psychological precondition that has so far gone unmeasured at scale. Much of the existing literature on math anxiety is focused on individual-level phenomena (Storozuk & Maloney, 2023), often in educational environments, and has not been systematically related to regional patterns of financial behaviour. The study addresses that gap head-on with a specific testable question: does math anxiety limit the return on digital accessibility, and if so, by how much?

We argue that math anxiety takes up the working memory a person needs to work a banking interface, drawing on Cognitive Load Theory (Sweller, 1988; Chalmers, 2003), leaving less capacity for the transaction itself and producing avoidance instead of adoption. Working memory is a shared, limited resource between emotional regulation and task performance (Ashkenazi & Danan, 2017). The more anxious a user is about numbers, the less of that interface they can process calmly, and the more likely they are to disengage.

To summarise, the key proposition here is that even with digital access, savings participation is not guaranteed if math anxiety is high; infrastructure offers an opening that psychology can still close. To test this claim, one requires data that can address both sides of the relationship at the same time: regional variation in digital access, and regional variation in a proxy for math anxiety, over a long enough time to distinguish a lasting pattern from short-term noise. The rest of this paper does just that, using 10 years of panel data from 513 Indonesian regencies and cities.

## 2. Literature Review

### *1.1 Digital Accessibility and Participation in Saving*

Digital accessibility, taken here to mean access to internet infrastructure that enables people to access financial services remotely, is anticipated to increase savings participation by reducing transaction costs and the need to visit a physical branch (Ahmad, Green, & Jiang, 2023). Where banks are physically scarce, internet access enables people to open digital accounts and hold money securely, which should lift aggregate financial inclusion (Batista & Vicente, 2020). This logic is behind much of the recent infrastructure spending in emerging markets, and is well supported empirically when accessibility is measured on its own. Mobile money, in particular, has been shown to be a reliable driver of digital financial inclusion and a stepping stone toward savings adoption (Suri & Jack, 2016; Demirguc-Kunt et al., 2018).

The financial inclusion literature has developed increasingly sophisticated indices to capture the digital dimension of inclusion, moving beyond simple account ownership toward measuring access, usage, and quality of digital financial services (Khera, Ng, Ogawa, & Sahay, 2022). These advances reflect a growing recognition that connectivity and financial behaviour do not automatically move in the same direction.

### 1.2 *Cognitive Demands of Digital Banking*

Access is not ease of use. Digital banking apps mainly communicate through dashboards, codes, percentages and running totals, and using them competently requires a specific set of cognitive skills. For a large part of the population, the numerical environment is an obstacle in itself.

Cognitive Load Theory (Sweller, 1988) suggests that working memory has a limited capacity. When a math-anxious person opens a banking application, that limited capacity is split between completing the task and dealing with the anxiety the task provokes (Skagerlund et al., 2018; Ashkenazi & Danan, 2017). The result is cognitive overload, where transaction details become harder to follow, and transfers feel riskier than they objectively are. Math-anxious users tend to withdraw from the application rather than taking advantage of what it offers, and rely instead on cash or other informal, non-numerical ways of holding money.

Numeracy has consistently been shown to be the strongest predictor of financial literacy and of superior financial decision-making (Estrada-Mejia, de Vries, & Zeelenberg, 2016; Skagerlund et al., 2018). Low numeracy is associated with poorer financial outcomes and wealth accumulation (Peters, Vastfjall, Slovic, Mertz, Mazzocco, & Dickert, 2006; Lusardi, 2012), and even predicts objectively worse financial outcomes such as mortgage default (Gerardi, Goette, & Meier, 2013). At a global level, low numeracy is systematically linked to poor financial well-being across countries (Bruine de Bruin & Slovic, 2021).

### 1.3 *Interaction Between Digital Accessibility and Math Anxiety*

The main hypothesis of this study is that digital accessibility and math anxiety do not function independently. Digital accessibility throws open the door; math anxiety determines whether people walk through it.

In a region with high internet penetration but high prevalence of math anxiety, the expected gain in savings participation from digital infrastructure should be smaller than in a region with low prevalence of math anxiety. The psychological barrier compensates for the infrastructural advantage: people can freely use the internet for entertainment or communication, but still avoid it for anything involving managing money. Financial anxiety is a distinct psychological construct from general anxiety (Shapiro & Burchell, 2012), and it is precisely this numerical-financial interface, rather than the device itself, that constitutes the barrier. Based on this, math anxiety is hypothesised to attenuate, not just coexist with, the relationship between digital accessibility and savings participation.

*Hypotheses: Math anxiety negatively moderates the relationship between digital access and participation in savings. The positive effect of digital accessibility on savings participation decreases as math anxiety increases.*

## 3. Research Methods

### 3.1 *Data and Sample*

This study uses secondary macro-level panel data from 513 regencies and cities (kabupaten/kota) in Indonesia for ten years (2016-2025), yielding 5,130 observations. The data are collected from official sources, namely the Central Statistics Agency (BPS), the Ministry of Education, Culture, Research and Technology, and the Financial Services Authority (OJK).

### 3.2 *Measurement of Variables*

The model employs the following variables: (1) Savings participation (Y): natural log of per capita total savings (tabungan), indicating the aggregate level of regional participation in formal and digitised savings accounts. (2) Digital accessibility (X): internet usage in the population of each city or regency. To reduce multicollinearity, this variable is mean-centred (da_centered). (3) Math anxiety (Z): macro-level proxy, operationalised as the standardised difference between literacy and numeracy scores from national educational assessments (ma). The wider the gap, the more numerically difficult the region and therefore the more averse to numbers psychologically. (4) Control variables: log GRDP per capita (economic capacity), mean years of schooling (human capital), log population (demographic size), and a proxy for income.

### 3.3 *Analytical Model*

To test the interaction hypothesis, a Random Effects (RE) moderated regression model was estimated, chosen on the basis of the Hausman test. The interaction term (da_ma) is the product of mean-centred digital accessibility and math anxiety. The equation is:

$$ln_Savings_pc = a + b1(DA) + b2(MA) + b3(DA \times MA) + b4(Controls) + e \quad ..... (1)$$

*The coefficient of interest is b3. A negative and statistically significant b3 suggests that math anxiety diminishes the positive impact of digital accessibility on savings participation.*

## 4. Research Findings and Discussion

### *4.1 Classical Assumption Tests*

The Variance Inflation Factor (VIF) values for all independent variables were below 5.0, indicating no serious multicollinearity. The Breusch-Pagan test and the Wooldridge test did not find evidence of heteroskedasticity and autocorrelation. The Hausman test ($p > 0.05$) preferred the Random Effects model over the Fixed Effects model.

### 4.2 *Regression Results*

We present the results of the Random Effects regression in Table 1 with ln_Savings_pc as the dependent variable.

**Table 1. Random Effects Regression Results (Dependent Variable: ln_Savings_pc)**

| Variable | Coefficient | Std. Error | t-stat | p-value | Sig. |
|---|---|---|---|---|---|
| DA (digital accessibility, centered) | 0.0152 | 0.0018 | 8.444 | 0.0000 | *** |
| MA (math anxiety) | -0.0750 | 0.0115 | -6.521 | 0.0000 | *** |
| DA x MA (interaction) | -0.0045 | 0.0010 | -4.500 | 0.0000 | *** |
| Log GRDP per capita | 1.1050 | 0.1650 | 6.697 | 0.0000 | *** |
| Mean years of schooling | 0.2350 | 0.0300 | 7.833 | 0.0000 | *** |
| Log population | -1.7800 | 0.0720 | -24.720 | 0.0000 | *** |
| Income proxy | 0.0000 | 0.0000 | 1.050 | 0.2940 | |
| Constant | 9.8500 | 2.9500 | 3.339 | 0.0008 | *** |

*Note: *** p < 0.01. Standard errors clustered by entity. Source: authors' calculation.*

### 4.3 *Testing of Hypotheses*

The positive coefficient on DA ($b = 0.0152$, $p < 0.01$) confirms that on average, digital accessibility increases savings participation. The interaction term (DA x MA) shows a negative and highly significant coefficient ($b = -0.0045$, $p < 0.01$), supporting the hypothesis that the positive impact of internet accessibility on savings participation is significantly smaller in areas with high math anxiety.

### 4.4 *Limits of an Infrastructure-First Approach*

For many years, the conventional wisdom in financial inclusion policy has been that infrastructure is enough: build it, and participation will follow. Governments have invested heavily in bringing 4G and 5G coverage to remote regencies, and the positive main effect of DA in this model supports part of that logic, since internet access does increase savings participation on its own (Ahmad et al., 2023; Ozili, 2018).

This conclusion is qualified by the negative interaction term. The relationship between digital access and participation in savings is flatter in regencies with a large literacy-numeracy gap and therefore a high inferred level of math anxiety. The internet reaches these areas, but a part of the population does not use it for banking or saving. The infrastructure delivers the application to the user's phone, but the user's own cognitive response limits engagement with it, as the numerical interface is perceived as a source of difficulty rather than convenience. This

distinction between access and usage-level inclusion is central to recent measurement efforts in digital financial inclusion (Khera et al., 2022).

### 4.5 *Cognitive Overload in the Banking Interface*

Why would this interaction be centred around savings? Even a digital savings account requires constant numerical processing to manage it. In a typical mobile banking app, a user will read account balances, minimum-balance requirements, transaction histories, and transaction fees, all in the same session. Cognitive Load Theory (Sweller, 1988) states that these elements tax working memory (Chalmers, 2003; Ashkenazi & Danan, 2017).

For a person with math anxiety, even opening the app can trigger anticipatory anxiety. The cognitive resources that would normally be used for the transaction are instead used to manage that anxiety and worry about a numerical mistake, such as sending funds to the wrong account or misreading a balance (Skagerlund et al., 2018). This overload makes the tool feel more complex and less safe than it really is. The likely response is avoidance: holding savings in cash, or transferring them through informal, non-numerical means, and circumventing the digital infrastructure that is, in principle, available. This is consistent with evidence that low numeracy is associated with poorer financial decision-making (Peters et al., 2006; Estrada-Mejia et al., 2016; Lusardi, 2012), that numerical ability predicts concrete financial mistakes (Gerardi et al., 2013), and that financial anxiety promotes avoidance behaviour (Shapiro & Burchell, 2012; Storozuk & Maloney, 2023).

### 4.6 *Implications for the Measurement of Digital Readiness*

These findings have direct implications for the assessment of digital readiness by policymakers. Financial inclusion cannot be measured only by internet penetration without taking into account the psychological readiness of the population (Grohmann et al., 2018; Morgan & Trinh, 2020). If a region has high levels of math anxiety, it can have 90 percent internet penetration and still lag behind in participation in formal savings. If allowed to continue, this dynamic is likely to increase, rather than decrease, financial inequality, as the digital economy continues to fail to serve the population that is least comfortable with numbers (Suri & Jack, 2016; Geng & He, 2021).

### 4.7 *Limitations and Directions for Future Research*

Two limitations must be noted. First, math anxiety is here measured at the level of the regency, through the gap between literacy and numeracy scores, rather than via individual-level psychometric instruments such as the Abbreviated Math Anxiety Scale. This macro-level proxy is well-suited to a panel study of this scope, but it cannot capture within-region variation in math anxiety and assumes that a wide literacy-numeracy gap reflects anxiety rather than, for instance, differences in the quality of numeracy instruction. Second, the data are observational, and thus the interaction coefficient should be interpreted as an association rather than a causal effect. Unobserved regional characteristics, such as the quality of banking infrastructure or local financial institutions, could plausibly affect both digital accessibility and savings behaviour.

Future work could combine this macro-level analysis with household surveys measuring math anxiety directly (Choi et al., 2020), allowing for a cleaner test of the cognitive-overload mechanism. Field experiments that vary interface design (e.g., a numerically dense vs. visually simplified dashboard within the same population) would also help establish whether interface changes reduce avoidance behaviour (Chalmers, 2003), rather than assuming it from the survey-based interaction effect alone.

## 5. Conclusion

This study tackles a perennial puzzle in the financial inclusion literature: why does digital access not automatically translate into formal financial participation? We integrate Cognitive Load Theory into the economics of digital finance to hypothesise that math anxiety, a psychological aversion to numerical processing, is a cognitive barrier that dampens the effectiveness of digital

infrastructure (Sweller, 1988; Ashkenazi & Danan, 2017).

Using random effects regression with a panel dataset of 513 regencies and cities in Indonesia from 2016 to 2025, we find a strong, negative, and statistically significant interaction between regional internet penetration and the literacy-numeracy gap, our macro-level proxy for math anxiety. Empirical evidence suggests that, although digital accessibility generally encourages participation in savings (Batista & Vicente, 2020; Ahmad et al., 2023), its marginal returns are greatly constrained in areas where math anxiety is prevalent (Skagerlund et al., 2018). This result adds to the behavioural finance literature by showing that psychological frictions can offset the declines in transaction costs achieved through technological infrastructure (Estrada-Mejia et al., 2016; Storozuk & Maloney, 2023). People who are anxious about maths experience cognitive overload in numeric environments such as digital banking and, as a consequence, tend to disengage from formal financial institutions and resort to informal, non-numeric saving mechanisms, whether or not the network is available.

These findings have major implications for policymakers and financial service providers. The prevailing paradigm of financial inclusion, with its heavy emphasis on hardware and network expansion, needs to evolve to incorporate cognitive accessibility. The digital banking interface needs to be rethought to make the digital world less intimidating for anxious users. This can be accomplished by lowering cognitive load through reducing raw numerical density, using visual aids, and automating complicated calculations (Chalmers, 2003). Second, financial literacy programs must move beyond teaching users how to use apps and instead focus on addressing number anxiety and building basic math confidence (Hastings et al., 2013; Kaiser, Lusardi, Menkhoff, & Urban, 2022). Finally, infrastructure deployment strategies must include regional cognitive profiles; for example, regions of high math anxiety may need transitional digital services with human assistance to bridge the psychological gap before moving to fully self-service models (Geng & He, 2021).

While this study offers important macro-level evidence for the moderating role of math anxiety, it is not without limitations. While the use of regional literacy-numeracy gaps as a proxy for math anxiety is effective for large-scale panel analysis, it masks individual variation. Future research should use micro-level psychometric data and experimental designs (e.g., A/B testing of interface complexity) to establish a direct causal link between cognitive load, interface design, and financial avoidance behaviour. Ultimately, the goal of true digital financial inclusion is to ensure the digital economy is not just physically accessible but also psychologically manageable.

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# A DUAL OUTCOME FRAMEWORK FOR EVALUATING COOPERATIVE MICROCREDIT RELATIONSHIPS

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***Abstract***
*The concept of microcredit success remains contested despite five decades of microfinance research and practice. Existing studies use diverse outcomes to define success, with the issue becoming more complex in cooperative microcredit, where members are simultaneously owners, savers, borrowers, and voters. This article develops a dual outcome framework combining business success at the member level and loan repayment performance at the member–cooperative relationship. The study integrates evidence from four microfinance handbooks and literature on credit constraints, financial intermediation, development economics, cooperative finance, and construct measurement. Four criteria guide the selection of outcomes: their correspondence with the member's dual identity, the possibility that outcomes diverge, their role in sustaining the credit cycle, and their feasibility of measurement at cooperative scale. The analysis identifies business success and loan repayment performance as distinct but complementary outcomes. Loan repayment performance is necessary for sustaining intermediation but does not by itself indicate business success, while neither outcome can serve as a proxy for the other. The framework therefore evaluates both outcomes separately rather than combining them into a compensatory index. It proposes a four-quadrant typology to guide future analysis on cooperative microcredit success.*
***Keywords:*** *microfinance, cooperative microcredit, business success, loan repayment, dual outcome framework*

## 1. Introduction

The question of the meaning of success in microcredit remains an unresolved conceptual issue, despite the development of microfinance practice and research over five decades. The debate is generally understood as a result of differing empirical findings on the impact of microcredit. A more fundamental issue lies in the lack of agreement on appropriate outcomes to define success. Gutiérrez-Nieto and Serrano-Cinca (2023) show that the differing directions of the relationship between financial and social performance in microfinance institutions largely stem from the diversity of definitions and measurements of social performance itself. These findings place the question of definition as a pre-eminent issue, prior to measurement and empirical evidence.

These issues become more complex in the context of cooperatives. Microfinance institutions, typically corporations or non-governmental organizations, separate owners, managers, and borrowers into distinct stakeholder groups, thus treating client well-being and the institution's sustainability as potentially interchangeable objectives. Cooperatives consolidate all these roles in members, who simultaneously act as owners, depositors, borrowers, and decision-makers through member meetings (Ledgerwood et al., 2013). This ownership structure alters the logical status of the trade-off between members' interests and those of the institution. The conceptual implications of these characteristics have not been systematically developed in the microfinance literature.

Based on these issues, this article poses one main research question, namely how the success of cooperative microcredit relationships should be conceptualized. This article specifically evaluates whether the combination of *business success* and *loan repayment performance* can be theoretically justified as a coherent evaluation framework. The scope of this article is limited to evaluating the credit relationship that has been established between the cooperative and its members, not to evaluating the cooperative's overall performance.

The contribution of this article lies in four areas. First, it provides explicit criteria for selecting evaluative outcomes from the range of outcomes used in the microcredit literature. Second, it defines the two focal outcomes and clarifies their boundaries and levels of analysis. Third, it shows

how the proposed framework differs from the established double bottom line by treating business success and loan repayment performance as distinct outcomes rather than combining them at the institutional level. Fourth, it develops a four-quadrant typology that can guide future analysis and evaluation practice. For microcredit providers, the framework offers a way to assess not only whether members repay their loans, but also whether their businesses are developing. This distinction can help providers identify different conditions within their loan portfolios and better understand whether repayment performance reflects sustainable business success.

The article is organized into four main sections. After the introduction, the literature review traces how microcredit success has been conceptualized, examines the different objectives of microcredit, and discusses the theoretical basis of business success and loan repayment performance. The research methods section explains the literature base and the approach used to develop the conceptual framework. The findings and discussion then develop the criteria for selecting the two outcomes, explain why they should be considered together, and examine their relevance to cooperative microcredit. This section also presents the dual outcome framework as the main contribution of this article. The article closes with its main conclusion.

## 2. Literature Review

### *2.1 Evolution of Microcredit Success*

The conceptualization of success in microcredit has evolved through four phases, reflecting shifts in objectives and evaluation orientations. The first phase lasted until the early 1980s and focused on expanding credit disbursement through subsidized, directed credit models. Success during this period was primarily measured by disbursement volume and geographic coverage, while portfolio quality was viewed merely as an administrative matter. The transition to the next phase was triggered by critiques from the "Ohio School," which argued that sustained access to credit was more valuable to borrowers than subsidized interest rates, and that interest rates failing to cover costs actually undermined the financial infrastructure intended to be built (Adams & Von Pischke, 1992)—a position that subsequently formed the basis for the sustainability paradigm outlined in later literature (Ledgerwood, 1999; Hartarska & Cull, 2023).

The second phase spanned roughly from the mid-1990s to the mid-2000s, establishing institutional sustainability as the primary metric of success. Literature from this period developed institutional indicators such as operational self-sufficiency, financial self-sufficiency, portfolio at risk, and the subsidy dependence index, while also introducing the concept that microfinance institutions should be evaluated against a "double bottom line" (Yaron, 1994; Ledgerwood, 1999). Internal critiques emerged within this same paradigm, noting that high loan repayment rates did not always reflect true portfolio quality, thereby necessitating a more cautious interpretation of institutional indicators (Ledgerwood, 1999; Rosenberg, 1999). The rise of commercialization during the latter half of this phase introduced an additional outcome dimension: outreach. The success of certain institutions in achieving financial sustainability raised questions regarding who was actually being served. Navajas et al. (2000) addressed this question through a six-dimensional outreach framework: depth, value to the user, cost to the user, breadth, length, and scope. Copestake (2007) developed the concept of mission drift, using average loan size as a proxy. Consequently, the second phase focused on three simultaneous output clusters: institutional financial performance, portfolio quality, and outreach.

The third phase began in the late 1990s and peaked in the 2010s, marked by a shift in focus from the institution to the member. Advances in experimental evaluation drove the use of household- and enterprise-level outcomes, such as business profits, investment, consumption, education, and women's empowerment. This shift yielded methodologically more rigorous evidence while demonstrating that the impact of microcredit on well-being tended to be more modest than the industry's initial claims (Armendáriz & Morduch, 2010; Banerjee, Duflo, et al., 2015; Banerjee, Karlan, & Zinman, 2015). The fourth phase began in the mid-

2010s and encompasses two distinct developments. The first is a shift in discourse from poverty alleviation to financial inclusion, placing access to and usage of services at the center of system-level evaluations. The second involves efforts to build consensus regarding beneficiary-level outcome domains, covering changes in business activities, economic poverty, assets, resilience, and health (Hartarska & Cull, 2023).

The evolution of the concept of microcredit success has given rise to four clusters of microcredit performance measurement. The first cluster concerns institutional financial performance, encompassing operational self-sufficiency, financial self-sufficiency, return on assets, portfolio yield, and the subsidy dependence index (Ledgerwood, 1999; Ledgerwood et al., 2013). The second cluster relates to portfolio quality, covering delinquency rates, portfolio at risk, loans overdue by more than thirty days, and the ratio of renegotiated loans. The third cluster focuses on outreach, defined by the six dimensions formulated by Navajas et al. (2000). The fourth cluster addresses client impact, including business profits, consumption, assets, and poverty status.

These four clusters exhibit a striking conceptual disparity. The institutional financial performance and portfolio quality clusters are institutional in nature, internationally standardized, and derivable from institutional information systems at no additional cost (Ledgerwood, 1999; Ledgerwood et al., 2013). In contrast, the client impact cluster is individual-level; it entails significantly higher measurement costs and remains a subject of debate across almost every dimension—ranging from variable selection and measurement instruments to evaluation methodology (Hartarska & Cull, 2023). These differences in measurement costs and methodological legitimacy help explain why evaluation practices rely more heavily on institutional outputs. Mosley and Hulme (1998) documented that early microcredit studies often treated loan repayment as evidence of increased borrower income. The asymmetries in measurement costs and methodological legitimacy across these clusters help explain the persistence of such practices over several decades, although this explanation is interpretive and warrants further empirical testing.

The multidimensional evaluation framework is not a new concept in microfinance literature. Yaron (1994) proposed the "double bottom line" concept, which assesses microfinance institutions based on both financial and social performance simultaneously. Navajas et al. (2000) developed a six-dimensional outreach framework, while Copestake (2007) devised a social performance assessment to detect mission drift. All three frameworks position their dimensions at the institutional level, presuppose a separation between owners and service users, and are operationalized in practice through composite assessments or inter-dimensional weighting. However, the framework still presents several issues. First, the dimensions employed are generally assessed at the institutional level. Consequently, it remains unclear how to distinguish between the success perceived by members and the institution's ability to maintain credit sustainability. Second, the framework typically separates service owners from service users, whereas in cooperatives, both roles are embodied by the same members. Third, when multiple dimensions are combined into a single assessment, the results can mask situations where one dimension performs well while another is problematic. This issue is particularly significant in cooperative microcredit, as the success of a member's business and their ability to repay a loan represent distinct concepts, yet both are linked to the cooperative's sustainability.

### *2.2 Theoretical Objectives of Microcredit*

The literature distinguishes five groups of objectives underlying microcredit, none of which can be reduced to a single, solitary goal. The first objective is development. From this perspective, microcredit is viewed as an instrument to alleviate credit constraints that hinder productive capital accumulation among households lacking collateral. Its theoretical underpinnings include occupational choice models with liquidity constraints (Evans & Jovanovic, 1989) and models linking wealth distribution to development (Banerjee & Newman,

1993; Galor & Zeira, 1993; Aghion & Bolton, 1997). These models carry significant implications for this article: a household's initial wealth determines who can utilize credit access, meaning initial wealth has the potential to simultaneously influence both business outcomes and repayment outcomes. Sen's (1999) capability perspective expands the development objective from mere income growth to the expansion of substantive freedoms. This expansion creates a tension with the framework proposed in this article, as the latter narrows development outcomes to business performance. This tension is openly acknowledged and addressed through a statement on construct boundaries in Section 6, rather than through a claim that business performance encompasses all dimensions of capability.

The second objective is financial sustainability. This perspective posits that an institution's ability to cover operating costs, the cost of funds, and loan losses is a prerequisite for the continuous provision of financial services. Ledgerwood (1999) asserts that without a minimum of 100 percent financial self-sufficiency, the long-term provision of financial services relies on donor funding. Robinson (2001) identifies sustainability as a prerequisite for the microfinance revolution. Cull et al. (2018) demonstrate that, in the aggregate, microfinance business models generate relatively modest profits while subsidies persist; thus, sustainability is best understood as a gradient rather than a binary status. The third objective is institutional. This group of objectives focuses on the development of financial markets as a system, rather than the growth of a single institution. Ledgerwood et al. (2013) conceptualize microfinance as a financial market system comprising core functions, support functions, and interconnected rules and norms. Von Pischke (1991) complements this perspective with the concept of debt capacity—the limit on borrowing ability jointly determined by the borrower's circumstances and the institution's capacity to assess risk.

The fourth objective concerns member welfare. Member-owned institutions do not aim to maximize profits for external owners; instead, they provide benefits to members through better service pricing, more secure access, and the distribution of surplus earnings. Ledgerwood et al. (2013) note that well-managed cooperatives often offer loans at lower interest rates than other microfinance institutions while simultaneously returning surpluses to members in the form of dividends. The fifth objective relates to cooperative principles. This group of objectives is normative and organizational in nature, encompassing shared ownership, democratic control based on the "one member, one vote" principle, member economic participation, autonomy, and concern for the community (International Co-operative Alliance, 1995). Hansmann (1996) explains the advantages of user-ownership models in specific instances of market failure. Guinnane (2001) demonstrates how rural credit cooperatives in Germany functioned as information mechanisms capable of mitigating information asymmetry at the local level.

These five groups of objectives differ in their levels of analysis and logical status. Development objectives and member welfare objectives operate at the individual and household levels. Financial sustainability and institutional objectives operate at the organizational and systemic levels. Cooperative objectives operate at the governance level and are procedural rather than outcome-based. A coherent outcome framework must explain how these various levels of analysis are mapped and justify the selection of specific objectives as the focus of evaluation. Failure to do so is a primary source of conceptual confusion in the literature.

### *2.3 Business Success and Loan Repayment Performance*

Business success, in this article, is defined as the improvement in the economic capacity of the member's business unit financed by the cooperative—manifested through the accumulation of productive capital, the scale of operations, and the business surplus over the course of the credit relationship. This construct operates at the level of the member and the business unit, rather than at the level of the household as a whole. It is essential to clearly define these conceptual boundaries. Business success here does not encompass changes in household consumption, resilience to shocks, or the expansion of capabilities in the sense defined by Sen

(1999), even though these are all legitimate development goals. This narrower focus is adopted because the credit being evaluated is productive credit explicitly intended to finance members' businesses; consequently, changes within the business unit represent the domain most directly aligned with the purpose of the financing.

The theoretical justification for this concept of business success rests on credit constraint theory. Poor households lacking collateral face credit rationing driven by information asymmetry—a phenomenon formalized by Stiglitz and Weiss (1981) through mechanisms of adverse selection and risk-taking incentives that worsen as interest rates rise. Such rationing causes the marginal product of capital in micro-enterprises to exceed the cost of funds, resulting in socially efficient investments that fail to materialize (Evans & Jovanovic, 1989; Banerjee & Newman, 1993). Alleviating these constraints should manifest at the business level—specifically in terms of working capital, productive assets, scale of operations, and surplus.

Loan repayment performance is defined as the behavior of members in fulfilling payment obligations according to the agreed schedule, without arrears exceeding cooperative policy thresholds and without restructuring that masks an inability to pay. This construct operates at the level of member behavior in relation to the cooperative. Portfolio ratios at the institutional level—such as "portfolio at risk"—are treated as aggregates of this behavior rather than as the same construct, given that portfolio ratios are also influenced by write-off policies and portfolio growth rates (Ledgerwood, 1999; Rosenberg, 1999).

The theoretical justification for loan repayment performance rests on financial intermediation theory. The social value created by intermediary institutions stems from savings in monitoring costs. Diamond (1984) demonstrated that individual savers lack both the incentive and the capacity to monitor every borrower; consequently, monitoring is delegated to an intermediary capable of diversifying its portfolio. Such savings are realized only if the intermediary can recover its claims, as a failure to recover destroys the basis for saver confidence and terminates the delegation. The informational advantages of intermediaries—analyzed by Leland and Pyle (1977) and Fama (1985)—also hold value only as long as the intermediary remains operational. Loan repayment performance is, therefore, not merely an administrative indicator but a condition determining whether the intermediation function retains value for those who delegated the monitoring task.

Loan repayment performance serves three distinct theoretical functions. The first function is informational, as repayment behavior reveals hidden information regarding borrower types and actions that cannot be directly observed; consequently, repayment data are used to test competing theories of group lending (Ahlin & Townsend, 2007). The second function is incentive-based, as eligibility for subsequent loans—contingent upon the repayment of current ones—creates a non-collateralized disciplinary mechanism (Armendáriz & Morduch, 2010). The third function is relational, as payment history serves as the basis for accumulating personal knowledge that enables incremental increases in loan amounts, consistent with the relationship lending literature in small business finance (Petersen & Rajan, 1994; Boot, 2000; Berger & Udell, 2002; Hartarska & Cull, 2023).

This insight holds particular significance for cooperatives. In a cooperative, the parties delegating monitoring are the saving members, while the parties being monitored are the borrowing members; thus, the delegation occurs among members who jointly own the institution. Consequently, a failure to recover loans does not shift losses to external shareholders but rather to fellow members.

The literature documents various concrete situations where loan repayment performance remains high despite a lack of improvement in members' business conditions. Refinancing is the most widely documented mechanism, with some markets recording refinancing loans that account for up to half of all disbursements (Hartarska & Cull, 2023). A debt spiral occurs when

members borrow from other sources to meet installment payments and subsequently borrow again from the institution to repay those sources (Armendáriz & Morduch, 2010). Social pressure can maintain repayment discipline, albeit at a cost borne by the borrower beyond their business operations (Rahman, 1999). Compulsory savings—which cannot be withdrawn while a loan is active—serve as collateral, meaning that a portion of the repayment effectively comes from the members' own funds (Ledgerwood, 1999). These four mechanisms yield repayment figures indistinguishable from repayments funded by business surpluses, yet their welfare implications are diametrically opposed.

The reverse scenario is also documented. Besley and Coate (1995) formalized the concept of strategic default by borrowers who are actually capable of repaying. Ledgerwood (1999) reported a more striking case: group members who became wealthier began to disregard group pressure to repay because they felt they had less at stake, thereby becoming defaulters due to their newfound wealth rather than an inability to pay. Such cases demonstrate that improvements in members' economic conditions do not automatically strengthen repayment discipline; indeed, they can weaken it when enforcement mechanisms rely on members' dependence on access to credit.

The methodological implications of these two bodies of evidence are fundamental. One outcome cannot serve as a proxy for the other. An evaluation measuring only repayment rates would classify painful repayment processes as successes. Conversely, an evaluation measuring only business performance would classify cooperatives experiencing capital erosion as successful. The two errors are in opposite directions and cannot correct each other.

## 3. Research Methods

### *3.1 Approach and Nature of the Conceptual Contribution*

This article is a conceptual piece employing an integrative approach. This approach is used to synthesize various concepts and arguments from literature spanning multiple theoretical traditions into a coherent framework (Jaakkola, 2020). This approach aligns with the article's objective: not to estimate relationships between variables, but to address the question of how microcredit success should be conceptualized. Consequently, the expected outcome of this analysis is not an empirical estimate, but rather criteria for selecting outcomes, conceptual definitions for the chosen outcomes, a typology of relationships between outcomes, and propositions testable in future research. This article is neither a systematic review nor a meta-analysis. The literature serves as a foundation for constructing and examining conceptual arguments, rather than claiming to cover all existing research on microcredit.

### *3.2 Key Literature and Selection Criteria*

The article's core literature consists of four microfinance handbooks: Ledgerwood (1999), Armendáriz and Morduch (2010), Ledgerwood et al. (2013), and Hartarska and Cull (2023). These four handbooks were selected because they represent the evolution of microfinance knowledge across different periods. By utilizing these four sources, it is possible to trace changes over time in how the literature conceptualizes microcredit success. Handbooks serve as the primary sources because each was compiled to synthesize the body of knowledge developed within the field of microfinance. Thus, these sources facilitate the identification of outcomes that are long-established and widely recognized in the literature, avoiding reliance on the perspective of any single study. Supporting literature was drawn from references cited in the four handbooks and supplemented by literature from five areas. The first area comprises credit constraint theory and development economics, providing a basis for understanding outcomes at the enterprise level. The second area is financial intermediation theory, which helps explain the significance of outcomes within credit relationships. The third area encompasses literature regarding microcredit contracts and factors influencing loan repayment. The fourth area concerns cooperative finance and the governance of member-owned institutions. The fifth area involves construct measurement, used to assess whether various outcomes should be treated separately or combined.

### *3.3 Synthesis Procedure*

The analysis was conducted in four stages. The first stage involved tracing how success is conceptualized in key literature and identifying the outcomes used to measure it. These outcomes were then categorized based on the level of analysis and the data sources employed. This categorization was primarily derived from indicators discussed in the four handbooks and subsequently cross-referenced with literature on outreach and social performance. The second stage involved examining the theoretical underpinnings of each outcome category. At this stage, core literature from the five aforementioned areas was used to understand why specific outcomes are deemed important and the objectives they aim to achieve. The third stage involved comparing the conceptual relationships among relevant outcomes. Particular attention was paid to the possibility that business success and loan repayment performance do not always move in tandem. This stage is crucial because the article does not assume that business success automatically leads to good loan repayment, or vice versa. The fourth stage utilized the findings from the previous three stages to formulate a typology and propositions. Consequently, the resulting typology does not stand in isolation but emerges from the mapping of outcomes and the discussion regarding the relationships between them.

### *3.4 Development of the Conceptual Framework*

Once the outcomes were mapped and their theoretical underpinnings explored, the conceptual framework was developed through four steps. The first step involved formulating criteria for outcome selection based on arguments found in the literature. These criteria were then applied to the various groups of outcomes that had been identified. The second step entailed formulating conceptual definitions for the two selected outcomes: business success and loan repayment performance. These definitions encompassed the meaning of each outcome, its dimensions, the level of analysis, and its conceptual boundaries. The third step involved constructing a typology by positioning business success and loan repayment performance as two distinct axes. Combinations of high and low levels for these two outcomes yielded four possible conditions, which were then used to build a four-quadrant typology. The fourth step was to derive propositions from the framework. Each proposition was formulated in a way that allowed for empirical testing and the possibility of falsification. Consequently, the resulting framework does not remain merely a conceptual depiction but serves as a foundation for subsequent empirical research.

## 4. Research Findings and Discussion

### *4.1 Selecting the Two Outcomes*

Selecting outcomes within an evaluation framework requires explicitly stated criteria, given that the literature offers at least four clusters of outcome variables and five distinct groups of objectives. Without such criteria, the selection of outcomes might appear to be a decision made prior to the analysis itself. This article employs four criteria, all derived from arguments found within the core body of literature. The first criterion is correspondence with the members' dual identity. Selected outcomes must represent members' interests in both of their roles simultaneously: as business operators and as collective owners of the shared fund (Ledgerwood et al., 2013; Hansmann, 1996). The second criterion concerns the possibility of divergence. Only pairs of outcomes that can empirically move in opposite directions warrant retention as separate dimensions; outcomes that consistently move in the same direction fail to provide additional discriminatory information (Campbell & Fiske, 1959). The third criterion is status as a necessary condition for the sustainability of the credit cycle. Institutional-level outcomes must determine the recurrence of credit disbursement, rather than merely describing the financial condition at a single point in time (Diamond, 1984; Von Pischke, 1991). The fourth criterion is availability at the cooperative level without the need for an experimental evaluation design. Selected outcomes must be capable of routine monitoring by small-scale cooperatives, taking into account the previously outlined asymmetries in measurement costs across the different clusters.

Applying these four criteria led to the selection of business success and loan repayment performance. Business success meets the first criterion by representing the interests of members as business owners, and the fourth criterion because some of the necessary information is already available during the credit assessment process conducted by the cooperative. Loan repayment performance meets the first criterion because a member's arrears reduce the value of other members' savings, and the third criterion because loan recovery determines fund availability for the subsequent cycle. Together, these two outcomes satisfy the second criterion, as the literature documents instances where they move in opposite directions.

The institutional financial performance cluster was not selected because most of its indicators are arithmetic derivatives of portfolio quality and cost structure; thus, they do not provide additional discriminatory information beyond what is captured by loan repayment performance. Broader household welfare outcomes—such as consumption, health, and empowerment—were excluded because they failed to meet the fourth criterion in the context of small-scale cooperatives, even though all four represent legitimate development goals. Outreach was not included as a dimension of the framework because it pertains to the stage preceding the establishment of a credit relationship, as explained in the following boundary statement.

### *4.2 Why the Two Outcomes Should Be Evaluated Together*

Business success and loan repayment performance play distinct roles in assessing the success of microcredit. Business success examines whether a member's business grows after obtaining credit, whereas loan repayment performance looks at whether the member is able to meet their obligations to the cooperative. The differences between the two can be observed in terms of the level of analysis, objectives, timing of measurement, theoretical basis, the member's role, and measurement methods. These differences indicate that the two outcomes cannot be treated as alternative ways of measuring the same thing. Business success provides information on a member's economic progress, while loan repayment performance offers insights into the sustainability of the credit relationship. Relying on only one of these metrics would result in the loss of significant information regarding the success of microcredit.

**Table 1. Conceptual Differences between the Two Outcomes**

| Dimension | Business Success | Loan Repayment Performance |
|---|---|---|
| Level of analysis | Member and business | Member–cooperative relationship and loan portfolio |
| Main role | Shows business development | Supports continued credit provision |
| Time orientation | Result of the current creditcycle | Supports the next credit cycle |
| Main theoretical basis | Credit constraint and development economics | Financial intermediation and credit contract theory |
| Member role | Member as entrepreneur | Member as borrower, owner, and saver |
| Measurement | More difficult and costly to measure | More standardized and usually available from cooperative records |

*Source*: The author

This distinction is further highlighted by the fact that the two outcomes do not always move in tandem. A member might repay a loan on time even if their business is not growing. Conversely, a member's business might flourish while loan repayments remain problematic. Such scenarios necessitate viewing the two outcomes separately. Loan repayment performance can remain high even when a member's business conditions do not improve. Refinancing can enable members to continue making repayments without demonstrating meaningful business growth (Hartarska & Cull, 2023). A debt spiral can also occur when members use loans from other sources to meet existing obligations (Armendáriz & Morduch, 2010). Social pressure can

sustain repayment even when the cost must be covered by resources outside the business (Rahman, 1999). Furthermore, mandatory savings—which cannot be withdrawn while the loan is active—can serve as a source of repayment, meaning that settlement does not necessarily stem from business earnings (Ledgerwood, 1999). These conditions demonstrate that good loan repayment performance does not automatically imply business success. If a cooperative focuses solely on loan repayment performance, members who repay through refinancing, other loans, or personal resources may appear indistinguishable from those who repay because their businesses are genuinely thriving.

The reverse scenario is also possible: a member's business may grow, yet loan repayments remain problematic. Besley and Coate (1995) demonstrated that borrowers who are actually capable of repaying may choose to engage in strategic default. Ledgerwood (1999) also notes a scenario where members who become wealthier find it easier to ignore group pressure to repay, as their reliance on the credit relationship diminishes. Consequently, business growth alone cannot serve as an indicator of a healthy credit relationship. If a cooperative focuses solely on business success, a member's business growth might appear positive even as repayment quality deteriorates and the cooperative's ability to continue extending credit comes under threat.

These two conditions illustrate why one outcome cannot simply substitute for the other. Relying solely on loan repayment performance might lead a cooperative to view repayment as a success even if the member's business is not growing. Conversely, focusing only on business success might cause the cooperative to overlook repayment issues that could jeopardize the sustainability of the credit arrangement. However, utilizing both outcomes does not imply they should be aggregated into a single score. Such an approach could obscure distinctions that are crucial to understand. For instance, a situation where both business success and loan repayment performance are high differs significantly from a scenario where one is high while the other is low. Although both conditions might yield a similar aggregate value, they carry different implications for the cooperative.

Therefore, this study maintains both outcomes as distinct measures while situating them within a unified evaluation framework. Business success indicates whether the credit has fostered the member's business growth, whereas loan repayment performance indicates the viability of the credit relationship. By examining both simultaneously, the evaluation can distinguish between scenarios where both objectives are achieved, where only one is met, and where neither is realized.

### *4.3 Why Cooperative Microcredit Requires a Dual Outcome Perspective*

The dual-outcome framework finds stronger justification in the context of cooperatives compared to other forms of microfinance. This distinction lies not in the characteristics of the credit disbursed, but rather in five structural features absent in other institutional forms.

The first feature is the dual identity of members. Ledgerwood et al. (2013) define financial cooperatives as member-owned service providers organized according to basic cooperative principles—lacking external shareholders, with members acting as owners, and operating on a "one member, one vote" basis. This structure eliminates the separation between those who benefit from business success and those who bear the burden of loan losses. An individual member's arrears reduce the value of other members' savings and capital contributions; consequently, loan repayment performance is not an external owner's interest competing with members' interests, but rather a matter of the members' own interests in different capacities. Hansmann (1996) provides the theoretical basis for this claim through an analysis of the costs associated with patron ownership.

The second feature is the dominance of internal capital. Ledgerwood et al. (2013) note that member savings and capital contributions serve as the primary funding mechanism for

cooperatives, providing a relatively stable and low-cost source of funds. The absence of an external capital buffer means that loan losses are borne directly by the members' capital base; thus, the sensitivity of member welfare to portfolio quality is far higher than in institutions with external shareholders.

The third feature is the structural conflict between net savers and net borrowers. Ledgerwood (1999) identifies the conditions necessary for a cooperative to function effectively: a group small enough for members to know one another, and a regular rotation of member roles between net saver and net borrower. When these conditions are not met, the cooperative becomes unstable, and structural conflict arises between borrowers—who desire low interest rates and lenient repayment pressure—and net savers, who seek high returns and highly prudent management of savings. The two outcomes in this framework directly represent the interests of these two member factions, which must be balanced.

The fourth feature is governance vulnerability. Ledgerwood et al. (2013) state that governance is one of the cooperative sector's greatest challenges; that general cooperative supervisory authorities often lack the expertise to oversee financial intermediaries; and that weak supervision, combined with poor governance, can jeopardize the security of financial cooperatives, particularly when the savings of the poor are at stake. Cuevas and Fischer (2006) and Fonteyne (2007) elaborate on agency problems specific to cooperatives, while Cook (1995) identifies horizon and free-rider problems inherent in cooperative property rights structures. An outcome-based framework that monitors only member business performance will fail to detect the erosion of governance until the institution faces serious distress.

A fifth characteristic is the long-term relationship grounded in collective norms. Loan funds are derived from the savings of fellow members; consequently, the repayment obligation is owed to the collective rather than to a third party. Ostrom (1990) demonstrates that the management of common-pool resources can be sustainable if the user group is capable of devising, monitoring, and enforcing its own usage rules. Repayment discipline within cooperatives can be understood within this framework—specifically, as a rule governing the use of a shared resource that is enforced by the users themselves. Guinnane (2001) illustrates how rural credit cooperatives successfully transformed local information into an institutional asset that underpinned such enforcement. Thus, loan repayment performance serves as a measure of the health of the collective norms sustaining the shared fund, rather than merely an indicator of the institution's cash inflows.

### *4.4 The Dual Outcome Framework*

The proposed conceptual model positions business success and loan repayment performance as the two dimensions constituting the success profile construct of cooperative microcredit relationships. The three underlying theories operate at different points within the model. Credit constraint theory explains why credit disbursement can alter members' business performance. Financial intermediation theory explains why loan recovery is a prerequisite for repeated lending. Cooperative finance theory explains why both outcomes are inherent to the same economic agent; thus, integrating them into a single evaluation framework is a consequence of the ownership structure rather than merely a methodological choice.

The typology within this model utilizes the individual member as the primary unit of analysis. Each member is positioned based on their business unit's performance and their loan repayment behavior throughout the credit relationship. This choice of unit of analysis aligns with the previously defined constructs and avoids errors that arise when inferring member behavior from portfolio ratios at the institutional level. While the cooperative level can still be analyzed, it does not serve as a single point within the typology. Cooperatives are characterized by the distribution of their members across the four quadrants; consequently, two cooperatives with identical portfolio ratios may exhibit vastly different success profiles if their member compositions differ.

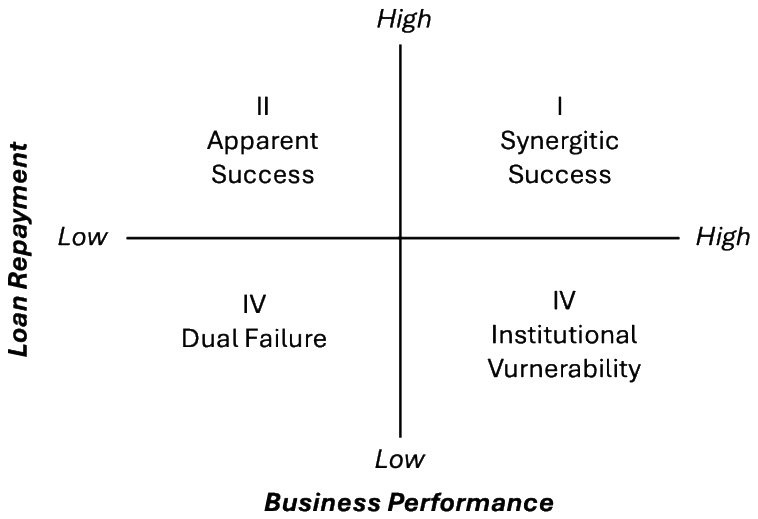



**Figure 1. Dual Outcome Framework for Cooperative Microcredit**
*Source*: The author

The typology is constructed by placing business success on the horizontal axis and loan repayment performance on the vertical axis, with quadrant numbering following the counter-clockwise convention starting from the top-right quadrant. The threshold setting between "high" and "low" categories is contextual and should be determined relative to the member distribution within the specific cooperative, rather than through absolute thresholds applied across cooperatives. This approach reflects the framework's nature as an internal diagnostic tool for cooperatives, rather than a tool for ranking cooperatives against one another.

## 5. Conclusion

This study concludes that the success of cooperative microcredit relationships cannot be adequately represented by a single outcome. Business success and loan repayment performance reflect different levels of analysis and serve different purposes, and neither can serve as a proxy for the other.

The strongest justification for integrating these two outcomes stems from cooperative finance rather than mainstream microfinance literature. The members' dual identity as both owners and borrowers eliminates the analytical separation between member interests and institutional interests, meaning the two outcomes represent the interests of the same economic actor. This characteristic distinguishes the proposed framework from the "double bottom line" tradition, which situates all dimensions at the institutional level and presupposes a separation between owners and service users.

The proposed framework is formulated as a non-compensatory profile construct featuring a four-quadrant typology. Its practical value lies in its ability to distinguish synergistic success from apparent success and institutional fragility—three conditions that cannot be differentiated through single-outcome evaluations.

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# THE EFFECTS OF SOCIAL MEDIA, BEHAVIOR, AND RELIGIOSITY ON SANTRI ENTREPRENEURIAL INTEREST

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***Abstract***
*This study aims to analyze the influence of social media, behavior, and religiosity of students on entrepreneurial interest at the Darul Uchuwah Islamic Boarding School in West Jakarta. The research method used is quantitative with a survey approach. The research sample was determined by purposive sampling technique using the Slovin formula with a sample size of 60 students. The results showed that social media did not have a significant effect on entrepreneurial interest of students, while student behavior and religiosity had a positive and significant effect on entrepreneurial interest. Student religiosity has also been shown to be the strongest factor because religious values encourage students to view entrepreneurship as an economic activity that is halal, has religious value, and is beneficial to society. Simultaneously, social media, student behavior, and student religiosity have a significant effect on entrepreneurial interest of students.*
***Keywords:*** *Social Media, Santri Behavior, Religiosity, Entrepreneurial Interest, Islamic Boarding School*

## 1. Introduction

The development of digital technology and social media has brought about significant changes in various aspects of life, including the world of education and the economy of Islamic boarding schools (pesantren). Once known as centers of traditional Islamic education, Islamic boarding schools (pesantren), are now beginning to adapt to technology to improve the competitiveness and well-being of their students (Nugroho & Hidayat, 2021). One positive impact of this development is increased access for students to information and business opportunities through social media and digital platforms (Maulana & Syamsudin, 2023). Therefore, it is important to examine the influence of social media and digital technology on entrepreneurial interest among students, particularly at the Darul Uchuwah Islamic Boarding School for Economics.

Social media plays a significant role in shaping the mindset and interest in entrepreneurship among students. Through platforms such as Instagram, Facebook, and TikTok, students can gain business inspiration from young entrepreneurs and learn digital marketing strategies firsthand (Rahman, 2021). Furthermore, social media provides opportunities for students to promote their own products without the need for a physical store, making it easier for them to start a business (Arifin, 2022). With the advent of social media, barriers to marketing products have become smaller, ultimately encouraging students' interest in entrepreneurship.

A person's behavior can also influence entrepreneurial interest. Behavior is an individual's actions manifested in daily actions (Khumairo, 2023). This factor is important because it can influence a person's intentions and actual behavior. If someone feels they have a high level of control over their behavior, they are more likely to have a strong intention and ultimately carry it out (Yusvan et al., 2024). Innovative behavior allows them to face challenges by turning them into opportunities (Krismananda, 2022).

Religiosity is a component of entrepreneurship. Religiosity is a situation and condition in which a person is motivated to carry out something based on religious devotion (Laksono & Soleh, 2022). Entrepreneurship is one of the muamalah activities exemplified by the Prophet Muhammad (peace be upon him). The Prophet Muhammad (peace be upon him) was successful in local and international businesses at the young age of 17, leading trade expeditions across countries such as Syria, Jordan, Bahrain, and Kuwait (Yahdina et al., 2021). Therefore, a person's religiosity will

influence their interest in entrepreneurship.

Interest in entrepreneurship is a crucial factor in fostering economic independence for Islamic boarding school students after completing their education at Islamic boarding schools. Previous studies have shown that students exposed to the digital entrepreneurship ecosystem tend to have a higher interest in starting their own businesses than those without access to social media and digital technology (Rohman, 2020). Furthermore, support from Islamic boarding schools in providing digital-based entrepreneurship programs can also increase students' motivation to explore various business opportunities (Maulana & Syamsudin, 2023). Therefore, understanding the factors influencing interest in entrepreneurship is crucial to improving the effectiveness of economic education programs in Islamic boarding schools.

Several previous studies have examined the influence of social media and digital technology on entrepreneurship, but few have focused on the Islamic boarding school environment. For example, research by Nugroho & Hidayat (2021) showed that intensive social media use is positively associated with increased entrepreneurial awareness among young Muslims. Another study by Rahman (2021) also found that digital technology-based learning can improve business skills among Islamic economics students. Furthermore, research related to entrepreneurial interest in Islamic boarding schools (pesantren) has been conducted, including by (Ernawati, 2021; Khoirunnisa et al., 2023; Kurniawan et al., 2023; Laksono & Soleh, 2022; Nanda, 2023; Shofiyuddin et al., 2023). However, there is limited research specifically examining the influence of social media, religiosity, and behavior on entrepreneurial interest among Islamic boarding school students.

Darul Uchuwah Islamic Boarding School for Economics is one such Islamic boarding school that focuses on developing entrepreneurial skills for its students. With its digital-based economics program, this Islamic boarding school strives to equip students with skills that can help them become economically independent after graduation. However, further research is needed to understand the effectiveness of social media and digital technology in increasing students' interest in entrepreneurship (Arifin, 2022). Therefore, this study aims to fill the gap in previous studies and provide strategic recommendations for administrators.

## 2. Literature Review

### *2.1 Social Media and Entrepreneurial Interest*

Social media has become a crucial tool in influencing entrepreneurial interest among Islamic boarding school students. Research shows that social media use can increase students' access to information and business opportunities, thus stimulating their interest in entrepreneurship (Kamal & Thoyyibah, 2020). Furthermore, platforms like TikTok allow students to express their creative ideas, which can serve as initial capital for entrepreneurship (Febriyanti, 2023).

However, not all studies find a positive relationship between social media and entrepreneurial interest. Some studies indicate that although social media provides business information, other factors such as entrepreneurship education and income expectations play a more significant role in influencing entrepreneurial interest (Jumadi & Mustofa, 2022). Therefore, the role of social media as a driver of entrepreneurial interest still requires further research.

On the other hand, social media use can also influence students' religious behavior. Research shows that platforms like Instagram can influence the religious behavior of Islamic boarding school students through the features they offer, which in turn can influence their interest in entrepreneurship (Ihzan, 2022). Thus, social media plays a dual role in influencing students' entrepreneurial interest, both directly and indirectly.

Overall, social media can be an effective tool in increasing entrepreneurial interest among

Islamic boarding school students, especially if used wisely and supported by adequate entrepreneurship education. However, it is important to note that social media can also have negative impacts if not used appropriately, so supervision and guidance from Islamic boarding schools are essential.

***H1: Social media has a significant effect on santri entrepreneurial interest.***

### *2.2 Santri Behavior and Entrepreneurial Interest*

Behavior is the result of all kinds of experiences and interactions between humans and their environment which are manifested in the form of knowledge, attitudes and actions (Loppies & Nurrokhmah, 2021). This behavior will influence students' interest in entrepreneurship. Be it a small business or on a large scale.

The behavior of students plays an important role in shaping their interest in entrepreneurship. Positive attitudes towards entrepreneurship, subjective norms, and perceived behavioral control can increase students' intentions to enter the business world (Suyanto & Astuti, 2020). Research shows that these variables contribute significantly to fostering interest in entrepreneurship among students (Sary et al., 2023).

***H2: Santri behavior has a significant effect on santri entrepreneurial interest.***

### *2.3 Religiosity and Entrepreneurial Interest*

The religiosity of Islamic boarding school students plays a significant role in shaping entrepreneurial interest. Research shows that high levels of religiosity positively influence students' entrepreneurial interest (Alfiyati, 2019). This suggests that religious values can encourage students to enter the business world.

Furthermore, religiosity also influences entrepreneurial attitudes and behavior. Research in Yogyakarta found that religiosity significantly influenced the entrepreneurial attitudes of young Muslims (Wibowo & Sujono, 2021). This suggests that religious values can shape positive attitudes toward entrepreneurship. Religiosity can also increase independence, which in turn influences entrepreneurial interest (Alfiyati, 2019).

***H3 : Religiosity has a significant effect on santri entrepreneurial interest.***

***H4 : Social media, santri behavior, and religiosity simultaneously have a significant effect on santri entrepreneurial interest.***

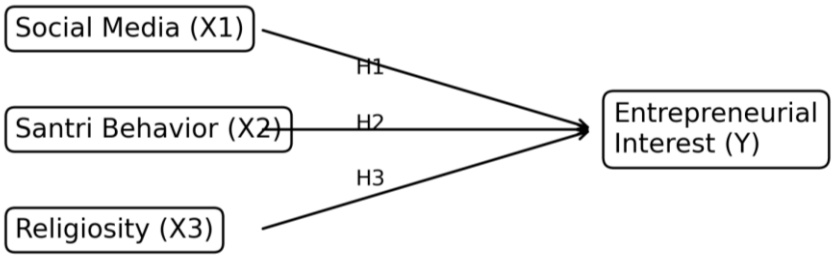



**Figure 1. Research Framework**

*Source: Adapted from the research framework in the source study.*

## 3. Research Methods

This study used a quantitative approach with a survey method. Data were collected using a questionnaire designed on a five-point Likert scale. The independent variables were social media (X1), santri behavior (X2), and religiosity (X3), while the dependent variable was entrepreneurial interest (Y) among santri of Pondok Pesantren Ekonomi Darul Uchuwah.

The study population consisted of 145 santri. Purposive sampling was applied with the criteria that respondents were active santri and resided at the pesantren. The source study estimated the required sample size using the Slovin formula with an error tolerance of 0.10, as follows:

$$n = N / [1 + N(e)^2]$$

Where n is the sample size, N is the population size, and e is the tolerated sampling error. With N = 145 and e = 0.10, the calculation produced approximately 59 respondents; the study used 60 santri as the final sample.

The questionnaire items were developed according to the indicators of each research variable. Instrument validity was tested using Pearson Product Moment correlation, and reliability was evaluated using Cronbach's Alpha. Respondents rated each statement from 1 (strongly disagree) to 5 (strongly agree).

Data analysis was conducted in several stages using statistical analysis software. Descriptive statistics were first used to summarize respondent characteristics and data distributions. Classical assumption tests included normality, multicollinearity, and heteroscedasticity tests. Multiple linear regression was then used to assess the effects of social media, santri behavior, and religiosity on entrepreneurial interest. Statistical significance was evaluated at a 95% confidence level ($\alpha = 0.05$). The analysis plan also included the coefficient of determination, an F-test for the overall regression model, and t-tests for the partial effects of each independent variable.

## 4. Research Findings and Discussion

### *4.1 Respondent Characteristics*

**Table 1. Respondent Characteristics**

| Variable | Category | Frequency | Percentage |
|---|---|---|---|
| Gender | Male | 30 | 50.0% |
| Gender | Female | 30 | 50.0% |
| Age | <15 years | 0 | 0.0% |
| Age | 15-18 years | 12 | 20.0% |
| Age | 19-22 years | 25 | 41.7% |
| Age | >22 years | 23 | 38.3% |
| Length of Stay | <1 year | 9 | 15.0% |
| Length of Stay | 1-3 years | 27 | 45.0% |
| Length of Stay | 4-6 years | 17 | 28.3% |
| Length of Stay | >6 years | 7 | 11.7% |
| Entrepreneurship Training | Yes | 39 | 65.0% |
| Entrepreneurship Training | No | 21 | 35.0% |

*Source: Research data.*

The respondents were evenly divided by gender, with 30 male santri (50%) and 30 female santri (50%). This balanced composition allowed the study to describe the examined factors without a gender imbalance in the sample.

Most respondents were 19-22 years old (41.7%), followed by those older than 22 years (38.3%). Respondents aged 15-18 years accounted for 20%, and no respondent was younger than 15 years. Thus, most participants were within an age range in which economic independence and entrepreneurial plans could become increasingly relevant.

Regarding length of stay, 45% of respondents had lived in the pesantren for 1-3 years and 28.3% for 4-6 years. Another 15% had stayed for less than one year, while 11.7% had stayed for more than six years. In addition, 65% of the respondents had participated in entrepreneurship training, whereas 35% had not. These characteristics indicate that most respondents had both sustained exposure to the pesantren environment and some experience with entrepreneurship training.

### *4.2 Validity and Reliability*

The validity test showed that all questionnaire items for social media, santri behavior, religiosity, and entrepreneurial interest had significance values below 0.05. Therefore, all items were considered valid and suitable for further statistical analysis.

**Table 2. Instrument Validity Test Results**

| Variabel | Item | r hitung | r tabel | Sig. | Keputusan |
|---|---|---|---|---|---|
| X1 | MS1 | 0.697 | 0.254 | 0.000 | Valid |
| X1 | MS2 | 0.899 | 0.254 | 0.000 | Valid |
| X1 | MS3 | 0.807 | 0.254 | 0.000 | Valid |
| X1 | MS4 | 0.795 | 0.254 | 0.000 | Valid |
| X1 | MS5 | 0.885 | 0.254 | 0.000 | Valid |
| X2 | PK1 | 0.825 | 0.254 | 0.000 | Valid |
| X2 | PK2 | 0.861 | 0.254 | 0.000 | Valid |
| X2 | PK3 | 0.874 | 0.254 | 0.000 | Valid |
| X2 | PK4 | 0.743 | 0.254 | 0.000 | Valid |
| X2 | PK5 | 0.774 | 0.254 | 0.000 | Valid |
| X3 | REL1 | 0.731 | 0.254 | 0.000 | Valid |
| X3 | REL2 | 0.853 | 0.254 | 0.000 | Valid |
| X3 | REL3 | 0.829 | 0.254 | 0.000 | Valid |
| X3 | REL4 | 0.787 | 0.254 | 0.000 | Valid |
| X3 | REL5 | 0.668 | 0.254 | 0.000 | Valid |
| Y | MB1 | 0.902 | 0.254 | 0.000 | Valid |
| Y | MB2 | 0.920 | 0.254 | 0.000 | Valid |
| Y | MB3 | 0.891 | 0.254 | 0.000 | Valid |
| Y | MB4 | 0.802 | 0.254 | 0.000 | Valid |
| Y | MB5 | 0.841 | 0.254 | 0.000 | Valid |

*Source: Research data.*

Based on the validity test results involving 60 respondents, all items for variables X1, X2, X3, and Y yielded calculated r-values greater than the r-table value of 0.254, with significance values of 0.000 (< 0.05). Consequently, all 20 statement items were deemed valid and suitable for use as research instruments.

The Cronbach's Alpha values for the respective variables are 0.842 for X1, 0.860 for X2, 0.834 for X3, and 0.919 for Y. All these values exceed 0.70; therefore, the four variables demonstrate good internal consistency and are considered reliable for use in the research analysis. This result means that the questionnaire items used to measure the four research constructs were consistent as a research instrument.

**Table 3. Reliability Test Result**

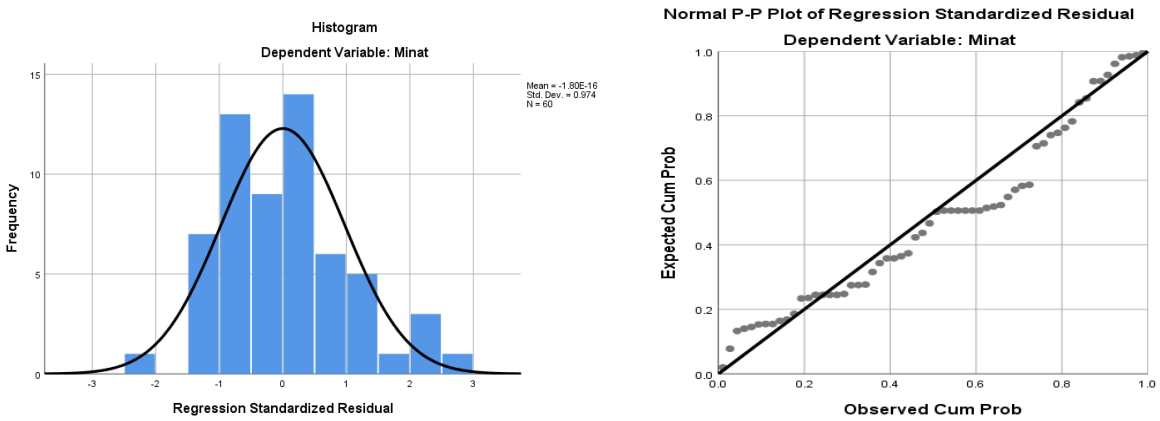
| Variabel | Cronbach's Alpha | Jumlah Item | Kriteria | Keputusan |
|---|---|---|---|---|
| X1 – Social Media | 0.842 | 5 | > 0,70 | Reliabel |
| X2 - Santri Behavior | 0.860 | 5 | > 0,70 | Reliabel |
| X3 - Religiosity | 0.834 | 5 | > 0,70 | Reliabel |
| Y - Entrepreneurial Interest | 0.919 | 5 | > 0,70 | Reliabel |

*Source: Research data.*

## *5.* Classical Assumption Test

### 5.1 Normality Test

Based on the residual histogram and the Normal P-P Plot, the regression model's residuals exhibit a pattern approximating a normal distribution. The histogram shows no extreme deviations, while the points on the P-P Plot largely follow the diagonal line. Thus, the assumption of residual normality can be considered satisfied




Picture 1. Normality Test

### *5.2 Multicollinearity Test*

The Tolerance values for all independent variables are above 0.10: 0.351 for X1, 0.374 for X2, and 0.592 for X3. The VIF values are 2.852, 2.674, and 1.688, respectively, all of which are below 10. Thus, the regression model shows no indication of multicollinearity among the independent variables.

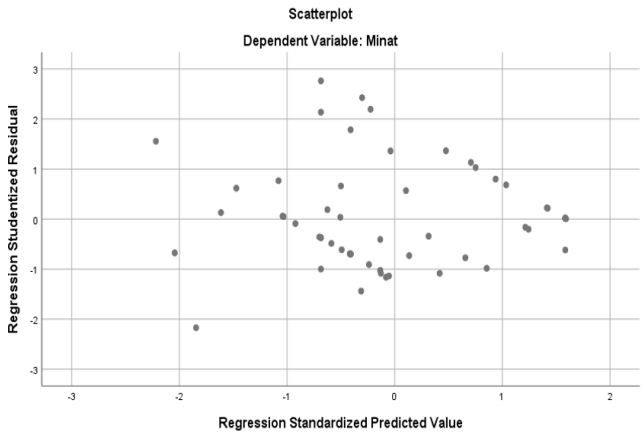
**Table 4. Multicollinearity Test**

| Variabel | Tolerance | VIF | Criteria | Results |
|---|---|---|---|---|
| X1 – Social Media | 0.351 | 2.852 | Tolerance > 0,10 dan VIF < 10 | Multicollinearity is not present. |
| X2 - Santri Behavior | 0.374 | 2.674 | Tolerance > 0,10 dan VIF < 10 | Multicollinearity is not present. |
| X3 - Religiosity | 0.592 | 1.688 | Tolerance > 0,10 dan VIF < 10 | Multicollinearity is not present. |

*Source: Research data.*

### *5.3 Heteroskedasticity Test*

Based on the scatterplot of the Regression Standardized Predicted Value versus the Regression Studentized Residual, the residual points are distributed relatively randomly above and below the value of 0 and do not form a specific pattern. Therefore, the regression model can be said to be free from heteroscedasticity, and the assumption of homoscedasticity is met.




Picture 2. *Heteroskedasticity Test*

### *5.4 Hypothesis Testing*

**Table 5. Hypothesis Test**

| Variable | B | T | p-value | Decision |
|---|---|---|---|---|
| Social Media (X1) → Entrepreneurial Interest (Y) | -0.014 | -0.127 | 0.900 | Rejected |
| Santri Behavior (X2) → Entrepreneurial Interest (Y) | 0.358 | 3.155 | 0.003 | Accepted |
| Religiosity (X3) → Entrepreneurial Interest (Y) | 0.532 | 4.044 | <0.001 | Accepted |
| Constant | 3.065 | | | |

*Source: Research data.*

Based on the table above, according to p-values, the use of social media (X1) does not have a significant effect on entrepreneurial interest (p-value = 0.900 > 0.05); therefore, the first hypothesis is rejected. Santri entrepreneurial behavior (X2) has a significant effect on entrepreneurial interest (p-value = 0.003 < 0.05); thus, the second hypothesis is accepted. Meanwhile, religiosity in entrepreneurship (X3) also has a significant effect on entrepreneurial interest (p-value < 0.001); consequently, the third hypothesis is accepted.

### *5.5 Effect of Social Media on Entrepreneurial Interest*

The partial test showed a regression coefficient of -0.014, a t-value of -0.127, and a p-value of 0.900. Because the p-value was greater than 0.05, the first hypothesis was rejected. Social media use was therefore not shown to have a significant direct effect on the entrepreneurial interest of santri at Pondok Pesantren Ekonomi Darul Uchuwah.

This result suggests that the mere availability or use of social media does not automatically create entrepreneurial interest when usage is not directed toward productive activities such as searching for business ideas, learning digital marketing, building networks, or promoting products. The finding is consistent with Jumadi and Mustofa (2022), who indicated that social media is not the only determinant of business interest because entrepreneurship education, expected income, and religiosity can have stronger roles. It is also consistent with Permatasari and Harsono (2025), who found that social media use was not significant while motivation and entrepreneurship knowledge were significant, and with Febrianti and Puspitowati (2025), who reported a positive but non-significant effect of social media on entrepreneurial interest.

The result differs from Adhiah et al. (2024), who found a positive and significant role of social media in entrepreneurial intention, with financial literacy acting as a mediator. The difference may reflect the distinct characteristics of pesantren students and the institutional context. Rules for device access, patterns of social media use, and digital supervision may differ from those of general university students. Consequently, social media in a pesantren context may need to be systematically directed toward entrepreneurial learning rather than remaining primarily a channel for communication, entertainment, or general information.

### *5.6 Effect of Santri Behavior on Entrepreneurial Interest*

Santri behavior had a positive and significant effect on entrepreneurial interest. The regression coefficient was 0.358, with a t-value of 3.155 and a p-value of 0.003. This indicates that stronger entrepreneurial behavior is associated with greater entrepreneurial interest. The source study interprets such behavior through characteristics including discipline,

independence, innovation, creativity, confidence, responsibility, decision-making ability, and readiness to face challenges.

This finding supports Suyanto and Astuti (2020), who related santri behavior to entrepreneurial interest, and Sary et al. (2023), who emphasized the role of attitudes and experiences that support entrepreneurial activity. In the perspective used by the source study, entrepreneurial intention is affected by positive evaluation of the behavior, environmental support, and perceived ability to act. Oktarina and Pawirosumanto (2024) likewise reported significant effects of subjective norms, perceived behavioral control, entrepreneurship education, and entrepreneurial attitudes on entrepreneurial interest.

Not all evidence is identical. Yusvan et al. (2024) found that attitudes and subjective norms influenced entrepreneurial intention, whereas perceived behavioral control was not significant among health students. Such variation indicates that the effect of behavior can depend on respondents' environment, habits, and prior experiences. In an economic pesantren, daily routines emphasizing discipline, responsibility, cooperation, and independence may align closely with core entrepreneurial characteristics and therefore strengthen entrepreneurial interest.

### *5.7 Effect of Religiosity on Entrepreneurial Interest*

Religiosity had a positive and significant effect on entrepreneurial interest, with a regression coefficient of 0.532, a t-value of 4.044, and a p-value below 0.001. It was the strongest predictor among the three independent variables. This indicates that higher religiosity is associated with stronger entrepreneurial interest among the santri in this study.

The result shows that religious values can shape not only worship practices but also economic orientation. Entrepreneurship can be understood as muamalah that has religious value when it is carried out honestly, responsibly, lawfully, fairly, and for social benefit. The finding is consistent with Alfiyati (2019), who reported an effect of religiosity on santri entrepreneurial interest, and with Wibowo and Sujono (2021), who found that religiosity affected entrepreneurial attitudes among young Muslims. Kinasih et al. (2025) also reported a positive and significant influence of religiosity on sharia-based entrepreneurial interest among students.

Rosada and Anwar (2026) further described the implementation of Islamic entrepreneurial values in pesantren as contributing to economic independence and to the formation of entrepreneurial character through honesty, trustworthiness, independence, creativity, and an Islamic work ethic. This helps explain why religiosity emerged as the most influential variable in the present study: religious values are embedded in the everyday life of santri and can become a direct ethical foundation for economic decision-making.

### *5.8 Simultaneous Effect of Social Media, Behavior, and Religiosity*

**Table 6. Simultaneous Effect**

| R | $R^2$ | Adjusted $R^2$ | Std. Error of the Estimate | F | df | p-value |
|---|---|---|---|---|---|---|
| 0.772 | 0.596 | 0.575 | 1.630 | 27.594 | (3, 56) | < 0.001 |

*Source: Research data.*

The multiple linear regression model was statistically significant, $F(3, 56) = 27.594$, $p < 0.001$. The model yielded $R = 0.772$ and $R^2 = 0.596$, indicating that social media utilization, entrepreneurial behavior and involvement, and entrepreneurial religiosity jointly explained 59.6% of the variance in entrepreneurial interest. The adjusted $R^2$ was 0.575, while the standard error of the estimate was 1.630. The remaining 40.4% of the variance was attributable to other

factors not included in the model.

The practical implication is that pesantren entrepreneurship programs should be integrated rather than relying on a single factor. Social media can be directed toward business learning and marketing, while entrepreneurial behavior can be strengthened through practice, mentoring, and habituation. At the same time, religious values can provide an ethical foundation emphasizing honesty, trustworthiness, responsibility, halal transactions, and social benefit. Through this combination, social media may shift from a general communication tool into a productive component of a santripreneur ecosystem.

## 6. Conclusion

This study concludes that social media did not have a significant partial effect on entrepreneurial interest among santri at Pondok Pesantren Ekonomi Darul Uchuwah. Social media therefore was not the main factor directly shaping entrepreneurial interest in the observed sample. Its contribution may become more meaningful when its use is directed toward business learning, product promotion, digital marketing, and entrepreneurial networking.

Santri behavior had a positive and significant effect on entrepreneurial interest. The stronger the behavioral characteristics associated with entrepreneurship - including discipline, independence, creativity, confidence, responsibility, and readiness to face challenges - the stronger the respondents' interest in entrepreneurship. Religiosity also had a positive and significant effect and was the strongest predictor in the model. This finding emphasizes the importance of religious values in encouraging santri to view entrepreneurship as a lawful, honest, trustworthy, and socially beneficial economic activity.

Simultaneously, social media, santri behavior, and religiosity significantly affected entrepreneurial interest. Accordingly, the source study recommends an integrated santripreneurship approach that combines digital marketing training, direct business practice, business mentoring, and the reinforcement of Islamic entrepreneurial values. Such a program is expected to help santri become more prepared for independent entrepreneurship after completing their education.

A limitation of this study is the small sample size comprising 60 *Santri* (Islamic boarding school students) which prevents broad generalization of the findings. Furthermore, the research model explains 59.6% of the variation in entrepreneurial interest, indicating that other factors outside the scope of this study may also influence the students' interest in entrepreneurship. Future researchers are advised to expand the respondent pool and incorporate additional variables to provide a more comprehensive explanation of the factors influencing the entrepreneurial interest of Santri.

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# INTEGRATING VOLUME AND OPEN INTEREST SCREENING WITH TECHNICAL ANALYSIS FOR CRYPTOCURRENCY TRADING: EVIDENCE FROM REAL-TIME TRADING ACTIVITY

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***Abstract***
*High volatility and an overwhelming selection of digital assets make systematic decision-making difficult for cryptocurrency traders. To address this challenge, this study evaluates the empirical effectiveness of a multi-stage trading strategy that combines liquidity screening with multi-timeframe technical analysis. Using a quantitative descriptive approach, the model filters assets based on 24-hour Open Interest changes, trading volume, and market capitalization before applying price action, Exponential Moving Averages, and the Stochastic Momentum Index to confirm trade entries. Unlike traditional studies relying solely on backtested simulations, this research evaluates actual execution data collected between July 2025 and February 2026. Across 117 real-time trades, the strategy achieved a 62% win rate, yielding a 31% cumulative net return and a total profit of $195.09. These results demonstrate that combining volume and open interest indicators as a pre-selection mechanism significantly enhances trade quality by focusing technical execution on assets with active market participation. Overall, the findings highlight that integrating quantitative liquidity filters with structured technical analysis and strict risk management provides a viable, disciplined approach to navigating volatile crypto markets.*
***Keywords***: *Cryptocurrency Trading, Technical Analysis, Open Interest, Volume Screening, Risk Management*

## 1. Introduction

The cryptocurrency market has experienced rapid growth in recent years, attracting increasing interest from investors and traders worldwide. Cryptocurrencies function not only as digital payment instruments but also as investment assets that offer substantial return potential. However, the cryptocurrency market is characterized by a high degree of volatility, resulting in substantial price fluctuations over relatively short periods. While these fluctuations create opportunities for significant returns, they also expose market participants to considerable risks of financial loss. Consequently, developing an effective trading strategy is essential for identifying market opportunities while maintaining appropriate risk control.

In addition to its high volatility, the cryptocurrency market comprises a large and continuously expanding number of digital assets, making it challenging for traders to determine which assets warrant further analysis. Conducting a comprehensive analysis of all available cryptocurrency assets is neither practical nor efficient. Therefore, an initial asset-screening process is required to identify assets that demonstrate relatively high levels of market activity and liquidity. In this study, asset selection is conducted using three primary indicators: 24-hour open interest change (OI Change 24h), trading volume, and market capitalization. These indicators are employed to identify cryptocurrency assets with substantial market activity before further technical analysis is performed.

Following the asset-screening process, this study evaluates a trading strategy that integrates market activity indicators with technical analysis and risk management. The proposed strategy combines volume and open interest screening with price action analysis, the Exponential Moving Average (EMA), the Stochastic Momentum Index (SMI), breakout strategies, and multi-time-frame analysis. These technical components are complemented by risk management techniques to control potential losses and improve the consistency of trading decisions. The integration of these approaches is intended to provide a systematic framework for identifying trading opportunities in highly volatile cryptocurrency markets.

Based on the background and research gap described above, this study addresses three primary research questions. First, how effective is a trading strategy that combines volume and open interest screening with technical analysis in the cryptocurrency market? Second, to what extent can asset screening based on market activity indicators improve the quality of trading decisions? Third, how does the proposed strategy perform when applied to actual trading data under volatile cryptocurrency market conditions?

In accordance with the research questions, this study aims to evaluate the effectiveness of a trading strategy that integrates asset screening with technical analysis in the cryptocurrency market. Specifically, the study seeks to assess the effectiveness of combining volume and open interest indicators with technical analysis techniques in identifying potential trading opportunities. In addition, the study evaluates the contribution of trading volume and open interest to the asset-selection process and examines whether these indicators can improve the quality of subsequent trading analysis and decision-making. Finally, the study aims to measure the performance of the proposed strategy based on actual trading results, particularly under volatile cryptocurrency market conditions, while considering the role of risk management in controlling potential losses.

## 2. Literature Review

### *2.1 Cryptocurrency and Market Characteristics*

Cryptocurrencies are digital assets that operate primarily through blockchain technology and decentralized networks, reducing reliance on traditional financial intermediaries. Since the introduction of Bitcoin, cryptocurrencies have developed from an alternative digital payment concept into a broader asset class that is actively traded in global financial markets (Nakamoto, 2008). Bitcoin and other cryptocurrencies have increasingly attracted investors because of their potential for substantial returns, although their investment characteristics differ considerably from those of traditional financial assets. Baur et al. (2018), for example, found that Bitcoin exhibited characteristics more consistent with a speculative investment than with a conventional medium of exchange.

A defining characteristic of the cryptocurrency market is its high volatility. Cryptocurrency prices can experience substantial increases or declines over relatively short periods, creating opportunities for traders while simultaneously increasing exposure to market risk. The market is also distinguished by continuous 24-hour trading, high participation from speculative traders, and strong sensitivity to changes in investor sentiment. Research by Catania et al. (2018) and Enoksen et al. (2020) highlights the importance of instability and changing market conditions in understanding cryptocurrency price dynamics. Furthermore, cryptocurrency prices may respond to developments in broader financial markets, macroeconomic conditions, monetary policy, geopolitical events, and changes in the price of Bitcoin, which remains a dominant asset within the cryptocurrency ecosystem (Corbet et al., 2018; Liu & Tsyvinski, 2021).

The speculative characteristics of cryptocurrency markets are particularly relevant to technical trading strategies. Because prices can change rapidly in response to shifts in market sentiment and trading activity, traders require mechanisms for identifying assets that demonstrate sufficient liquidity and market participation. Consequently, market-based indicators such as trading volume and open interest can provide additional information regarding the intensity of trading activity before technical analysis is applied.

### *2.2 Technical Analysis*

Technical analysis refers to an approach to financial market analysis that evaluates historical price and trading data to identify patterns, trends, momentum, and potential future price movements. The fundamental premise of technical analysis is that information reflected in market activity may be incorporated into observable price and volume movements. Lo et al. (2000) demonstrated that certain technical patterns contain potentially useful information for financial-market analysis, while Park and Irwin (2007) documented substantial academic

interest in the profitability and predictive ability of technical trading strategies. Technical analysis has therefore remained an important approach among market participants, particularly in markets characterized by frequent price movements and high trading activity.

In the context of cryptocurrency trading, this study applies several complementary technical-analysis approaches, including price action, support and resistance, breakout analysis, moving averages, momentum indicators, and multi-time-frame analysis. The combination of these techniques is intended to reduce reliance on a single indicator and provide a more comprehensive assessment of market conditions.

### *2.3 Price Action and Market Structure*

Price action analysis focuses on the movement of market prices without relying exclusively on mathematical indicators. It can be used to identify market structure through a sequence of higher highs (HH), higher lows (HL), lower highs (LH), and lower lows (LL). A sequence of higher highs and higher lows generally indicates an upward market structure, whereas lower highs and lower lows indicate a downward structure. Changes in these patterns may provide information regarding potential trend continuation or reversal (Murphy, 1999).

In addition to identifying highs and lows, price action analysis can incorporate concepts such as Break of Structure (BoS) and Change of Character (ChoCh). A Break of Structure refers to a price movement that breaks an established structural high or low, potentially indicating continuation of the prevailing trend. A Change of Character refers to a shift in price behavior that may provide an early indication of a transition from one market structure to another. These concepts are used in this study to establish the prevailing market direction and identify potential changes in market structure before an entry decision is considered.

Support and resistance represent important price levels or zones at which buying and selling pressure may influence subsequent price movements. Support generally refers to an area where buying pressure may emerge and limit further price declines, whereas resistance represents an area where selling pressure may restrict further price increases (Murphy, 1999). These levels can function as potential reaction zones, including areas where prices may rebound or where a breakout may occur.

Within the proposed trading strategy, support and resistance are used to identify areas of interest before an entry is considered. Rather than treating these levels as fixed prices, the analysis considers them as zones in which market participants may respond to changes in supply and demand. This approach is particularly relevant in volatile cryptocurrency markets, where prices may temporarily move beyond a level before either continuing the breakout or returning to the previous trading range.

### *2.4 Breakout Strategy*

A breakout strategy seeks to identify trading opportunities when the price moves beyond an established support or resistance level. A breakout may indicate that the balance between buying and selling pressure has shifted and that a new price movement may develop. However, not every breakout necessarily results in sustained price movement. Consequently, confirmation from price structure, volume, momentum, and higher-time-frame conditions can be used to distinguish potentially meaningful breakouts from false breakouts.

In this study, breakout analysis is integrated with price action, volume, EMA, SMI, and multi-time-frame analysis. The purpose of this integration is to increase the reliability of entry decisions by requiring multiple forms of confirmation rather than relying solely on the occurrence of a price-level breakout.

### *2.5 Multi-Time-Frame Analysis*

Multi-time-frame analysis involves examining the same asset across different time

horizons to obtain a hierarchical view of market conditions. A top-down approach begins with a higher time frame to establish the broader market direction and subsequently moves to lower time frames to identify more precise trading setups and entry points (Murphy, 1999).

This study applies three time frames. The **daily timeframe** is used to determine the primary market direction and broader trend. The **4-hour (H4) timeframe** is then used to assess market structure and identify potential trading setups. Finally, the **15-minute (M15) timeframe** is used to obtain more precise entry confirmation. This approach is intended to ensure that short-term trading decisions remain consistent with the broader market structure.

### *2.6 Technical Indicators: Exponential Moving Average and Stochastic Momentum Index*

The Exponential Moving Average (EMA) is a trend-following indicator that assigns greater weight to more recent price observations. Compared with a simple moving average, the EMA responds more quickly to recent changes in price, making it useful for identifying short- to medium-term changes in market direction.

This study employs the **13-period EMA (EMA 13)** and **21-period EMA (EMA 21)** to identify trend direction and establish market bias. The relationship between the two moving averages can provide information regarding the prevailing trend, while the EMA lines may also function as dynamic areas of support or resistance. Moving-average techniques are widely used in technical analysis because they provide a relatively simple mechanism for smoothing price fluctuations and identifying underlying trends (Murphy, 1999; Smit et al., 2023).

The Stochastic Momentum Index (SMI) is a momentum-based technical indicator that can be used to assess the position of the current closing price relative to a recent price range. Momentum indicators are commonly used to identify potential overbought and oversold conditions and to assess the strength of prevailing price movements (Dongrey, 2022).

In this study, the SMI is used primarily as a confirmation indicator rather than as a standalone trading signal. Specifically, the indicator is employed to evaluate momentum conditions and provide additional confirmation before an entry is executed. The use of SMI alongside price action, EMA, and support or resistance is intended to reduce the possibility of entering trades based solely on a single technical signal.

### *2.7 Trading Volume and Open Interest*

Trading volume represents the quantity of an asset traded during a specified period and provides information regarding the intensity of market participation. Volume is an important component of technical analysis because changes in trading activity may provide additional information about the strength of price movements. In cryptocurrency markets, Balcilar et al. (2017) found that trading volume contains information relevant to Bitcoin returns at certain points of the conditional distribution, although its predictive relationship with returns is nonlinear and varies across market regimes.

Open interest, particularly in cryptocurrency derivatives markets, represents the number of outstanding derivative contracts that remain open. Changes in open interest can provide information regarding the level of participation and capital committed to derivative positions. When considered together with price and trading volume, changes in open interest may provide additional information regarding market positioning and trading activity. Research on cryptocurrency derivatives has highlighted the importance of derivatives markets in price discovery and broader market dynamics (Alexander et al., 2020).

In this study, trading volume and 24-hour open interest change (OI Change 24h) are used during the initial asset-screening stage. Assets exhibiting relatively high changes in open interest, substantial trading volume relative to market capitalization, and increasing overall market activity are prioritized for further technical analysis. This screening process is intended

to narrow the universe of cryptocurrency assets to those demonstrating sufficient market activity and potentially greater trading opportunities.

### *2.8 Risk Management*

Risk management represents an essential component of systematic trading because the identification of profitable opportunities does not eliminate the possibility of adverse price movements. In highly volatile cryptocurrency markets, inappropriate position sizing or insufficient control of downside risk may result in substantial losses. Therefore, this study incorporates several risk-management mechanisms into the trading strategy.

First, stop-loss levels are determined based on relevant price structures to limit potential losses when the market moves against the trading position. Second, the strategy applies a minimum risk-reward ratio of **1:1**, ensuring that the potential reward is not lower than the predefined level of risk. Third, partial take-profit mechanisms are used to secure a portion of realized gains while allowing the remaining position to potentially benefit from continued price movement. Fourth, the break-even mechanism may be applied after sufficient price movement in favor of the position to reduce exposure to subsequent losses. Finally, the **1.618 Fibonacci Extension** is employed as an advanced potential target for identifying extended price objectives.

The integration of these risk-management techniques is intended to ensure that trading performance is evaluated not solely on the basis of winning trades but also in terms of the ability to control losses and preserve trading capital.

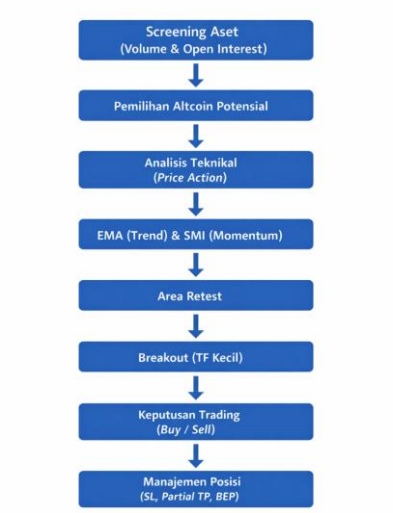



**Figure 1. Research Framework and Process**

## 3. Research Framework

Based on the literature discussed above, this study proposes an integrated trading framework consisting of several sequential stages. The first stage is **asset screening**, in which trading volume, market capitalization, and 24-hour open interest changes are evaluated to identify assets with relatively high market activity. The second stage involves **technical analysis**, incorporating price action, support and resistance, breakout analysis, EMA, SMI, and multi-time-frame analysis. The third stage involves **trading decision-making**, in which potential entry opportunities are evaluated based on the convergence of the identified signals. The fourth stage involves **risk management**, including stop-loss placement, risk-reward assessment, partial take-profit, break-even management, and Fibonacci Extension targets. The final stage involves **performance evaluation**, in which the actual trading results are assessed to determine the effectiveness of the proposed strategy.

The novelty of this study lies primarily in the integration of market-activity screening, technical analysis, multi-time-frame confirmation, and risk management within a single systematic

cryptocurrency trading framework. Previous research has examined technical analysis, cryptocurrency market behavior, trading volume, and individual technical indicators from different perspectives (Balcilar et al., 2017; Lo et al., 2000; Nti et al., 2020; Park & Irwin, 2007). However, this study combines **volume and open-interest screening**, **price-action-based market-structure analysis**, **EMA and SMI indicators**, **breakout analysis**, **multi-time-frame confirmation**, and **explicit risk-management rules** into an integrated trading procedure.

A further contribution of the study is its evaluation using **actual trading activity rather than relying exclusively on historical backtesting or simulated trading environments**. This distinction is important because actual trading involves execution-related considerations and behavioral responses that may not be fully captured by historical simulations. Therefore, the study seeks to provide empirical evidence regarding how an integrated screening and technical-analysis framework performs under actual cryptocurrency market conditions.

## 4. Research Methods

This study employed a quantitative research approach with descriptive-analytical methods to evaluate the performance of an integrated cryptocurrency trading strategy. The analysis was based on actual trading activity conducted under real market conditions rather than solely on historical simulations or backtesting. The use of actual trading data enables the study to capture market phenomena that may be difficult to reproduce in simulated environments, including false breakouts, sudden changes in market sentiment, high volatility, and changes in market momentum. The use of technical analysis and systematic trading rules is consistent with previous research demonstrating the relevance of price, volume, and technical indicators in financial-market analysis (Lo et al., 2000; Park & Irwin, 2007; Nti et al., 2020).

The research was conducted over the period from **July 17, 2025, to February 9, 2026**. This period was selected to capture trading activity across varying cryptocurrency market conditions, including periods of changing volatility, market momentum, and investor sentiment. The relatively extended observation period also provides an opportunity to evaluate the consistency of the proposed trading strategy across different market conditions rather than relying on a single short-term market episode.

## 5. Research Data and Sources

The study utilized primary trading data obtained from actual cryptocurrency futures transactions conducted during the research period. Additional market information was obtained from cryptocurrency trading platforms, CoinGlass, asset-change detail records, and cryptocurrency futures transaction data. These data sources were used to obtain information concerning price movements, trading volume, open interest, market capitalization, and transaction outcomes.

The use of market activity variables such as trading volume and open interest is supported by previous research indicating that trading activity can provide information relevant to cryptocurrency price dynamics. Balcilar et al. (2017), for example, examined the relationship between Bitcoin trading volume, returns, and volatility, demonstrating that volume contains information relevant to cryptocurrency market behavior. Similarly, research on cryptocurrency derivatives highlights the importance of derivatives-market activity for understanding price discovery and market dynamics (Alexander et al., 2020).

## 6. Research Procedures

The research procedure consisted of several sequential stages designed to systematically identify and evaluate trading opportunities. The first stage involved **asset screening** based on 24-hour open interest change (OI Change 24h), market capitalization, and the Volume-to-Market-Capitalization (VMC) ratio. The purpose of this screening stage was to narrow the large universe of cryptocurrency assets to those exhibiting relatively high levels of market activity. Volume provides an indication of trading intensity, while open interest provides information concerning

outstanding positions in the derivatives market. The combination of these indicators was therefore used as an initial filter before conducting more detailed technical analysis.

The second stage involved **market-structure analysis using price action**. The analysis considered the formation of higher highs, higher lows, lower highs, and lower lows to determine the prevailing market structure. Break of Structure (BoS) and Change of Character (ChoCh) were also considered when evaluating potential changes in market direction. Price-action analysis has long been used in technical analysis to identify trends and market patterns based on historical price movements (Lo et al., 2000; Murphy, 1999).

The third stage involved identifying the prevailing trend using the **Exponential Moving Average (EMA)**. Specifically, EMA 13 and EMA 21 were used to assess trend direction and establish market bias. The EMA was also considered as a dynamic support or resistance area. Moving-average techniques are widely used to smooth price fluctuations and identify underlying trends, although their effectiveness may vary according to market conditions (Murphy, 1999; Smit et al., 2023).

The fourth stage involved **momentum confirmation using the Stochastic Momentum Index (SMI)**. The SMI was used to evaluate momentum conditions and identify potential overbought or oversold situations. Rather than functioning as an independent trading signal, the indicator was used as a confirmation tool alongside price action and EMA analysis. The use of multiple technical indicators is consistent with the broader literature on technical analysis, which emphasizes the importance of evaluating price and market information from complementary perspectives (Dongrey, 2022; Nti et al., 2020).

The fifth stage consisted of **multi-time-frame analysis**. A top-down approach was employed in which the daily timeframe was used to establish the broader market direction, the H4 timeframe was used to assess market structure and identify potential trading setups, and the M15 timeframe was used to seek more precise entry confirmation. This approach was intended to align short-term trading decisions with the broader market trend and reduce the likelihood of entering positions that conflict with higher-time-frame market conditions.

The sixth stage involved determining the **entry point, stop-loss level, and take-profit target**. Entry decisions were made only after the relevant technical conditions and confirmation signals were identified. Stop-loss levels were determined according to market structure to limit potential losses, while take-profit targets were established based on predefined risk-reward considerations and relevant technical levels. Partial profit-taking, break-even adjustments, and Fibonacci Extension targets were also incorporated into the trading process where applicable.

The final stage involved **evaluating the actual trading results**. Each completed transaction was classified as either profitable or unprofitable, and overall performance was evaluated using indcators including the total number of transactions, number of profitable and losing transactions, win rate, total profit, profit percentage, and average profit per trade.

The study evaluated the performance of the proposed trading strategy using actual cryptocurrency trading results recorded during the research period. Before technical analysis was conducted, cryptocurrency assets were screened according to 24-hour Open Interest Change, market capitalization, and the Volume-to-Market-Capitalization (VMC) ratio. This screening process was designed to prioritize assets exhibiting relatively high market activity and therefore reduce the number of assets requiring detailed technical analysis.

The screening process was followed by market-structure analysis using price action, including the identification of trend structure, support and resistance levels, and potential breakout conditions. EMA 13 and EMA 21 were subsequently used to identify trend direction and market bias, while the SMI was employed to provide additional momentum confirmation. The integration of these

indicators allowed the trading strategy to evaluate potential opportunities from several complementary perspectives rather than relying on a single technical indicator.

For example, the screening process identified **AIGENSYN** as an asset exhibiting a substantial increase in trading volume and open interest. Following the screening stage, the asset was analyzed using market structure, support areas, EMA, and SMI before a trading entry was considered. This example illustrates the sequential nature of the proposed methodology, in which market-activity screening precedes technical analysis and trading execution.

## 7. Research Findings and Discussion

### *7.1 Trading Performance*

The trading results obtained during the research period are summarized in Table 1.

**Table 1. Trading Results Statistics**

| Indicator | Result |
|---|---|
| Total Transactions | 117 |
| Profitable Transactions | 73 |
| Losing Transactions | 44 |
| Win Rate | 62% |
| Total Profit | USD 195.09 |
| Profit Percentage | 31% |
| Average Profit per Trade | USD 1.67 |

The strategy generated **117 transactions**, consisting of **73 profitable transactions and 44 losing transactions**, resulting in a reported win rate of approximately **62%**. The strategy generated a total profit of **USD 195.09**, corresponding to a reported profit percentage of **31%**, with an average profit of approximately **USD 1.67 per transaction**.

The win rate indicates that profitable transactions represented the majority of executed trades during the observation period. However, the win rate alone should not be interpreted as conclusive evidence of strategy superiority. Trading performance should also be evaluated in relation to risk-reward ratios, transaction costs, drawdowns, position sizing, and other measures of risk-adjusted performance. Previous research on technical analysis emphasizes that apparent profitability can vary depending on market conditions, transaction costs, and methodological assumptions (Park & Irwin, 2007). Therefore, the 62% win rate provides evidence of the observed trading performance during the study period but does not, by itself, establish that the strategy will consistently outperform alternative strategies or market benchmarks.

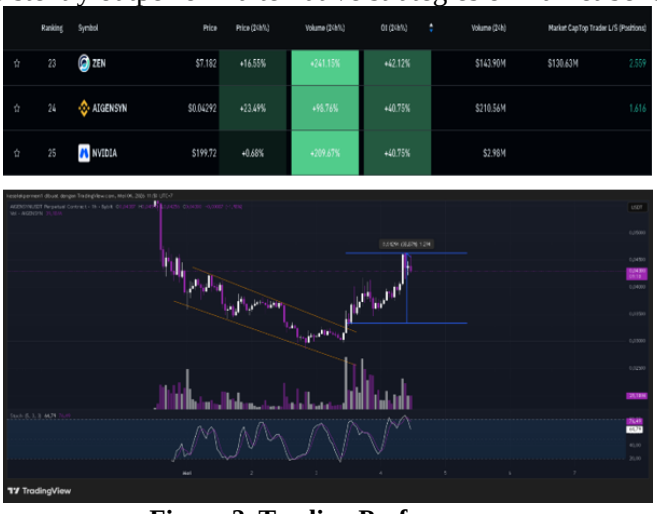



**Figure 2. Trading Performance**

### *7.2 Discussion of Strategy Performance*

The observed performance suggests that the integration of asset screening and technical analysis may provide a systematic approach to identifying cryptocurrency trading opportunities. The initial screening process using volume, open interest, and market capitalization reduced the number of assets requiring further analysis and directed attention toward assets exhibiting relatively high market activity. This approach is theoretically consistent with evidence that trading volume contains information regarding cryptocurrency market dynamics (Balcilar et al., 2017).

The subsequent integration of **price action, EMA, SMI, volume, open interest, and multi-time-frame analysis** provided several layers of confirmation before trading decisions were executed. Price action was used to determine market structure, while EMA was used to establish the prevailing trend and market bias. The SMI provided additional information regarding momentum, while volume and open interest were used to assess the level of market activity. Multi-time-frame analysis then helped align the entry decision with the broader market direction.

The use of multiple forms of technical information is consistent with the broader literature on technical analysis. Lo et al. (2000) demonstrated that certain technical patterns may contain information relevant to future price movements, while Park and Irwin (2007) noted that the profitability of technical analysis has been documented across different markets and periods, although the evidence is not uniformly conclusive. Nti et al. (2020) similarly emphasize the extensive use of technical indicators and analytical approaches in financial-market prediction research.

The role of trading volume is particularly relevant in the present strategy because an increase in trading activity may provide additional information regarding the strength and significance of price movements. Karpoff (1987) established the importance of the relationship between price changes and trading volume in financial-market research, while Balcilar et al. (2017) specifically examined the predictive relationship between Bitcoin volume, returns, and volatility. In the present study, volume was therefore not treated merely as a secondary indicator but as an initial screening variable for identifying assets with substantial market activity.

Open interest provided an additional dimension because it reflects activity in cryptocurrency derivatives markets. The combination of open interest and volume may provide a broader representation of market participation than either variable considered independently. Research by Alexander et al. (2020) highlights the relevance of cryptocurrency derivatives markets to price discovery, informational efficiency, and market dynamics. Accordingly, incorporating open interest into the initial screening process provides a potentially useful mechanism for identifying assets experiencing changes in derivatives-market participation.

The results also suggest that the proposed strategy was able to operate under real cryptocurrency market conditions that included high volatility and rapidly changing market momentum. Unlike a purely historical backtest, actual trading activity exposes the strategy to real-time market conditions, including false breakouts, rapid sentiment changes, and unexpected price movements. These conditions are particularly relevant in cryptocurrency markets, which have been characterized by substantial volatility and periods of speculative activity (Baur et al., 2018; Corbet et al., 2018; Enoksen et al., 2020).

Overall, the findings provide preliminary evidence that an integrated approach combining **asset screening, price-action analysis, EMA, SMI, multi-time-frame analysis, and risk management** can generate a positive trading outcome during the specified observation period. Nevertheless, the results should be interpreted as evidence of the strategy's performance within the particular market conditions and observation period examined in this study. Further research using longer observation periods, multiple market regimes, benchmark comparisons, transaction-cost adjustments, and risk-adjusted performance measures would be necessary to

determine the robustness and generalizability of the strategy.

## 8. Conclusion

This study evaluated an integrated cryptocurrency trading strategy that combines asset screening, technical analysis, multi-time-frame analysis, and risk management under actual market conditions. The findings indicate that the proposed strategy generated a relatively favorable trading performance during the observation period from July 17, 2025, to February 9, 2026. The strategy generated 117 transactions, consisting of 73 profitable transactions and 44 losing transactions, resulting in a win rate of 62%, total profit of USD 195.09, and a reported return of 31%. These results provide preliminary evidence that the integration of market-activity screening and technical analysis can support systematic trading decisions in a highly volatile cryptocurrency market. However, the results should be interpreted within the specific market conditions and observation period examined rather than as evidence of universal or persistent profitability.

The asset-screening process using 24-hour Open Interest Change (OI Change 24h), market capitalization, and the Volume-to-Market-Capitalization (VMC) ratio played an important role in narrowing the large number of available cryptocurrency assets to those exhibiting relatively high market activity. Trading volume has been shown to contain information relevant to cryptocurrency returns and volatility, while derivatives-market activity can provide additional information regarding price discovery and market dynamics (Alexander et al., 2020; Balcilar et al., 2017). Accordingly, the findings suggest that combining volume and open interest as an initial screening mechanism can provide a practical basis for determining which assets should receive further technical analysis.

The study also found that the integration of price action, EMA, SMI, and multi-time-frame analysis provided multiple layers of confirmation before trading positions were initiated. Price action was used to identify market structure and potential changes in market direction, while EMA was used to determine trend direction and market bias. SMI provided additional momentum confirmation, and multi-time-frame analysis enabled short-term entry decisions to be considered within the context of broader market conditions. The use of multiple technical-analysis components is consistent with previous literature emphasizing the potential informational value of technical patterns and indicators in financial markets (Lo et al., 2000; Murphy, 1999; Nti et al., 2020).

Risk management was also an important component of the strategy. Stop-loss placement, risk-reward assessment, partial take-profit, and break-even mechanisms were incorporated to limit downside exposure and protect realized gains. This is particularly important in cryptocurrency markets because of their substantial volatility and susceptibility to rapid changes in market sentiment (Baur et al., 2018; Corbet et al., 2018; Enoksen et al., 2020). Therefore, the findings suggest that trading performance should not be evaluated solely according to the percentage of profitable transactions, but also according to the strategy's ability to control losses and maintain an acceptable relationship between risk and return.

Overall, the study concludes that the proposed combination of **asset screening, price action, EMA, SMI, multi-time-frame analysis, and risk management** provides a structured framework for cryptocurrency trading under volatile market conditions. Nevertheless, the observed results represent the performance of the strategy during a specific observation period and should not be interpreted as conclusive evidence that the strategy will consistently generate positive returns across all cryptocurrency market regimes.

### *8.1 Practical Implications*

The findings have several practical implications for cryptocurrency traders. First, the results suggest that traders may benefit from conducting an initial asset-screening process before performing detailed technical analysis. The cryptocurrency market contains a large number of assets, making it inefficient to analyze every available asset individually. Screening based on OI Change 24h, market capitalization, and the VMC ratio provides a systematic

mechanism for prioritizing assets with relatively high levels of market activity. This approach is consistent with evidence that trading volume contains information concerning cryptocurrency market behavior (Balcilar et al., 2017).

Second, traders can consider combining multiple technical-analysis tools rather than relying on a single indicator. The use of price action, EMA, SMI, and multi-time-frame analysis allows trading decisions to incorporate information concerning market structure, trend direction, momentum, and broader market conditions. Such an approach may reduce dependence on isolated trading signals and encourage more systematic decision-making. Nevertheless, technical indicators should be regarded as decision-support tools rather than guarantees of future price movements, particularly because evidence concerning the profitability of technical analysis varies across markets and time periods (Park & Irwin, 2007).

Third, the findings emphasize the importance of risk management in cryptocurrency trading. Even when a trading strategy generates a relatively high win rate, individual trades remain exposed to adverse price movements. Cryptocurrency markets can experience rapid price changes associated with speculative activity, market sentiment, and broader financial-market developments (Baur et al., 2018; Corbet et al., 2018). Consequently, traders should establish stop-loss levels before entering positions and maintain predefined risk-reward parameters rather than allowing individual trading decisions to be determined entirely by short-term market movements.

Finally, traders should recognize the risks associated with false breakouts, sudden changes in market sentiment, and movements in Bitcoin that may influence other cryptocurrency assets. These risks reinforce the importance of continuously reassessing market structure and momentum rather than assuming that a previously identified trend will continue indefinitely. The use of multi-time-frame analysis may assist traders in maintaining consistency between short-term entries and broader market conditions.

### *8.2 Academic Implications*

From an academic perspective, this study contributes to the literature on cryptocurrency trading by integrating several analytical dimensions that are frequently examined separately. The proposed framework combines **market-activity screening through volume and open interest, price-action analysis, moving-average analysis, momentum confirmation, multi-time-frame analysis, and risk management** within a single trading procedure. Previous studies have examined relationships between trading volume and cryptocurrency returns (Balcilar et al., 2017), cryptocurrency derivatives and price discovery (Alexander et al., 2020), and the broader effectiveness of technical-analysis approaches (Lo et al., 2000; Park & Irwin, 2007). This study extends these perspectives by applying the indicators as sequential components of an integrated trading strategy.

The study also contributes methodologically by evaluating the strategy using actual trading activity rather than relying exclusively on historical price simulations. Actual trading provides an opportunity to observe trading outcomes under real market conditions, including rapid price changes, false breakouts, and changing market momentum. Nevertheless, actual trading also introduces additional sources of variation, including execution conditions and trader decision-making, which should be considered when interpreting the results.

The findings further provide a basis for future quantitative testing of the individual contribution of each component of the strategy. Future researchers could statistically evaluate whether the inclusion of open interest, volume screening, EMA, SMI, or multi-time-frame confirmation produces statistically significant improvements in risk-adjusted performance. Such an approach would strengthen the distinction between a practically useful trading framework and a strategy whose observed performance may be attributable to particular market conditions.

### *8.3 Risk Analysis and Research Limitations*

Despite generating a relatively favorable outcome during the observation period, the strategy remains exposed to several market and methodological risks. One important risk is the occurrence of **false breakouts**, in which prices temporarily move beyond a support or resistance level before reversing. Because breakout strategies rely on price movements through important technical levels, false breakouts may generate premature entries and subsequent losses. The use of additional confirmation through price action, volume, momentum, and multiple time frames can potentially reduce this risk, but it cannot eliminate it entirely (Lo et al., 2000; Murphy, 1999).

A second risk arises from **sudden changes in market sentiment**. Cryptocurrency prices can respond rapidly to market information and changes in investor expectations. Previous research has documented substantial volatility and changing dynamics within cryptocurrency markets (Catania et al., 2018; Enoksen et al., 2020). Consequently, technical conditions that appear favorable at the time of entry may change rapidly following unexpected information.

A third risk is the **influence of Bitcoin price movements on other cryptocurrency assets**. Bitcoin occupies a central position within the cryptocurrency ecosystem, and movements in major cryptocurrency assets can be associated with broader changes across the market. Research examining the relationships between cryptocurrencies and other financial assets demonstrates that cryptocurrency markets are interconnected with broader market dynamics (Corbet et al., 2018). Therefore, an apparently attractive setup on an individual altcoin may still be affected by broader market movements.

A fourth risk involves **extreme volatility caused by macroeconomic, monetary, or geopolitical developments**. Unexpected market information can produce price movements that exceed the assumptions underlying a technical setup. This reinforces the importance of stop-loss mechanisms and predefined risk-management rules. The importance of risk control is particularly relevant because cryptocurrency assets can exhibit substantial price fluctuations over relatively short periods (Baur et al., 2018; Liu & Tsyvinski, 2021).

Several methodological limitations should also be acknowledged. First, the identification of market structures, support and resistance zones, breakouts, and price-action patterns contains an element of analyst subjectivity. Although predefined analytical rules were used, some technical interpretations may differ between analysts. This limitation is consistent with the broader challenge of evaluating technical-analysis strategies, where methodology and implementation can influence reported results (Park & Irwin, 2007).

Second, because the study used actual trading data, the results may have been influenced by trader-related factors, including hesitation, fear, uncertainty, and execution decisions. Consequently, the observed performance cannot be attributed exclusively to the technical strategy itself. Third, the screening parameters were not subjected to a formal statistical optimization process. The selected thresholds and indicators were therefore based on the research framework rather than being optimized through an independent statistical procedure.

Fourth, the study was conducted over a relatively specific observation period. Cryptocurrency market conditions can change considerably across bullish, bearish, sideways, and high-volatility regimes. Therefore, the observed 62% win rate and 31% reported return may not be replicated under different market conditions. Previous research has similarly emphasized the instability of cryptocurrency market dynamics, which complicates the generalization of findings from one period to another (Catania et al., 2018).

Finally, the study primarily evaluates performance using transaction-level outcomes, including win rate, total profit, and average profit per trade. Although these measures provide useful information, a more comprehensive evaluation would include additional risk-adjusted

metrics such as maximum drawdown, Sharpe ratio, Sortino ratio, profit factor, expectancy, and transaction costs. Consequently, future research should incorporate these measures to provide a more complete assessment of strategy performance.

### *8.4 Recommendations for Future Research*

Future research should extend the observation period to include different cryptocurrency market regimes, including bullish, bearish, sideways, and extreme-volatility periods. A longer observation period would allow researchers to determine whether the observed performance is persistent across different market environments rather than being specific to the conditions during July 2025–February 2026.

Future studies could also compare the proposed strategy with alternative technical indicators, such as the Relative Strength Index (RSI), Moving Average Convergence Divergence (MACD), Bollinger Bands, and volatility-based indicators. Such comparisons would allow researchers to determine whether the current combination of EMA and SMI provides additional predictive or practical value relative to alternative technical configurations.

Another potential direction is the development of an **automated asset-screening and trading system**. The current framework could be translated into predefined computational rules for volume, open interest, market structure, momentum, and entry confirmation. This would reduce analyst subjectivity and make the strategy more suitable for quantitative testing. Such an approach would also allow researchers to conduct systematic robustness tests and out-of-sample evaluations.

Future research should also incorporate **risk-adjusted performance measures and transaction costs**. A strategy with a high win rate may not necessarily be economically superior if its losing trades are substantially larger than its winning trades or if trading costs materially reduce profitability. Park and Irwin (2007) emphasize the importance of methodological considerations, including transaction costs and data-snooping issues, when evaluating technical trading profitability.

Finally, the proposed framework could be tested across other financial markets, including equities, foreign exchange, commodities, and cryptocurrency derivatives. Cross-market testing would provide evidence regarding whether the combination of market-activity screening and technical analysis represents a broadly applicable trading framework or whether its effectiveness is primarily associated with the characteristics of cryptocurrency markets.

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# EMOTIONAL BIASES AND STOCK INVESTMENT DECISIONS DURING MARKET VOLATILITY IN EMERGING COUNTRIES: DOES RISK TOLERANCE MATTER?

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***Abstract***
*Although the number of stock investors in Indonesia continues to grow year after year, this expansion has not been accompanied by strong investment literacy. Consequently, many novice investors suffer early losses and become hesitant to continue participating in the market. This vulnerability was highlighted by the MSCI index adjustment in January 2026, which triggered severe market volatility and complicated investment decision-making. To better understand these dynamics, this quantitative study examines the effects of overconfidence, herding, loss aversion, and regret aversion on investment decisions in the Indonesian stock market, evaluating risk tolerance as a moderating variable. Novelty of this study is assessed quantitative study from homogeneous sampling method in order to isolate the result on specific behavioral relationship. The sample of this study is members of investor community that have homogeneous background, characteristics and become active investors during the 2026 MSCI event. The data were analyzed using SPSS multivariate regression. The findings reveal that overconfidence and loss aversion significantly impact investment decisions, whereas herding and regret aversion do not. Additionally, risk tolerance acts as a significant moderator only for loss aversion (where it weakens the relationship) and regret aversion (where it strengthens it). Overall, these results demonstrate that emotional biases do not uniformly dictate investor behavior and that risk tolerance does not serve as a universal buffer across all psychological traits.*
***Keywords****: Emotional Biases, Overconfidence, Herding, Loss Aversion, Regret Aversion, Risk Tolerance, Investment Decisions.*

## 1. Introduction

The rapid growth in the number of investors in Indonesia between 2022 and early 2026, as reported by the Indonesian Central Securities Depository (KSEI), was not necessarily accompanied by rational investment decision-making. Instead, the increasing participation of retail investors has been associated with speculative trading behavior, often conducted without adequate fundamental analysis (Handayani & Rosilawati, 2024; Syukur et al., 2025). This lack of investor preparedness became particularly evident during the market turmoil between November 2025 and January 2026. During this period, social media rumors concerning the potential inclusion of PT Bumi Resources Tbk (BUMI) and PT Petrindo Jaya Kreasi Tbk (PTRO) in the MSCI Global Standard Index were associated with heightened investor overconfidence (Costa et al., 2025) and herding behavior, particularly through the reinforcement of recommendations disseminated by stock market influencers (Bintoro, 2022; Trisno & Vidayana, 2023).

The situation was further intensified by uncertainty surrounding MSCI's assessment of the Indonesian equity market, particularly concerns regarding market transparency. Subsequent speculation regarding a potential downgrade of Indonesia's capital market classification to Frontier Market status, drawing comparisons with the Pakistan Stock Exchange's experience in 2021, further heightened investor uncertainty. These developments contributed to substantial selling pressure in the market and sharp declines in the prices of BUMI and PTRO shares. The resulting market instability was accompanied by temporary trading halts and significant capital outflows (Hidayati et al., 2022). Consequently, many retail investors experienced substantial losses following the rapid decline in stock prices and successive trading halts.

Such adverse market experiences may subsequently influence investors' psychological

responses and future investment behavior. In particular, investors who experience significant losses may develop loss aversion, leading them to become more reluctant to participate in the capital market. Similarly, negative investment experiences may generate regret aversion, whereby investors avoid subsequent investment opportunities to minimize the possibility of experiencing similar regret. These behavioral responses highlight the importance of examining investment decisions not only from a conventional financial perspective but also through the lens of behavioral finance.

Against this backdrop, this study examines the effects of emotional biases, including overconfidence, herding, loss aversion, and regret aversion on investment decisions among retail investors. Furthermore, the study investigates risk tolerance as a moderating variable to determine whether investors' tolerance for risk influences the relationship between emotional biases and investment decisions. By focusing on the period surrounding the January 2026 MSCI-related market volatility, this study seeks to provide a more comprehensive understanding of how psychological biases and individual risk preferences shape retail investor behavior during periods of heightened market uncertainty.

## 2. Literature Review

### *2.1 Grounded theory*

This study is grounded in Prospect Theory, developed by Kahneman and Tversky in 1979 (Bintoro, 2022). The theory was introduced in their seminal article, *Prospect Theory: An Analysis of Decision under Risk*, and subsequently extended in 1992 to provide a more comprehensive explanation of decision-making under conditions of risk and uncertainty (Ariefin Addinpujoartanto & Darmawan, 2020). Prospect Theory is a behavioral economic theory that explains how individuals evaluate potential gains and losses and how these evaluations influence decision-making under uncertain conditions. Unlike traditional economic models, which generally assume that individuals make rational decisions based on objective information, Prospect Theory recognizes that psychological factors and subjective perceptions of gains and losses can substantially influence individual choices. In the context of investment, this perspective provides a theoretical foundation for understanding why investors may deviate from rational decision-making when confronted with market volatility, uncertainty, and potential financial losses.

Behavioral finance is an important field of financial research that integrates psychological perspectives with conventional financial theory to explain how individuals actually make economic and investment decisions. The field seeks to identify and explain market anomalies by examining systematic deviations from the rational decision-making assumptions of traditional finance (Corzo et al., 2024). Human behavior in financial markets is influenced not only by objective information and economic considerations but also by cognitive and emotional factors. Among these factors, emotional biases represent an important component of investment decision-making because emotions can substantially influence how individuals process information, evaluate risk, and respond to changes in financial markets (Cotrus et al., 2012, as cited in Kumar & Chaurasia, 2024). Accordingly, behavioral finance provides a relevant theoretical perspective for examining how overconfidence, herding, loss aversion, and regret aversion influence investment decisions.

### 2.2 *Emotional Biases*

Overconfidence refers to an excessive level of confidence in one's own knowledge, abilities, judgments, or capacity to control outcomes. Investors exhibiting overconfidence tend to perceive themselves as more knowledgeable, skilled, or capable of predicting market movements than they actually are. Consequently, overconfident investors may overestimate the accuracy of their information and underestimate the risks associated with their investment decisions. They may also attribute successful investment outcomes to their own abilities while attributing unsuccessful outcomes to external market conditions (Yanti & Endri, 2024). In financial markets, this bias can encourage investors to trade more frequently and take greater

risks because they believe that their judgments are superior to those of other market participants.

Herding behavior refers to the tendency of investors to follow the investment decisions or actions of other investors rather than relying primarily on their own information and analysis. This behavior may occur when investors perceive the decisions of other market participants as a source of information, particularly under conditions of uncertainty or limited information. Retail investors may imitate the investment behavior of other investors, influential market participants, or broader investor groups in the expectation of obtaining similar returns (Wayan Rona & Kadek Sinarwati, 2021). In this context, herding can reduce investors' reliance on independent analysis and increase their tendency to make investment decisions based on collective market behavior.

Loss aversion refers to the tendency of individuals to perceive losses as psychologically more significant than equivalent gains. In investment decision-making, investors exhibiting loss aversion may place greater emphasis on avoiding losses than on obtaining comparable investment gains (Limarus & Pamungkas, 2023). This tendency can influence investors' willingness to accept risk and may lead them to alter, delay, or avoid investment decisions when the perceived possibility of loss is high. The psychological impact of a financial loss is generally greater than the psychological satisfaction associated with an equivalent gain, making loss aversion an important factor in understanding investor behavior under conditions of market uncertainty (Kumar & Chaurasia, 2024).

Regret aversion refers to the tendency of individuals to avoid making decisions because they anticipate experiencing regret if the outcome is unfavorable. In investment contexts, investors may avoid certain investment opportunities or maintain existing positions to minimize the possibility of experiencing regret associated with an incorrect investment decision (Sukma Ardini et al., 2023). Regret aversion can therefore cause investors to become more conservative or passive in their investment behavior. It may also encourage investors to follow the decisions of other market participants because collective decision-making can reduce the perceived personal responsibility for an unfavorable outcome (Kumar & Chaurasia, 2024). Thus, regret aversion may influence both the willingness to participate in the market and the manner in which investors make investment decisions.

### 2.3 *Risk Tolerance*

Financial risk tolerance refers to the degree to which an individual is willing and able to accept uncertainty and potential financial losses in pursuit of investment returns. It is an important factor in determining how individuals allocate and manage their financial resources, as differences in risk tolerance can lead investors to adopt different investment strategies (Harahap et al., 2022). Risk tolerance also influences how investors process market information and respond to market volatility (Sudirman et al., 2023). In this study, risk tolerance is positioned as a moderating variable because investors with different levels of willingness to accept risk may respond differently to emotional biases. Accordingly, the effect of overconfidence, herding, loss aversion, and regret aversion on investment decisions may vary depending on the investor's level of risk tolerance.

### 2.4 *Investment Decisions*

An investment decision refers to an investor's decision to allocate financial resources to an investment instrument, including the decision to buy, hold, or sell stocks. Investors generally make investment decisions with the expectation of obtaining future returns while considering the risks associated with the investment (Handayani & Rosilawati, 2024). However, investment decisions are not always based on comprehensive financial or fundamental analysis. Particularly among retail investors, decisions may be influenced by short-term information, social media content, market sentiment, and announcements concerning domestic or global market indices. Consequently, investment decisions can be understood as the outcome of an interaction between financial considerations, market information, psychological factors, and

individual risk preferences.

The Jakarta Composite Index (JCI), or *Indeks Harga Saham Gabungan* (IHSG), is an indicator of the overall movement and performance of stocks listed on the Indonesia Stock Exchange (IDX) (Hasan et al., 2023). The JCI serves as an important benchmark for investors in evaluating aggregate market performance and assessing broader developments in Indonesia's capital market. Changes in the index may be influenced by domestic economic conditions, global market developments, investor sentiment, and external shocks. During periods of heightened market uncertainty, changes in investor sentiment can contribute to substantial movements in stock prices and market indices (Hidayati et al., 2022). Therefore, the JCI provides an important contextual indicator for examining investor behavior during periods of elevated market volatility, including periods associated with major global index-related announcements.

### 2.5 *Hypothesis Development*

Overconfidence may cause investors to overestimate their knowledge, analytical abilities, and capacity to predict market movements. Investors exhibiting high levels of overconfidence are more likely to believe that their investment judgments are accurate and that they can outperform other market participants. This perception may encourage more frequent trading and greater willingness to assume investment risk. Rona and Sinarwati (2021) found that overconfidence has a positive and significant effect on investment decisions, indicating that investors with higher levels of overconfidence tend to be more active in making investment decisions. Based on this theoretical argument and previous empirical findings, the first hypothesis is formulated as follows:

**H1: Overconfidence has a positive effect on investment decisions.**

Herding occurs when investors follow the investment behavior of other market participants rather than relying primarily on their own information and analysis. Under conditions of uncertainty, investors may perceive the decisions of other investors as an additional source of information or as an indication of appropriate market behavior. Wibowo et al. (2023) suggest that herding can influence investment decisions because investors may feel more secure when their decisions are consistent with those of other market participants. Consequently, investors who exhibit stronger herding tendencies are more likely to base their investment decisions on collective market behavior. Therefore, the second hypothesis is formulated as follows:

**H2: Herding has a positive effect on investment decisions.**

Loss aversion describes the tendency to place greater psychological weight on potential losses than on equivalent gains. In investment decision-making, investors with strong loss-averse tendencies may become more cautious when faced with the possibility of financial loss. Limarus and Pamungkas (2023) argue that concerns about capital losses can influence investors' preferences and choices regarding investment instruments. Consequently, loss aversion may affect investors' willingness to initiate, maintain, or alter their investment positions. Based on this theoretical perspective and previous empirical evidence, the third hypothesis is formulated as follows:

**H3: Loss aversion has a significant effect on investment decisions.**

Regret aversion refers to investors' tendency to avoid decisions that may subsequently cause feelings of regret. In financial markets, investors may become reluctant to make investment decisions when they anticipate that an unfavorable outcome could lead to regret or self-blame. Nurdinda et al. (2020) demonstrate that anticipated regret can influence investment decision-making, as investors may become more selective in choosing investment alternatives to minimize the possibility of experiencing regret from future losses. Therefore, regret aversion is expected to influence how investors evaluate and make investment decisions. Based on this argument, the fourth hypothesis is formulated as follows:

**H4: Regret aversion has a significant effect on investment decisions.**

Risk tolerance may alter the extent to which overconfidence translates into investment decisions. Investors with high risk tolerance may be more willing to act on their beliefs and judgments, even when those judgments are influenced by overconfidence. Conversely, investors with lower risk tolerance may be less likely to translate their confidence into aggressive investment decisions because their willingness to accept potential losses is limited. Sudirman et al. (2023) indicate that risk tolerance is related to investors' willingness to accept risk and their responses to market conditions. Therefore, the relationship between overconfidence and investment decisions may differ according to investors' levels of risk tolerance. Accordingly, the fifth hypothesis is formulated as follows:

**H5: Risk tolerance moderates the effect of overconfidence on investment decisions.**

The effect of herding behavior on investment decisions may depend on investors' tolerance for financial risk. Investors with high risk tolerance may be more willing to follow collective market behavior even when such behavior involves substantial uncertainty or potential losses. In contrast, investors with low risk tolerance may be less likely to translate herding tendencies into investment actions because their limited willingness to accept risk constrains their responses to market signals. Thus, risk tolerance may strengthen or weaken the relationship between herding behavior and investment decisions. Based on this theoretical argument, the sixth hypothesis is formulated as follows:

**H6: Risk tolerance moderates the effect of herding on investment decisions.**

Loss aversion is closely related to investors' perceptions and acceptance of financial risk. Investors with stronger loss-averse tendencies may be more sensitive to potential losses and therefore less willing to accept investment risk. However, the behavioral consequences of loss aversion may differ according to an individual's level of risk tolerance. Investors with relatively high risk tolerance may be more capable of maintaining investment positions despite experiencing potential losses, whereas investors with low risk tolerance may respond more strongly to perceived downside risk. Therefore, risk tolerance may alter the relationship between loss aversion and investment decisions. Accordingly, the seventh hypothesis is formulated as follows:

**H7: Risk tolerance moderates the effect of loss aversion on investment decisions.**

Regret aversion may influence investment decisions by causing investors to avoid choices that they perceive could result in future regret. However, the extent to which anticipated regret affects investment behavior may depend on investors' willingness to tolerate financial risk. Investors with high risk tolerance may be more willing to accept uncertain outcomes despite the possibility of regret, whereas investors with low risk tolerance may be more likely to avoid investment opportunities perceived as risky. Nurdinda et al. (2020) emphasize the importance of risk-related considerations in investment decision-making. Thus, risk tolerance may function as a psychological mechanism that changes the strength of the relationship between regret aversion and investment decisions. Based on this argument, the eighth hypothesis is formulated as follows:

**H8: Risk tolerance moderates the effect of regret aversion on investment decisions.**

## 3. Research Methods

### 3.1 *Research Design*

This study employed a quantitative research approach using primary data collected through an online questionnaire distributed to investor community of Kolese De Britto High School which considers have homogeneous characteristics and similar values on responding situation on this study. The questionnaire was developed using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to measure respondents' perceptions of behavioral biases, risk tolerance, and investment decisions.

The sampling technique employed in this study was non-probability sampling using purposive sampling. According to Hardani et al. (2020), purposive sampling is a sampling technique in which respondents are selected based on predetermined criteria that are considered relevant to the objectives of the study. This technique was considered appropriate because the study required respondents with specific characteristics relevant to the research context, particularly respondent who have experience or involvement in stock market investment.

The study targeted a sample of 100 respondents. The sample size was determined with reference to the minimum sample requirements for regression analysis commonly applied in behavioral finance research (Bintoro, 2022; Yanti & Endri, 2024). The selected respondents were expected to provide sufficient empirical observations for examining the relationships between emotional biases, risk tolerance, and investment decisions.

### 3.2 *Data Analysis*

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS). Before conducting hypothesis testing, the questionnaire items were evaluated through validity and reliability tests. The validity test was conducted to determine whether each measurement item adequately represented the construct being measured, while the reliability test was performed to assess the internal consistency of the measurement instruments.

After the instruments were confirmed to be valid and reliable, classical assumption tests were conducted. These tests included the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. These procedures were performed to assess whether the data met the assumptions required for the regression analysis.

Following the classical assumption tests, hypothesis testing was conducted using multiple linear regression analysis and moderated regression analysis. The analysis also included the F-test to evaluate the overall significance of the regression model and the adjusted coefficient of determination (Adjusted $R^2$) to assess the explanatory power of the independent variables. The results were subsequently interpreted and discussed in relation to the theoretical framework and previous empirical findings.

### 3.3 *Regression Model*

Model 1 was used to examine the direct effects of overconfidence, herding, loss aversion, and regret aversion on investment decisions.

$$Y=\alpha+1X1+2X2+3X3+4X4+e.$$

To examine whether risk tolerance moderates the relationships between emotional biases and investment decisions, the second regression model was formulated as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 M + \beta_6 X_1 * M + \beta_7 X_2 * M + \beta_8 X_3 * M + \beta_9 X_4 * M + e$$

Model 2 was employed to determine whether risk tolerance significantly moderates the effects of overconfidence, herding, loss aversion, and regret aversion on investment decisions. The moderating effects were assessed through the significance of the interaction terms (X_1M), (X_2M), (X_3M), and (X_4M). A statistically significant interaction coefficient indicates that the relationship between the corresponding emotional bias and investment decisions varies according to the respondent's level of risk tolerance.

The hypotheses concerning the direct effects of emotional biases on investment decisions were evaluated using the statistical significance of the corresponding regression coefficients in Model 1. The hypotheses concerning the moderating role of risk tolerance were evaluated using the significance of the interaction terms in Model 2.

A significance level of 5% was adopted. A p-value below 0.05 indicates a statistically significant relationship, whereas a p-value greater than 0.05 indicates that the corresponding hypothesis is not statistically supported. The direction and magnitude of the regression coefficients were also considered when interpreting the nature of the relationships between the variables.

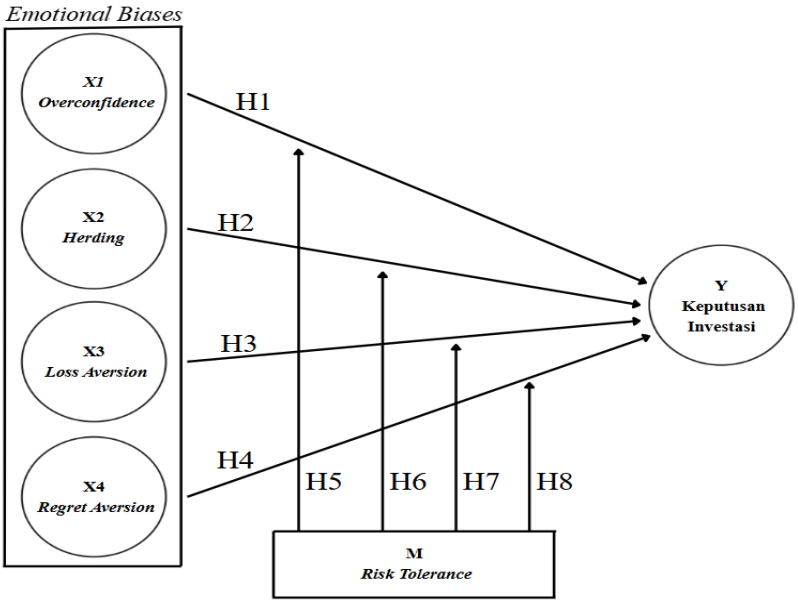



**Figure 1. Research Model**

## 4. Research Findings and Discussion

### 4.1 *Regression Results*

Based on the results of the regression test of variable X against variable Y, it can be seen that the sig. value of variable X1 is 0.000, X2 is 0.582, X3 is 0.000, and X4 is 0.655. The results of the significant values for variables X1 and X3 are smaller than 0.05 (alpha), meaning that variables X1 and X3 have successfully influenced variable Y. Meanwhile, for variables X2 and X4, the results of the significant values are more than 0.05 (alpha), meaning that variables X2 and X4 have not succeeded in influencing variable Y. Then also obtained beta results for the constant of 10.893, variable X1 of 0.267, X2 of 0.027, X3 of 0.315, and X4 of -0.024, resulting in the formula:

$$Y=10,893+0,267X1+0,027X2+0,315X3-0,024X4+e$$

**Table 1. Result of Model 1**

| Coefficients | | |
|---|---|---|
| | **B** | **Sig.** |
| (Constant) | 10,893 | |
| *Overconfisence* (X1) | 0.267 | 0,000 |
| *Herding* (X2) | 0.027 | 0.582 |
| *Loss Aversion* (X3) | 0.315 | 0,000 |
| *Regret Aversion* (X4) | -0.024 | 0.655 |
| a. Dependent Variable : Investment Decision | | |

**Table 2. Result of Model 2**

| Coefficients | | |
|---|---|---|
| | **B** | **Sig.** |
| (Constant) | -0.973 | |
| *Overconfisence* (X1) | 0.176 | 0.611 |
| *Herding* (X2) | 0.298 | 0.414 |

| Coefficients | | |
|---|---|---|
| | **B** | **Sig.** |
| *Loss Aversion* (X3) | 0.977 | 0,016 |
| *Regret Aversion* (X4) | -0.933 | 0.006 |
| *Risk Tolerance (M)* | 0.840 | 0.021 |
| ***Overconfidence**** | | |
| *Risk Tolerance (X1M)* | -0.001 | 0.943 |
| ***Herding**** | | |
| *Risk Tolerance (X2M)* | -0.011 | 0.493 |
| ***Loss Aversion**** | | |
| *Risk Tolerance (X3M)* | -0.036 | 0.050 |
| ***Regret Aversion**** | | |
| *Risk Tolerance (X4M)* | 0.036 | 0.011 |
| a. Dependent Variable: Investment Decision | | |

Based on the results of the regression test of variable X and variable M against variable Y, it can be seen that the sig. value of variable X1 is 0.611, X2 is 0.414, X3 is 0.016, X4 is 0.021, X1M is 0.943, X2M is 0.493, X3M is 0.050, and X4M is 0.011. Variables X3, X4, X3M and X4M are smaller than or equal to 0.05 (alpha) which means they successfully influence variable Y, while variables X1, X2, X1M and X2M are greater than 0.05 (alpha) which means they do not successfully influence variable Y. Then also obtained beta results for the constant of -0.973, variable X1 of 0.176, X2 of 0.298, X3 of 0.977, X4 of -0.933, M of 0.840, X1M of -0.001, X2M of -0.011, X3M of -0.036 and X4M of 0.036, thus getting the formula results:

$$Y=-0,973+0,176X1+0,298X2+0,977X3-0,933X4+0,840M-0,001X1*M-0,011X2*M$$
$$0,036X3*M+0,036X4*M+e$$

Additionally, based on the results of the F test using the SPSS application, a significant value for the F test was obtained of 0.000. A significant value < alpha (0.05), then significant, meaning that the independent variable and the moderating variable simultaneously or together have a significant effect on the dependent variable. While, based on the results of the adjusted determination coefficient test (Adjsuted R-Squared), the adjusted R Square value of 0.465 or 46.5% shows the ability of the independent variables (overconfidence, herding, loss aversion, regret aversion) and the moderating variable (risk tolerance) to explain the variation in changes in the dependent variable (investment decisions) by 46.5% and the remaining 53.5% can be explained by other variables outside the model.

**Table 3. Result of F Test**

| ANOVA | | | | |
|---|---|---|---|---|
| **Model** | **Sum of Squares** | **Df** | **F** | **Sig** |
| Regression | 498,435 | 5 | 19,103 | 0,000 |
| Residual | 516,612 | 99 | | |
| Total | 1015,048 | 104 | | |
| **Model Summary** | | | | |
| **Model** | **R** | **Rsquare** | **Adjusted R Square** | |
| 1 | 0,701 | 0,491 | 0,465 | |

### 4.2 *Discussion*

The effect of overconfidence on investment decisions, showed a significance value of 0.000 < 0.05 (alpha). This indicates that overconfidence influences investment decisions. Respondent have a high level of trust in analysis or confidence in certain stocks in the Indonesian capital market. The results of this study align with research conducted by Wayan Rona & Kadek Sinarwati (2021) regarding overconfidence in investment decisions, which showed that overconfidence significantly influences investment decisions. One cause of

increased overconfidence is increased self-confidence without considering existing advice, information, and trends, resulting in overconfidence in one's abilities. This positive and significant tendency towards overconfidence is very logical given the dynamic conditions of the Indonesian stock market. When the stock market is faced with high volatility due to strong sentiment, such as the adjustment or rebalancing period of the MSCI index in early 2026, Respondent who feel overconfident will not hold back or be passive. In contrast, investors felt they had above-average abilities to "read market direction" or capitalize on price fluctuations to achieve profits (capital gains).

The effect of herding on investment decisions, showed a significance value of 0.582 > 0.05 (alpha). This indicates that herding behavior has no effect on investment decisions. Following the herd of well-known influencers or following market trends was not a determining factor for Respondent in making stock investment decisions in the Indonesian capital market. This study's findings are interesting because they differ from previous studies such as those by Wayan Rona & Kadek Sinarwati, 2021 and Limarus & Pamungkas, 2023, which found that herding or herding behavior has a positive and significant influence on investment decision-making. This difference in results may be due to the different capital market conditions when the data for this study were collected compared to previous studies. During the current study's highly volatile observation period due to highly volatile market dynamics following the announcement of changes or rebalancing of the MSCI index in early 2026, investors tend to be faced with a massive and transparent flow of information. When information is widely and quickly available, respondent are no longer simply "herding" aimlessly.

The effect of loss aversion on investment decisions, showed a significance value of 0.000 < 0.05 (alpha). This indicates that the fear of losing assets, or loss aversion, influences investment decisions. Respondent are more cautious and strive to avoid losses when making stock investment decisions in the Indonesian capital market. This is in line with previous research by Limarus & Pamungkas (2023), which also found that loss aversion influences investment decisions. The results of this study indicate that loss aversion significantly influences investment decisions. The positive influence of loss aversion indicates that the higher the level of caution of Respondent in avoiding losses, the more focused their investment decisions will be. Amidst uncertain conditions in the Indonesian stock market, especially when facing high sentiment or volatility such as the MSCI index adjustment or rebalancing period, Respondent with a loss aversion bias are less likely to act rashly. This bias encourages Respondent to implement stricter risk management strategies, such as setting cut-loss limits, diversifying their portfolios, or selecting stocks with strong fundamentals (blue-chip). Thus, the fear of loss positively guides them towards more rational and defensive investment decisions.

The effect of regret aversion on investment decisions, showed a significance value of 0.655 > 0.05 (alpha). This indicates that regret aversion has no effect on investment decisions. Respondent do not experience regret aversion when making stock investment decisions in the Indonesian capital market. This finding indicates a difference or contradiction with previous research by (Nurdinda et al., 2020), which stated that regret aversion significantly influences stock investment decisions in the Indonesian capital market. Regret aversion emerged when investors delayed making investment decisions due to fear of loss.

## 5. Conclusion

Based on the results of the data analysis, this study demonstrates that investment decisions are significantly influenced by overconfidence and loss aversion, whereas herding and regret aversion do not exhibit significant direct effects. These findings indicate that respondents' investment decisions are primarily driven by confidence in their own judgment and sensitivity to potential losses rather than by a tendency to follow collective market behavior or avoid anticipated regret.

Furthermore, risk tolerance plays an important role as a moderating variable in the

relationships between emotional biases and investment decisions. The moderation analysis suggests that differences in investors' willingness to accept financial risk influence the extent to which emotional biases shape investment behavior. In particular, risk tolerance alters how respondents respond to emotional considerations, indicating that investors with different levels of risk tolerance may translate psychological biases into investment decisions in different ways. Overall, these findings highlight the importance of integrating behavioral finance perspectives with individual risk preferences to better understand investment decision-making during periods of heightened market uncertainty.

### 5.1 *Practical and Academic Implications*

For retail investors, the finding that overconfidence and loss aversion significantly influence investment decisions underscores the importance of maintaining an appropriate balance between confidence and caution. While confidence can encourage decisive action, excessive confidence may increase the likelihood of speculative behavior if it is not supported by objective analysis. Similarly, sensitivity to potential losses can encourage more careful decision-making but may also lead to overly conservative investment behavior when not managed effectively.

Given the moderating role of risk tolerance, investors are encouraged to develop a clearer understanding of their own risk preferences before making investment decisions. A more structured and systematic investment approach, including the development of a written trading plan, portfolio diversification, and the use of risk-management tools such as stop-loss and take-profit orders, may help investors make more consistent decisions while minimizing the influence of emotional biases during periods of market volatility.

From an academic perspective, future behavioral finance research should seek to expand and refine the present research model. Because this study employed a relatively homogeneous sample, future studies should include more diverse respondent groups, including female investors, investors from different educational backgrounds, and participants from various regions and demographic groups in Indonesia. Such broader sampling would improve the external validity and generalizability of future research findings while providing a more comprehensive understanding of investor behavior across different population groups.

### 5.2 *Research Limitations*

First, the study employed a relatively homogeneous sample, consisting exclusively of male respondents from a single educational background. This limited demographic diversity may restrict the generalizability of the findings to broader populations of retail investors with different demographic characteristics. There was a time gap between the occurrence of the market phenomenon examined and the data collection period. The study focused on market conditions during November 2025 to January 2026, whereas data were collected between April and May 2026. This interval may have introduced recall bias, as respondents may not have accurately remembered the emotions, perceptions, and decision-making processes they experienced during the period of heightened market volatility associated with the MSCI-related news.

Additionally, the study relied on an online questionnaire as the primary data collection instrument. Although online surveys facilitate efficient data collection, they are also susceptible to self-report bias, including social desirability bias. Respondents may have provided answers that reflected socially desirable or idealized investment behavior rather than accurately reporting the psychological responses they experienced during periods of market uncertainty.

Finally, this study examined risk tolerance as the sole moderating variable in the relationship between emotional biases and investment decisions. However, investment decision-making is influenced by numerous additional internal and external factors that were not incorporated into the research model. Variables such as financial literacy, investment

experience, trading frequency, investment capital, income level, and access to market information may also moderate the influence of emotional biases on investment decisions. Future studies are therefore encouraged to incorporate these variables to develop a more comprehensive explanation of investor behavior in the Indonesian capital market.

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# FROM PRICE ADVANTAGE TO BRAND CONFIDENCE: INDONESIAN CONSUMERS' CHANGING PERCEPTIONS OF CHINESE-MADE SMARTPHONES

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***Abstract***
*China's expanding digital and consumer-goods industries have reshaped competition in Asian markets, while smartphones have become important gateways to participation in the digital economy. This paper examines Indonesian consumers' perceptions of Chinese-made smartphones and changes in brand preferences between 2021 and 2026. It compares two consumer surveys conducted in 2021 (N = 1,101) and 2026 (N = 629), focusing on brand choice, perceived product characteristics, changes over time, and implications for consumer behavior and marketing strategy. Xiaomi remained the most widely used brand, although its share declined from 40.7% to 36.9%. Vivo declined from 25.2% to 17.3%, while OPPO increased from 11.0% to 24.8%. Huawei accounted for 12.9% of respondents in 2026. Meanwhile, respondents who had never used a Chinese smartphone declined from 22.6% to 8.1%. Despite greater market penetration, perceptions across seven attributes declined moderately, with the overall score falling from 3.93 to 3.81 on a five-point scale. The findings suggest that Chinese smartphone brands are moving beyond price-based competition toward differentiated positioning, technology, product experience, and perceived value. The paper discusses implications for consumer behavior, country-of-origin research, and inclusive digital transformation in Asia.*
***Keywords:*** *Chinese smartphones; Indonesian consumers; country-of-origin effect; brand image; inclusive transformation.*

## 1. Introduction

China's transformation from a predominantly manufacturing-oriented economy into a major source of technology, innovation, and globally recognized brands has significantly reshaped competition in global consumer markets. Chinese firms have increasingly moved beyond the traditional role of low-cost manufacturers toward the development of technological capabilities, proprietary brands, product innovation, and international market presence. Research on Chinese firms shows that their internationalization has involved not only the exploitation of manufacturing capabilities but also the acquisition and development of technological and brand assets (Child & Rodrigues, 2005). In the electronics sector, Chinese firms have progressively built technological capabilities through learning, research and development, global value chains, and internationalization (Kimura, 2019). Studies of Chinese innovative firms similarly indicate that innovation capability has become an important determinant of their internationalization strategies (Liao et al., 2020). This transformation is particularly visible in the smartphone industry, where Chinese companies such as Huawei, Xiaomi, OPPO, vivo, and other brands have evolved from latecomers into significant global competitors. Research on the Chinese mobile-phone sector shows that Chinese firms have followed distinctive catch-up strategies, combining technological development with increasingly sophisticated marketing strategies as the industry has matured (Malerba et al., 2021).

The changing position of Chinese firms is particularly significant in Southeast Asia. The region has become an important destination for Chinese consumer products and an increasingly important arena for competition among Chinese, Japanese, Korean, American, and local brands. Euromonitor International reports that Chinese exports to Southeast Asia reached USD 587 billion in 2024, an increase of 12% from the previous year, making the region China's largest export destination. Chinese firms have been particularly successful in consumer electronics, appliances,

and other technology-intensive categories, combining product innovation with competitive pricing and increasingly sophisticated branding strategies (Euromonitor International, 2025). In the smartphone category, Chinese brands' combined volume share in Southeast Asia reportedly increased from approximately 21% in 2014 to more than 60% in 2024 (Euromonitor International, 2025). This development indicates that Chinese smartphone brands are no longer competing merely as low-cost alternatives but have become important actors in the region's consumer technology markets.

The importance of Chinese consumer technology is closely connected with the development of the Asian digital economy. Smartphones have evolved from relatively simple communication devices into multifunctional interfaces between individuals and the digital economy. They provide access to communication, social media, e-commerce, digital payments, education, information, entertainment, and a growing range of economic and public services. The International Telecommunication Union and Broadband Commission have consequently identified smartphone access as an important dimension of digital inclusion, noting that gaps in smartphone adoption can continue to limit the socio-economic benefits of connectivity even where mobile networks are available (Broadband Commission, 2022). The Asian Development Bank similarly emphasizes that digital transformation can contribute to inclusive development by improving access to finance and education, increasing productivity, and expanding opportunities for individuals and small businesses, while also recognizing persistent digital divides across developing Asia (Asian Development Bank, 2025). Thus, the affordability, reliability, and technological capability of smartphones have implications beyond individual consumption: they can influence people's ability to participate meaningfully in the digital economy.

This relationship is particularly relevant in Indonesia. Indonesia is Southeast Asia's largest economy and one of the world's most populous countries, making it one of the region's most important consumer markets (World Bank, 2026a). Its digital economy was the largest in ASEAN in 2025, with a gross merchandise value estimated at USD 99 billion, although substantial disparities in digital access and quality remain across regions and socioeconomic groups (World Bank, 2025). The World Bank reports that internet use in Indonesia has expanded considerably, reaching approximately 73% of the population in 2024, while important urban-rural and regional disparities persist (World Bank, 2026b). In this context, the availability of affordable and capable smartphones is closely connected with the broader question of who can participate in Indonesia's rapidly developing digital economy.

Chinese smartphone manufacturers have established a particularly strong position in this market. Xiaomi, OPPO, vivo, Huawei, and other Chinese brands compete across different price segments and increasingly differentiate themselves through technology, design, cameras, artificial intelligence, ecosystem integration, retail presence, and brand experience. Recent market data illustrate the intensity of this competition. In the second quarter of 2025, Xiaomi accounted for approximately 21% of smartphone shipments in Indonesia, according to Counterpoint Research (Kusuma & Jain, 2025). By the first quarter of 2026, OPPO had taken the leading position in Indonesia's smartphone shipment market, while Xiaomi held approximately 21% of the market, illustrating how quickly competitive positions can change (Counterpoint Research, 2026). These developments make Indonesia an important setting for examining not only the market penetration of Chinese smartphone brands but also the perceptions that underpin consumer choice.

However, market penetration does not necessarily mean that consumers perceive Chinese products positively in all respects. Country-of-origin research has long demonstrated that information about where a product is made can influence consumers' evaluation of product quality and purchase decisions. Country of origin can function as an informational cue, particularly when consumers have incomplete information about a product (Diamantopoulos et al., 2017). At the same time, country-of-origin effects interact with other product and brand attributes. Consumers may evaluate country of origin differently depending on product category, brand familiarity, perceived quality, price, and previous experience (Elliott & Cameron, 1994; Yunus & Rashid, 2016).

This issue is especially relevant to Chinese products. For decades, "Made in China" was widely associated in international consumer markets with mass production, low prices, and, in some cases, lower quality or reliability. Recent evidence suggests, however, that this stereotype is changing. Euromonitor International (2025) observes that Chinese brands in Southeast Asia are increasingly being evaluated not merely for low prices but also for quality, innovation, and value. Research specifically examining Indonesian consumers likewise identifies a decline in negative stereotypes toward Chinese smartphone brands, with consumers increasingly emphasizing the relationship between price and performance rather than simply associating Chinese products with cheapness (Amrullah & Purnomo, 2023). This transformation is consistent with the broader evolution of Chinese firms from manufacturing-oriented latecomers toward innovative global competitors.

Nevertheless, the relationship between country image, brand image, product quality, and consumer choice remains complex. Previous research on Chinese smartphones in Indonesia has shown that country-of-origin image and brand image can influence purchase intention through perceived quality and consumer uncertainty (Berliando & Wardhani, 2022; Wibowo et al., 2021). Research on Chinese smartphone brands has also found that brand image may have a more direct influence on purchase intention than country-of-origin image (Darmawan et al., 2021). These findings suggest that consumers do not necessarily evaluate all Chinese smartphones as a single homogeneous category. Instead, country of origin may provide an initial evaluative cue, while individual brands increasingly compete through their own reputations, product performance, technological capabilities, and consumer experiences.

Despite these insights, an important question remains insufficiently explored: *how have Indonesian consumers' choices and perceptions of Chinese smartphone brands changed over time?* Most existing studies provide cross-sectional evidence concerning country-of-origin image, perceived quality, brand image, and purchase intention. They offer valuable explanations of consumer behavior at a particular point in time, but they provide less evidence about whether the underlying basis of consumer acceptance changes as Chinese smartphone brands become more established.

This study addresses this issue by comparing two consumer surveys conducted in Indonesia in 2021 and 2026. Rather than examining only current market penetration, the study investigates whether the brands used by respondents and their perceptions of Chinese-made smartphones have changed over the five-year period. The analysis measures consumer perceptions across seven dimensions: price advantage, perceived added value, innovation, novelty of design, technological capability, quality and reliability, and brand image.

The comparison is particularly interesting because it may reveal a possible tension between *market penetration and consumer perception*. If Chinese smartphone brands have become more widely used while perceptions of their price advantage, innovation, technology, quality, and brand image have changed, this may indicate that the basis of consumer acceptance is also changing. Greater familiarity with Chinese brands may reduce the salience of country-of-origin stereotypes while simultaneously raising consumers' expectations regarding product performance and brand experience.

The study therefore addresses five research questions:

1.) Which Chinese smartphone brands are chosen by Indonesian consumers, and what proportion of respondents use each brand?
2.) What product characteristics are associated with consumers' choices of Chinese smartphone brands?
3.) Have brand preferences and consumer perceptions changed between 2021 and 2026?
4.) If changes have occurred, what factors may help explain these changes?

5.) What are the implications of these changes for understanding consumer behavior and developing marketing strategies for Chinese smartphone brands?

By comparing the two surveys, this study contributes to the literature in three respects. First, it adds a temporal dimension to research on country-of-origin and Chinese smartphone brands in Indonesia. Second, it distinguishes between the growing market presence of Chinese smartphone brands and consumers' perceptions of their specific product characteristics. Third, it connects consumer behavior with the broader transformation of the Asian digital economy.

The study is also relevant to the theme of digital economy, human dignity, and inclusive transformation in Asia. Smartphones are not simply consumer goods; they are increasingly important gateways through which individuals access economic opportunities, financial services, education, information, social networks, and public services. Greater availability of affordable and capable smartphones can therefore contribute to digital inclusion. Yet inclusion should not be understood merely as increasing device ownership. Meaningful inclusion requires access to technology that is affordable, reliable, useful, and capable of enabling people to participate effectively in economic and social life. From this perspective, the evolution of Chinese smartphone brands in Indonesia provides a useful case for examining how competition, innovation, affordability, and consumer trust interact in the broader process of digital transformation in Asia.

## 2. Literature Review

### *2.1 Consumer Perception and Perceived Value*

Consumer perception refers to the process through which individuals select, organize, and interpret information to form judgments about products and brands (Schiffman & Wisenblit, 2018). These judgments are shaped not only by objective product characteristics but also by consumers' prior experiences, knowledge, expectations, price perceptions, brand familiarity, and available information.

A central concept in consumer evaluation is *perceived value*. Consumers generally assess a product by comparing the benefits they expect to receive with the sacrifices required to obtain and use it. Benefits may include performance, features, design, convenience, and technological capabilities, while sacrifices include monetary price, time, effort, and perceived risk (Kotler et al., 2022). Zeithaml (1988) similarly conceptualizes perceived value as the consumer's overall assessment of a product's utility based on perceptions of what is received and what is given. Thus, price does not operate independently of quality: a low-priced product can generate high perceived value when consumers believe that its performance and benefits adequately compensate for the price paid.

This perspective is particularly relevant to smartphones, where consumers evaluate multiple attributes simultaneously. Technology, innovation, design, reliability, and brand reputation can compensate for a higher price, while a low price may not generate value if consumers perceive the product as unreliable or technologically inferior. Consequently, the seven dimensions examined in this study—price advantage, added value, innovation, design novelty, technological capability, quality and reliability, and brand image—can be understood as interconnected components of consumers' overall evaluation of Chinese smartphones.

### *2.2 Country-of-Origin and Chinese Products*

Country-of-origin (COO) refers broadly to the influence of consumers' perceptions of a product's originating country on their evaluation and behavioral responses. Country of origin can function as an informational cue, particularly when consumers have limited information about a product or brand. A substantial meta-analysis by Verlegh and Steenkamp (1999) found that country of origin affects product evaluations, particularly perceived quality, although the magnitude of the effect varies across products, consumers, and contexts. More recent meta-analytic evidence confirms that country-of-origin image has a moderate positive effect on consumer brand evaluations, including brand-specific associations and brand commitment

(Oduro et al., 2024).

Country-of-origin effects, however, should not be treated as a simple or permanent response to a "Made in" label. Consumers may distinguish among country image, product-country image, corporate image, and individual brand image. Fan (2019), for example, emphasizes the distinction between China's country image, corporate image, and brand image. Consumers may therefore hold mix ed evaluations: they may have reservations about China as a country while simultaneously developing positive perceptions of a particular Chinese brand through product experience.

This distinction is important for Chinese smartphones because Xiaomi, OPPO, vivo, Huawei, and other brands do not necessarily occupy the same position in consumers' minds. Meta-analytic research also suggests that the effects of different country-of-origin components vary, with country-of-brand effects particularly relevant to purchase intention (De Nisco & Oduro, 2022). In other words, consumers may increasingly evaluate a Chinese smartphone according to *which Chinese brand it is*, rather than simply according to the fact that it is Chinese.

Evidence from Indonesia supports this more nuanced interpretation. Berliando and Wardhani (2022) found that country-of-origin and brand image reduced customer uncertainty, while lower uncertainty was associated with stronger purchase intention. In this context, customer uncertainty refers to consumers' doubts or lack of confidence about the product and its expected performance. Their findings suggest that favorable country and brand images can reduce consumers' uncertainty about whether an OPPO smartphone will deliver the expected benefits. Darmawan et al. (2021) similarly found an important role for brand image in explaining purchase intention, while Wibowo et al. (2021) highlighted perceived quality as an important link between country-of-origin, brand image, and purchase intention.

### *2.3 Chinese Smartphones and the Changing Meaning of "Value"*

Chinese smartphone brands have increasingly challenged the traditional stereotype of Chinese products as inexpensive but technologically inferior. Amrullah and Purnomo (2023), through their analysis of Indonesian smartphone communities, found that negative perceptions of Chinese brands were declining. Consumers increasingly evaluated brands such as Xiaomi, OPPO, and vivo according to whether their features and performance were "worth the price," suggesting a shift from a low-price/low-quality stereotype toward a price–performance/value perspective.

This shift is consistent with the broader development of consumer technology brands. Vera-Martínez (2021) found that perceived innovativeness and perceived benefits are important antecedents of consumer identification and loyalty toward technology brands. In technology markets characterized by rapid product cycles, consumers may therefore evaluate brands not simply on whether they offer affordable products but on whether they continuously deliver meaningful technological and functional benefits.

The meaning of value can consequently change as a product category matures. When a technology is relatively unfamiliar, consumers may rely more heavily on extrinsic cues such as country of origin, price, and brand reputation. As familiarity and direct experience increase, consumers can rely more on their own evaluations of performance, reliability, design, and technological capability. Research on country image similarly shows that familiarity with foreign brands, products, and countries is associated with more developed country-image perceptions (Leonidou et al., 2022).

This suggests that consumer perceptions should be understood as dynamic rather than static. Changes may result from accumulated consumer experience, increasing brand familiarity, technological upgrading, changing competitive standards, and shifts in the

positioning of the brands themselves. As Chinese smartphones become mainstream products rather than unfamiliar alternatives, consumers may become less concerned with whether they are "Chinese" and more concerned with whether a particular brand provides sufficient value, innovation, quality, reliability, and technological capability.

Accordingly, the strategic question for Chinese smartphone manufacturers is no longer simply: How can Chinese brands offer smartphones at lower prices? It increasingly becomes: How can Chinese brands deliver superior perceived value and convince consumers that their products are technologically capable, innovative, reliable, and trustworthy? This study examines whether the comparison between Indonesian consumer surveys in 2021 and 2026 provides evidence of such a transformation. In particular, it investigates whether changes in brand choice are accompanied by changes in the perceived price advantage, value, innovation, design, technology, quality, reliability, and brand image of Chinese smartphones.

## 3. Research Methods

### *3.1 Research Design*

This study employs a comparative descriptive research design based on two consumer surveys conducted in Indonesia in 2021 and 2026. The design is intended to identify differences in Chinese smartphone brand usage and consumer perceptions across the two survey periods. Both surveys were administered online using Google Forms, an online questionnaire platform that enables researchers to distribute questionnaires electronically and collect and organize responses for subsequent analysis (Dillman et al., 2014). The use of an online questionnaire was appropriate for a study concerning consumers of digital technology and enabled responses to be collected from respondents across different regions of Indonesia. The Google Form link was sent to the individuals the researchers knew by WhatsApp messages. The respondents were also encouraged to pass the link to their friends.

The 2021 survey obtained 1,101 responses, while the 2026 survey obtained 629 responses. The two samples were independent and were not designed as a panel; therefore, the study does not track changes in the perceptions of the same individuals. The comparison should consequently be interpreted as identifying differences between two cross-sectional samples, rather than measuring individual-level longitudinal change. Differences in the demographic composition of the samples are explicitly reported because they may contribute to differences observed between the two survey periods. Table 1 presents the demographic profiles of the two samples.

**Table 1. Comparison of Respondent Characteristics, 2021 and 2026**

| Characteristic | Category | 2021 | 2026 |
|---|---|---|---|
| **Age** | Baby Boomers | 8.8% | 1.3% |
| | Gen X | 27.6% | 8.6% |
| | Gen Y | 31.1% | 28.5% |
| | Gen Z | 32.4% | 61.6% |
| | **Total** | **100.0%** | **100.0%** |
| **Highest Education** | Junior high school or below | 1.8% | 4.8% |
| | Senior high school/vocational school | 27.3% | 55.3% |
| | Bachelor's degree/Diploma | 44.4% | 33.4% |
| | Master's degree | 22.1% | 5.7% |
| | Doctoral degree | 4.4% | 0.8% |
| | **Total** | **100.0%** | **100.0%** |
| **Monthly Income** | < IDR 2 million | 35.2% | 52.8% |
| | IDR 2–5 million | 22.3% | 29.3% |
| | > IDR 5–10 million | 18.1% | 10.8% |
| | > IDR 10–15 million | 9.4% | 3.8% |
| | > IDR 15 million | 15.1% | 3.3% |
| | **Total** | **100.0%** | **100.0%** |

| Characteristic | Category | 2021 | 2026 |
|---|---|---|---|
| **Province/Region of Residence** | Java | 81.9% | 67.4% |
| | Kalimantan | 1.0% | 9.4% |
| | Sumatra | 2.7% | 9.1% |
| | Sulawesi | 2.9% | 8.1% |
| | West and East Nusa Tenggara | 5.4% | 2.5% |
| | Bali | 3.4% | 1.9% |
| | Papua | 2.5% | 1.1% |
| | Maluku | 0.3% | 0.5% |
| | **Total** | **100.0%** | **100.0%** |
| **Occupation** | Student | 28.2% | 39.1% |
| | Private-sector employee | 22.3% | 19.9% |
| | Not employed | 3.9% | 6.5% |
| | Small/medium entrepreneur | 9.3% | 6.4% |
| | Lecturer/Teacher/Researcher | 14.8% | 5.9% |
| | Other | 21.5% | 22.3% |
| | **Total** | **100.0%** | **100.0%** |

The samples show several important compositional differences. The proportion of Gen Z respondents increased substantially, from 32.4% in 2021 to 61.6% in 2026, while the shares of Baby Boomers and Gen X declined. The educational profile also shifted toward respondents with senior high school or vocational education. Similarly, respondents with monthly income below IDR 2 million increased from 35.2% to 52.8%. Geographically, the 2026 sample was more dispersed outside Java: the share of respondents from Java declined from 81.9% to 67.4%, while representation from Kalimantan, Sumatra, and Sulawesi increased. The proportion of students also increased from 28.2% to 39.1%.

These differences are important for interpreting changes between the two surveys. In particular, a change in the mean perception score between 2021 and 2026 may reflect both changing consumer perceptions and differences in the demographic composition of the respondents. The study therefore treats the comparison primarily as descriptive evidence of changing patterns, rather than as evidence of causal change in the Indonesian population as a whole.

### *3.1.1 Measurement*

The measurement of consumer perceptions was grounded in the literature on perceived value, country-of-origin effects, technology-product evaluation, and brand image. Rather than treating the perception of Chinese smartphones as a single undifferentiated construct, the survey examined seven characteristics that capture different dimensions of how consumers evaluate technology products.

The first dimension was *price advantage*, referring to whether Chinese smartphones were perceived as less expensive than comparable products from other countries. Price is an important component of perceived value because consumers evaluate what they receive relative to what they give up financially (Zeithaml, 1988). The second dimension was *added value*, reflecting whether consumers perceived the overall benefits of Chinese smartphones to be high relative to their cost. This is consistent with the multidimensional conceptualization of consumer perceived value, which includes price/value-for-money and quality/performance dimensions (Sweeney & Soutar, 2001).

The third dimension was *innovation*, reflecting consumers' perceptions of the extent to which Chinese smartphones offer innovative products and features. Innovation is particularly relevant in technology markets, where frequent product launches and technological improvements shape consumers' evaluations of brands (Vera-Martínez, 2021). The fourth dimension, *design novelty*, captures whether

consumers perceive the physical and product design of Chinese smartphones as new or distinctive. The fifth dimension, *technological capability*, addresses perceptions of whether Chinese smartphones incorporate advanced technology.

The final two dimensions concern *quality and reliability* and *brand image*. Perceived quality is particularly important because a favorable country-of-origin or brand image does not necessarily translate into purchase preference unless consumers believe that the product can deliver reliable performance (Wibowo et al., 2021). Brand image captures consumers' overall evaluation of the reputation and attractiveness of Chinese smartphone brands and is conceptually distinct from their broader perception of China as a country of origin (Fan, 2019).

Accordingly, the seven statements used in the survey were:

1.) Chinese smartphones are cheaper than similar products from other countries.
2.) Chinese smartphones provide high added value.
3.) Chinese smartphones have a high level of innovation.
4.) Chinese smartphones have novel designs.
5.) Chinese smartphones use advanced technology.
6.) Chinese smartphones are of high quality and reliable.
7.) Chinese smartphones have a good brand image.

Each statement was measured using a five-point Likert scale, ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Likert-type items are commonly used to capture respondents' degree of agreement with evaluative statements, while descriptive statistics such as frequencies and means can be used to summarize response patterns when appropriately applied (Boone & Boone, 2012).

Respondents could also select "do not know." These responses were excluded from the calculation of the mean score for each perception item because respondents who did not have sufficient knowledge to evaluate an attribute should not be treated as neutral respondents. The resulting mean therefore represents the average evaluation among respondents who expressed an opinion about the respective attribute. The underlying response distributions, including the numbers selecting "strongly agree," "agree," "neutral," "disagree," "strongly disagree," and "do not know," were retained for descriptive interpretation.

### *3.1.2 Data Analysis*

The analysis was primarily descriptive and comparative. First, frequencies and percentages were calculated to identify the Chinese smartphone brands used by respondents in each survey year. The resulting brand shares were compared between 2021 and 2026 to identify increases or decreases in the relative prevalence of each brand within the respective survey samples.

Second, mean scores were calculated for each of the seven perception attributes for both survey years. The 2021 and 2026 means were then compared to identify the direction and magnitude of changes in consumer perceptions. An overall perception score was calculated as the average of the seven attribute scores for each survey year. The analysis also examined the underlying response distributions to determine whether the changes in means were consistent with broader shifts in respondents' levels of agreement.

The analysis therefore focuses on three forms of evidence: (1) changes in brand-use shares, (2) changes in the seven perception scores, and (3) changes in the distribution of responses across the five-point scale. These descriptive comparisons are

used to address the research questions concerning brand preference, perceived product characteristics, and changes between 2021 and 2026.

Because the two surveys used independent samples with different demographic compositions, the analysis does not claim that the observed differences represent statistically tested population-level changes or causal effects. Instead, the findings are interpreted in conjunction with the literature on country-of-origin effects, perceived value, brand image, technological innovation, and changing consumer familiarity with Chinese smartphone brands.

### *3.2 Research Findings*

#### *3.2.1 Chinese Smartphone Brands Used by Indonesian Respondents*

The first major finding concerns the changing distribution of Chinese smartphone brands among survey respondents. Xiaomi remained the most frequently used Chinese smartphone brand in both surveys, but the relative position of the brands changed substantially between 2021 and 2026.

In 2021, Xiaomi was reported as the smartphone brand used by 40.7% of valid respondents, followed by vivo (25.2%), OPPO (11.0%), and OnePlus (0.5%). Meanwhile, 22.6% reported that they had never used a Chinese smartphone. In 2026, Xiaomi remained the leading brand at 36.9%, but OPPO became the second most frequently reported brand at 24.8%, followed by vivo at 17.3% and Huawei at 12.9%. The proportion of respondents who had never used a Chinese smartphone declined sharply to 8.1%.

**Table 2. Chinese Smartphone Brands Used by Respondents, 2021 and 2026**

| Brand / Category | 2021 | 2026 | Change (percentage points) |
|---|---|---|---|
| Xiaomi | 40.7% | 36.9% | −3.8 |
| Vivo | 25.2% | 17.3% | −7.9 |
| OPPO | 11.0% | 24.8% | +13.8 |
| Huawei | — | 12.9% | +12.9 |
| OnePlus | 0.5% | — | −0.5 |
| Never used a Chinese smartphone | 22.6% | 8.1% | −14.5 |

*Note. Percentages represent the composition of the respective survey samples and should not be interpreted as national smartphone market shares. The 2021 brand-use figures are based on the reported valid responses, which are fewer than the total survey sample.*

The most notable change was the rise of OPPO, whose share increased by 13.8 percentage points, from 11.0% to 24.8%. In contrast, vivo declined by 7.9 percentage points, from 25.2% to 17.3%. Xiaomi remained the most frequently reported brand, although its share declined modestly by 3.8 percentage points. The reduction in the "never used a Chinese smartphone" category is equally notable. In 2021, almost one in four respondents reported having no experience with Chinese smartphones. By 2026, this proportion had fallen to approximately one in twelve. Within the two survey samples, therefore, Chinese smartphone use appears to have become considerably more widespread and normalized.

This pattern is illustrated in Figure 1. The figure highlights three developments: Xiaomi's continued leading position, the substantial increase in OPPO's share, and the sharp reduction in respondents who had never used a Chinese smartphone.

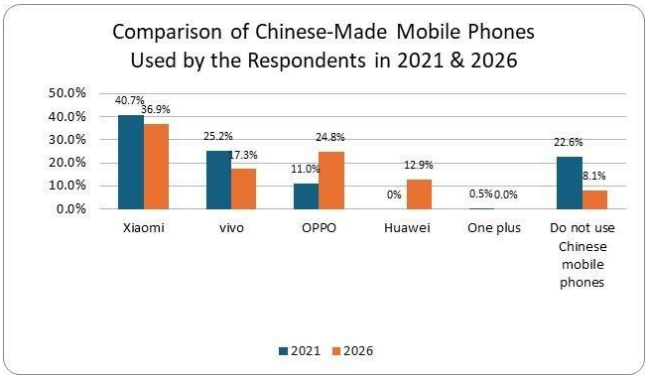



**Figure 1 Comparison of Chiness-made Mobile Phones used by respondents in 2021 & 2026**

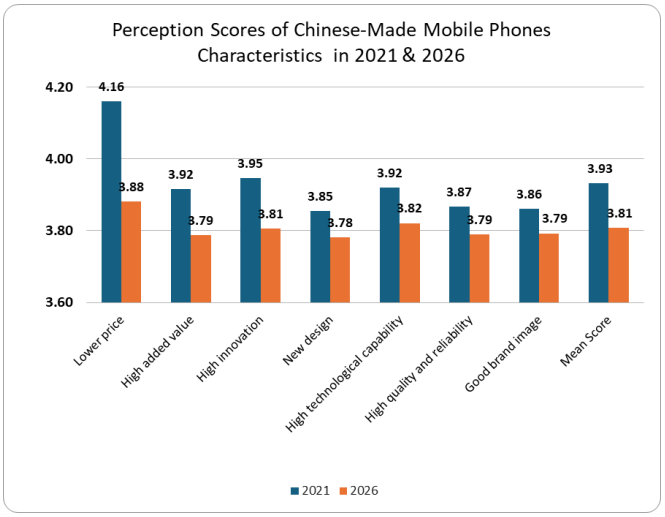



**Figure 2 Perception Scores of Chinese-made Mobile Phones Characteristics in 2021 & 2026**

The survey pattern is broadly consistent with the competitive dynamics observed in the Indonesian smartphone market. Industry data also indicate strong competition among Chinese brands. For example, Counterpoint Research (2026) reported that OPPO maintained the leading position in Indonesian smartphone shipments in the first quarter of 2026, while Xiaomi held a 21% shipment share. However, this external market data should be distinguished from the survey shares reported in Table 2: the former measure national smartphone shipments, whereas the latter measure brand use among the respondents in this study.

### *3.2.2 Perceived Characteristics of Chinese Smartphones*

The second major finding concerns respondents' evaluations of Chinese smartphones across the seven measured attributes. All seven attributes received mean scores above the neutral midpoint of 3.0 in both survey years, indicating that respondents who expressed an opinion generally held positive perceptions of Chinese smartphones. At the same time, the mean score declined for every attribute between 2021 and 2026. The overall perception score decreased from 3.93 to 3.81, a decline of 0.12 points on the five-point scale.

**Table 3. Perceptions of Chinese Smartphone Characteristics, 2021 and 2026**

| Product characteristic | 2021 | 2026 | Change |
|---|---|---|---|
| Lower price than similar products from other countries | 4.16 | 3.88 | −0.28 |
| High added value | 3.92 | 3.79 | −0.13 |

| Product characteristic | 2021 | 2026 | Change |
|---|---|---|---|
| High innovation | 3.95 | 3.81 | −0.14 |
| New design | 3.85 | 3.78 | −0.07 |
| High technological capability | 3.92 | 3.82 | −0.10 |
| High quality and reliability | 3.87 | 3.79 | −0.08 |
| Good brand image | 3.86 | 3.79 | −0.07 |
| **Overall average** | **3.93** | **3.81** | **−0.12** |

The *price advantage* received the highest score in both years. Its mean score, however, declined from 4.16 in 2021 to 3.88 in 2026, representing the largest decline among the seven attributes (−0.28). This suggests that Chinese smartphones continued to be perceived as relatively affordable, but the strength of this perception decreased.

In 2021, *innovation* received the second-highest score (3.95). In 2026, technological capability received a slightly higher score (3.82) than innovation (3.81). This indicates that perceptions of technological capability remained relatively strong even as the overall scores declined. *Design novelty* received the lowest score in both years, although the decline was relatively small, from 3.85 to 3.78. In 2026, it was followed closely by *added value, quality and reliability*, and *brand image*, all scoring 3.79.

Overall, therefore, the results show a combination of continued positive evaluation and moderate weakening of perceived advantage. Chinese smartphones were not negatively evaluated in 2026; rather, respondents remained generally positive while expressing somewhat less favorable evaluations than respondents in 2021.

## 4. Discussion

### *4.1 From "Cheap Chinese Products" to "Accessible Digital Technology"*

The most substantial change in consumer perception concerns *price advantage*. The score for the statement that Chinese smartphones are cheaper than comparable products from other countries declined from 4.16 in 2021 to 3.88 in 2026, the largest decline among the seven attributes. Nevertheless, price remained the highest-rated characteristic in both years.

This combination is important. It suggests that Chinese smartphones continue to be associated with affordability, but their competitive meaning may be changing. Rather than being evaluated primarily as "cheap Chinese products," they increasingly appear to be treated as mainstream technology products whose value must be assessed in relation to technology, innovation, quality, reliability, design, and brand experience. This interpretation is consistent with evidence of declining negative stereotypes toward Chinese smartphone brands in Indonesia (Amrullah & Purnomo, 2023). It also corresponds with the broader transformation of Chinese technology firms, which have increasingly competed through technological capabilities, innovation, product design, and global brand development (Fan, 2011; Liao & Yang, 2023).

The implication is that price remains an important entry point but may be less sufficient as a long-term source of differentiation. As Chinese smartphones become more familiar and competition intensifies, perceived value increasingly depends on the total relationship between price and performance. This represents a shift from a low-price proposition toward a broader value proposition.

### *4.2 The Rise of OPPO and the Fragmentation of Chinese Smartphone Choice*

The substantial increase in OPPO's share—from 11.0% in 2021 to 24.8% in 2026—is another important finding. During the same period, vivo declined from 25.2% to 17.3%, while Xiaomi remained the leading brand, although its share decreased modestly. The available data do not allow a causal explanation for these movements. Nevertheless, the pattern indicates that Indonesian respondents do not treat "Chinese smartphone" as a homogeneous product category.

They distinguish among individual brands.

This finding reinforces the distinction between country image, corporate image, and brand image (Fan, 2019). Country of origin may provide an initial evaluative cue, but repeated consumer experience can make individual brand associations increasingly important. Previous Indonesian research similarly indicates that brand image and perceived quality can play important roles in translating country-of-origin perceptions into purchase intentions (Darmawan et al., 2021; Wibowo et al., 2021).

Thus, competition is increasingly not simply between Chinese and non-Chinese smartphones, but among differentiated Chinese brands. The strategic challenge for Xiaomi, OPPO, vivo, Huawei, and other Chinese manufacturers is consequently to establish distinctive positions and credible brand-specific value rather than relying primarily on the collective reputation of Chinese technology.

### *4.3 From Country-of-Origin Cue to Brand-Experience Heuristic*

The findings also support a broader interpretation of changing consumer evaluation. Country-of-origin research suggests that consumers may use country information as an extrinsic cue, particularly when product information is limited (Verlegh & Steenkamp, 1999). As consumers become more familiar with products and brands, however, direct experience and product-specific information can become increasingly important (Alba & Hutchinson, 1987; Li & Wyer, 1994).

The present findings are consistent with this possibility. By 2026, only 8.1% of respondents reported never having used a Chinese smartphone, compared with 22.6% in 2021. At the same time, respondents continued to evaluate Chinese smartphones positively but somewhat less strongly across all seven attributes. This combination may indicate a process of market normalization. As Chinese smartphones become familiar and mainstream, consumers may rely less on a broad "Made in China" judgment and more on questions such as: Which brand? What technology? How reliable? What experience? And is it worth the price?

The implication is a potential transition from a country-of-origin heuristic toward a brand-experience heuristic. This does not mean that country-of-origin effects disappear. Rather, their influence may increasingly operate together with brand familiarity, perceived quality, and previous consumer experience.

### *4.4 Why Did Perceptions Decline?*

The decline in all seven perception scores requires cautious interpretation because the surveys do not directly measure its causes and were conducted with independent samples. Four explanations nevertheless provide plausible directions for interpreting the pattern.

First, *sample composition changed substantially*. The 2026 survey included a much larger proportion of Gen Z respondents (61.6% versus 32.4% in 2021) and respondents with monthly incomes below IDR 2 million (52.8% versus 35.2%). These differences may influence expectations, purchasing power, technology use, and product evaluation. The observed decline therefore cannot be interpreted as definitive evidence that Indonesian consumers as a whole became less favorable toward Chinese smartphones.

Second, *increasing consumer experience may produce more demanding evaluations*. Consumer expertise changes how individuals process product information and evaluate alternatives (Alba & Hutchinson, 1987). Once Chinese smartphones become familiar, consumers may compare them more closely with competing brands and judge technological features that were once distinctive as increasingly standard.

Third, *competition may raise consumers' reference standards*. Chinese brands increasingly compete not only with Apple and Samsung but also with one another. Greater choice enables consumers to compare price, technology, design, reliability, and brand experience across several brands. Consequently, positive evaluation of one attribute does not necessarily translate into a stronger overall perception.

Fourth, *normalization may reduce the novelty premium*. In an emerging product category, technological advancement may generate strong positive reactions because it exceeds expectations. Once the technology becomes commonplace, the same capability may simply become an expected feature. The decline in perceived innovation from 3.95 to 3.81 can be interpreted in this context.

These explanations should be regarded as interpretive propositions rather than causal findings. Testing them would require longitudinal panel data or multivariate analysis controlling for age, income, education, region, prior smartphone experience, and brand used.

### *4.5 Digital Economy, Human Dignity, and Inclusive Transformation*

The findings have implications beyond smartphone marketing because smartphones increasingly function as gateways to participation in the digital economy. Access to an affordable and capable smartphone can facilitate communication, digital payments, e-commerce, education, employment, information, and social participation. Digital inclusion is therefore not simply a question of owning a device but of having meaningful opportunities to use digital technologies.

This perspective connects digital transformation with *human dignity*. A human-rights-based approach to digital development emphasizes that technology should expand people's capabilities and opportunities rather than reproduce or deepen existing inequalities. UNESCO's (2021) framework for inclusive digital transformation explicitly links digital development with human rights, accessibility, openness, and participation. Similarly, the UN human-rights framework recognizes the growing importance of digital technologies for participation in economic, social, and public life while emphasizing that technological development must remain grounded in human dignity and fundamental rights (UN Human Rights Council, 2021).

From this perspective, affordability matters because high device prices can constitute a barrier to digital participation. However, affordability alone is insufficient. A device contributes to meaningful inclusion only when it also provides adequate performance, reliability, security, usability, and access to relevant digital services. UNESCO's (2024) human-centered approach similarly emphasizes that digital transformation should be accessible and rights-based rather than measured simply by technological diffusion.

The present findings provide an interesting illustration. The proportion of respondents who had never used a Chinese smartphone declined from 22.6% to 8.1%. This suggests greater diffusion of Chinese-made smartphones within the populations represented by the two surveys. However, it should not be interpreted as direct evidence of increased national digital inclusion because the surveys are not nationally representative and their demographic compositions differ. Nevertheless, the continued positive evaluation of Chinese smartphones—with all seven attributes scoring above 3.7 in 2026—suggests that affordability is accompanied by perceptions of technology, innovation, quality, reliability, and brand value. For inclusive transformation, the relevant principle is therefore not simply "the cheapest technology," but "accessible technology that enables meaningful participation."

This distinction is particularly important in emerging Asian economies. The contribution of technology to human dignity depends not only on whether people can acquire devices but also on whether those devices enable them to exercise agency, pursue education and economic opportunities, communicate with others, access information, and participate in social life.

Digital transformation becomes genuinely inclusive when technological progress expands these capabilities without leaving disadvantaged groups behind. UNESCO (2021, 2024) similarly emphasizes that digital technologies can support human development while warning that inequalities in accessibility, skills, and rights protection can reproduce existing social inequalities.

### *4.6 Theoretical Implications*

This study contributes to the literature on country-of-origin and consumer behavior in three related ways. *First*, it reinforces the importance of distinguishing country image from brand image. The substantially different trajectories of Xiaomi, OPPO, vivo, and Huawei suggest that consumers do not treat Chinese smartphones as a homogeneous category. Country of origin may provide an initial cue, but individual brand associations increasingly shape consumer choice.

*Second*, the findings suggest that country-of-origin effects may become less straightforward as products become familiar. The sharp decline in respondents who had never used a Chinese smartphone provides contextual evidence of increasing familiarity within the survey samples. As direct experience accumulates, consumers may rely increasingly on perceived quality, technological performance, reliability, and brand experience rather than on country-of-origin information alone. This is consistent with research showing that consumer expertise and product knowledge influence the way country-of-origin information is processed (Alba & Hutchinson, 1987; Li & Wyer, 1994).

Third, the findings point toward a possible shift from a country-of-origin heuristic to a brand-experience heuristic. The question facing consumers may increasingly be not "Is this a Chinese smartphone?" but "Which Chinese brand offers the value and experience I want?" This does not imply that country-of-origin effects disappear. Rather, their relative importance may decline as Chinese brands become more established and consumers become more capable of evaluating them on product- and brand-specific attributes.

The study therefore suggests that the internationalization of Chinese technology brands should be understood not simply as the expansion of products from one country into foreign markets, but as a process through which country-based perceptions are progressively transformed into brand-based consumer relationships. This provides an important direction for future research on the evolution of Chinese brands in Indonesia and other emerging Asian markets.

### *4.7 Managerial Implications*

The findings suggest that Chinese smartphone manufacturers in Indonesia should gradually move beyond a predominantly low-price positioning. Price remains the strongest perceived attribute, but its score declined by 0.28 points between 2021 and 2026. Marketing communication should therefore emphasize *value for money*, integrating affordability with performance, technology, design, durability, and service. The substantial differences in brand shares also indicate the importance of *brand-level differentiation*: Xiaomi, OPPO, vivo, Huawei, and other Chinese brands should communicate distinctive identities and value propositions rather than relying on a generic "Chinese technology" image. Because quality and reliability remain central to consumer evaluation, companies should strengthen after-sales service, warranty coverage, software support, repair networks, data protection, and transparent communication, thereby reducing consumer uncertainty and building brand-specific trust.

The large proportion of Gen Z respondents in the 2026 sample also suggests that younger consumers deserve increasing strategic attention, although the sample cannot be treated as nationally representative; communication for this segment can connect smartphones with creativity, content creation, education, gaming, entrepreneurship, and lifestyle. Finally, as smartphones increasingly function as gateways to broader digital services, Chinese

manufacturers have an opportunity to compete through ecosystems rather than devices alone, integrating hardware with applications, cloud services, artificial intelligence, entertainment, financial services, and other digital experiences. The strategic trajectory is therefore from price competition to value competition to brand and ecosystem competition.

## 5. Conclusion

This study examined Indonesian consumers' changing perceptions and use of Chinese-made smartphones by comparing surveys conducted in 2021 and 2026. Three main findings emerge. First, Chinese smartphone brands became more widely used within the two survey samples, with the proportion of respondents who had never used a Chinese smartphone declining from 22.6% to 8.1%. Xiaomi remained the most frequently reported brand, while OPPO experienced substantial growth. Second, perceptions of Chinese smartphones remained positive across all seven measured attributes, but the overall perception score declined from 3.93 to 3.81. The largest decline occurred in perceived price advantage, suggesting that Chinese smartphones may be moving from a primarily low-price positioning toward broader competition based on value, technology, quality, reliability, and brand experience. Third, the findings suggest a possible shift from country-of-origin-based evaluation toward more brand- and experience-based evaluation as Chinese smartphones become increasingly familiar and mainstream.

These findings have implications beyond marketing. As smartphones increasingly function as gateways to education, employment, financial services, commerce, and social participation, their affordability and quality can contribute to inclusive digital transformation. However, affordability alone does not guarantee meaningful digital inclusion. Technology contributes to inclusion when it is sufficiently reliable, capable, secure, and accessible to enable people to participate meaningfully in economic and social life. In this sense, the evolution of Chinese smartphone brands illustrates how market competition and technological diffusion can potentially contribute to broader digital participation in Asia.

The study has several limitations. First, the 2021 and 2026 surveys used independent cross-sectional samples rather than the same respondents; therefore, the observed differences cannot be interpreted as individual-level longitudinal change. Second, the demographic composition of the two samples differed substantially, particularly in age, income, education, and geographical distribution. Third, the survey measured general perceptions of Chinese smartphones rather than perceptions of individual brands, limiting the ability to explain why consumers chose Xiaomi, OPPO, vivo, Huawei, or other brands. Finally, the descriptive design does not establish causal relationships between country-of-origin perceptions, brand image, perceived value, and brand choice.

Future research should employ longitudinal or panel designs to examine how individual consumer perceptions evolve over time. It should also compare consumers of specific Chinese brands and examine how country image, brand image, perceived quality, perceived value, trust, and purchase intention interact. Multivariate analysis could further test whether age, income, technological involvement, prior experience, and consumer knowledge moderate country-of-origin effects. Qualitative research could complement these approaches by exploring how Indonesian consumers interpret the changing meaning of "Chinese technology." Finally, comparative research across Indonesia and other Asian markets would help determine whether the transition from price-based competition to value-, brand-, and experience-based competition represents a broader pattern in the internationalization of Chinese technology brands.

The future of Chinese smartphone brands in Indonesia will depend not simply on how cheaply they can sell technology, but on how effectively they can turn affordability, innovation, quality, and trust into meaningful opportunities for people to participate in the digital economy.

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# DIGITAL LITERACY GAP (EXCEL) AMONG GENERATION Z STUDENTS IN FACING DIGITAL TRANSFORMATION TOWARD THE WORLD OF WORK IN MAKASSAR

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***Abstract***
*The rapid growth of digital transformation has resulted in changing competency requirements in the workplace, particularly regarding the effective use of digital technologies. One of the digital skills that continues to be relevant and applicable across different sectors is proficiency in spreadsheet applications, particularly Microsoft Excel. Nevertheless, Generation Z students may have different levels of digital competency, including their ability to use Excel for academic and work-related purposes. This study examines variations in Excel proficiency among Generation Z students in Makassar and investigates how these skills contribute to their preparedness for entering the workforce. A quantitative research design was employed, involving 150 students from several higher education institutions in Makassar. Data were obtained through a structured questionnaire measuring students' Excel proficiency, self-confidence, and level of work readiness. The collected data were subsequently analyzed using descriptive statistical analysis and multiple linear regression. The findings indicate that students demonstrate varying levels of Excel proficiency, particularly when performing more advanced tasks involving data analysis, pivot tables, and the use of formulas. Furthermore, both Excel proficiency and self-confidence have a positive and statistically significant relationship with students' work readiness. Students who possess stronger digital technology competencies and greater confidence in applying those competencies tend to demonstrate better preparation for entering and adapting to the demands of the digital workplace.*
***Keywords:*** *digital literacy, Microsoft Excel, Generation Z, work readiness, digital transformation.*

## 1. Introduction

The continuous advancement of digital technology has created new demands for individuals to adapt to rapid changes, particularly within the fields of education and employment. The effectiveness and competitiveness of an organization or company are strongly influenced by its ability to manage and utilize available resources, especially human resources who possess relevant digital competencies. Within the ongoing process of digital transformation, human resources play an important role in organizational operations because the quality of employees can directly affect productivity and competitiveness. For this reason, students as future members of the workforce need to develop sufficient digital competencies to compete in an increasingly demanding labor market. One of the fundamental competencies required in many work environments is the ability to operate data-processing software, including Microsoft Excel.

Digital literacy can be understood as an individual's capacity to access, comprehend, utilize, and manage information through digital technologies in an effective manner. For students, this competency is particularly important because it can contribute to their preparation for entering the workforce. As members of Generation Z who have grown up alongside digital technology, students are generally expected to possess adequate levels of digital literacy. Nevertheless, the actual level of digital competence among students is not necessarily uniform, especially when it comes to the practical use of Microsoft Excel. Differences in Excel proficiency suggest that students do not have identical capabilities in applying digital technology, which may subsequently influence their preparedness for professional work. Digital literacy is particularly relevant to work readiness because many workplace activities require employees to process information, manage data, and complete tasks accurately and efficiently.

Apart from digital competence, students' work readiness may also be influenced by their learning experiences and opportunities to interact with technology. Access to appropriate technological resources can provide students with greater opportunities to develop and practice their

digital abilities. Similarly, learning activities that incorporate technology can strengthen students' practical understanding of various digital applications. However, differences in access to technological resources and learning experiences may result in unequal levels of digital competency among students. This condition is important to consider because limited opportunities to develop digital skills may affect students' ability to adapt to the demands of a technology-oriented workplace.

The educational environment also has an important role in strengthening students' digital literacy. The availability of technological infrastructure, opportunities for practical learning, and academic support from lecturers can encourage students to develop greater competence in using digital tools. In contrast, an inadequate learning environment may restrict students' opportunities to practice and improve their technological abilities. A supportive and comfortable academic environment can also increase students' motivation and confidence to engage actively in technology-based learning activities.

Based on these considerations, digital competence, particularly the ability to use Microsoft Excel, represents an important component of the skills needed by Generation Z students to prepare for employment. Despite the increasing importance of digital technology, differences in students' levels of digital proficiency remain evident and require further investigation. Therefore, this study focuses on examining variations in Microsoft Excel proficiency as an element of digital literacy among Generation Z students in Makassar as they prepare to enter an increasingly digitalized workplace. Furthermore, this research seeks to examine the extent to which digital literacy competence contributes to students' work readiness.

## 2. Literature Review

### *2.1 Digital Literacy*

Belshaw (2011), in his thesis, stated that digital literacy is not merely about technical skills but also involves eight main elements, namely:

1.) Cultural
2.) Cognitive
3.) Constructive
4.) Communicative
5.) Confident
6.) Creative
7.) Critical
8.) Civic

### *2.2 Digital Transformation*

According to Gregory Vial (2019), digital transformation refers to the use of digital technologies that leads to significant changes in the way businesses operate, as well as changes in business structures and organizations. The following are indicators of digital transformation according to Gregory Vial (2019) that are commonly used in research:

1.) Technology Use
2.) Organizational Structure Changes
3.) Business Value Creation
4.) Organizational Performance

## 3. Hypotheses

### *3.1 The Effect of Digital Literacy (Microsoft Excel) on Students' Work Readiness*

Students' preparedness to enter the workforce can be influenced by their ability to utilize technology effectively. Digital literacy represents the competence required to operate and apply digital technologies appropriately in completing various activities and work-related tasks. Students who demonstrate a strong ability to use Microsoft Excel are likely to have greater preparation for entering the professional environment. Competence in using digital applications enables students to perform tasks more efficiently, accurately, and systematically.

Microsoft Excel proficiency, including the ability to organize data, apply formulas, and conduct basic data analysis, has become increasingly relevant to the demands of modern

workplaces. Students who possess adequate knowledge and skills in utilizing digital technologies are generally more capable of adapting to work environments that rely on digital systems. Conversely, insufficient digital literacy may create difficulties in completing technology-based tasks and consequently reduce students' level of work readiness.

Previous research has also indicated that digital technology competence is positively associated with an individual's readiness to enter the workforce. Students who possess sufficient digital skills tend to demonstrate better adaptability when facing work environments that increasingly utilize digital technologies.

**H1: Microsoft Excel-based digital literacy has a positive and significant effect on the work readiness of Generation Z students in Makassar.**

### *3.2 The Effect of Technology Access on Digital Literacy*

Access to technological resources is another factor that may contribute to the development of students' digital competencies. Technology access refers to the availability and ease of use of digital devices and supporting resources, including computers, laptops, and internet connections. Students who have sufficient opportunities to access and utilize technology are more likely to develop their digital literacy through continuous practice and interaction with various digital applications.

Adequate access to technology provides students with greater opportunities to explore and improve their ability to use digital tools, including Microsoft Excel. Regular exposure to technological devices can help students become more familiar with different features and functions, allowing them to develop their skills more effectively. In contrast, inadequate access to technological resources may limit students' opportunities to practice and understand digital applications, which can subsequently affect the development of their digital competencies.

Previous research has suggested that access to technological resources plays an important role in supporting individuals' ability to understand and utilize digital technology. Greater access provides more opportunities for students to engage with digital tools and develop the skills required in technology-oriented environments.

**H2: Technology access has a positive and significant effect on the Microsoft Excel-based digital literacy of Generation Z students in Makassar.**

### *3.3 The Effect of the Learning Environment on Digital Literacy*

The learning environment is another important factor that may contribute to the development of students' digital literacy. It encompasses various conditions surrounding the learning process, including the availability of technological facilities, instructional approaches, and support provided by lecturers. A learning environment that provides adequate resources and encouragement can create opportunities for students to become more familiar with digital technologies and develop their technological competencies.

The availability of appropriate technological facilities allows students to practice using digital applications more frequently. In addition, learning methods that involve technology-based activities can provide students with practical experience in applying digital tools. Guidance and assistance from lecturers can further support students when they encounter difficulties in using technology. On the other hand, limited facilities, less effective teaching methods, or insufficient academic support may restrict students' opportunities to develop their digital skills. A comfortable and supportive learning atmosphere can also increase students' motivation and willingness to actively participate in technology-based learning activities.

Previous studies have demonstrated that a positive learning environment can contribute to the development of students' digital competencies. Adequate facilities, effective learning practices, and appropriate academic support provide students with better opportunities to improve their ability to use digital technology.

**H3: The learning environment has a positive and significant effect on the digital literacy of Generation Z students in Makassar.**

## 4. Research Methodology

This research was carried out in Makassar and involved Generation Z students studying at various higher education institutions. The primary purpose of the study was to examine differences in students' digital technology competencies, particularly their ability to use Microsoft Excel, and to assess the extent to which these competencies are related to their preparedness for entering a workplace that increasingly relies on digital technology.

The respondents in this study were university students who met the predetermined selection criteria. A total of 150 students were involved as research participants. The respondents were selected using a purposive sampling technique, in which participants were chosen according to specific characteristics considered relevant to the research objectives.

Several methods were employed to collect the required data, namely observation, interviews, documentation, and questionnaires. Among these methods, the questionnaire functioned as the main data collection instrument. It was designed to obtain information regarding students' Microsoft Excel proficiency, access to technological resources, perceptions of the learning environment, and level of work readiness.

## 5. Results And Discussion

### *5.1 Research Instrument Testing*

#### *5.1.1 Validity Test*

**Tabel 1**
**Results of the Instrumen Validity Test**

| Statemant | *Pearson Correlation* | Standartd | Desc. |
|---|---|---|---|
| **Literasi Digital(X)** | | | |
| X1.1 | 0,634 | 0,30 | Valid |
| X1.2 | 0,696 | | Valid |
| X1.3 | 0,642 | | Valid |
| X1.4 | 0,684 | | Valid |
| X1.5 | 0,445 | | Valid |
| X1.6 | 0,564 | | Valid |
| X1.7 | 0,663 | | Valid |
| X1.8 | 0,620 | | Valid |
| X1.9 | 0,739 | | Valid |
| X1.10 | 0,639 | | Valid |
| X1.11 | 0,685 | | Valid |
| X1.12 | 0,739 | | Valid |
| X1.13 | 0,601 | | Valid |
| X1.14 | 0,712 | | Valid |
| X1.15 | 0,688 | | Valid |
| X1.16 | 0,554 | | Valid |
| **Transformasi Digital (Y)** | | | |
| Y1.1 | 0,722 | 0,30 | Valid |
| Y1.2 | 0,669 | | Valid |
| Y1.3 | 0,728 | | Valid |
| Y1.4 | 0,716 | | Valid |
| Y1.5 | 0,667 | | Valid |
| Y1.6 | 0,696 | | Valid |
| Y1.7 | 0,658 | | Valid |
| Y1.8 | 0,640 | | Valid |

Source: Processed Data, 2026

Based on Table 1, all instrument correlation coefficient values are above 0.30. This indicates that all questionnaire instruments used for data collection are valid.

### *5.1.2 Reability Test*

**Tabel 2**
**Result of the Instrumen Reliability test**

| *Variabeil* | *Total Number of Instruments.* | *Cronbach's Alpha* | *Standartd* | *Desc.* |
|---|---|---|---|---|
| *Literasi Digital (X)* | *16* | *0,940* | *0,60* | *Reiliabeil* |
| *Transformasi Digital (Y)* | *8* | *0,939* | | *Reiliabeil* |

### *5.2 Data Analysis Results*

To examine the relationships among digital literacy, technology access, learning environment, and students' preparedness in the digital era, statistical analyses were conducted using **SPSS Version 25 for Windows**. The analytical procedures included regression analysis, the simultaneous **F-test**, the partial **t-test**, and the coefficient of determination.

### *5.2.1 Regression Analysis*

The regression analysis was conducted to determine the direction and magnitude of the relationship between the variables included in the research model. Based on the SPSS output, the regression equation obtained was:

$$\mathbf{Y = 6.097 + 0.423X}$$

The constant value of **6.097** indicates that when the digital literacy variable is assumed to remain constant, the predicted value of the dependent variable is 6.097. Meanwhile, the regression coefficient of **0.423** indicates that every one-unit increase in digital literacy is associated with an estimated increase of 0.423 units in the dependent variable.

The positive value of the regression coefficient demonstrates that the relationship between digital literacy and the dependent variable is positive. In other words, improvements in students' digital literacy tend to be accompanied by improvements in the dependent variable.

### *5.2.2 Coefficient of Determination*

The coefficient of determination was examined using the **Adjusted R Square** value obtained from the Model Summary. The analysis produced an Adjusted R Square value of **0.622**. This result indicates that approximately **62.2%** of the variation in the dependent variable can be explained by digital literacy, whereas the remaining **37.8%** may be attributed to other variables that were not included in the research model.

The relatively large coefficient of determination suggests that digital literacy represents an important factor in explaining variations in the dependent variable.

### *5.2.3 Simultaneous F-Test*

The significance of the regression model was further examined using the **F-test**. The ANOVA results show an F-value of **254.568** with a significance value of **0.000**. Since the significance value is lower than the 0.05 threshold, the regression model is statistically significant.

These findings indicate that the independent variable included in the model has a statistically significant relationship with the dependent variable. Thus, the proposed relationship represented in the regression model is supported by the statistical results.

#### *5.2.4 Partial t-Test*

The partial effect of digital literacy was evaluated using the **t-test**. The analysis produced a t-value of **15.955**, a regression coefficient of **0.423**, and a significance value of **0.000**. Because the significance value is below 0.05, digital literacy has a statistically significant effect on the dependent variable.

The positive regression coefficient further indicates that the effect is in a positive direction. Therefore, the hypothesis proposing a positive relationship between digital literacy and the dependent variable is supported.

#### *5.2.5 The Effect of Digital Literacy on Students' Work Readiness*

The statistical findings demonstrate that digital literacy has a positive and significant relationship with students' work readiness. The regression coefficient of **0.423** and significance value of **0.000** indicate that students with stronger digital competencies tend to demonstrate a higher level of preparedness for entering the workforce. Therefore, **H1 is accepted**.

Digital literacy encompasses the ability to access, understand, evaluate, and utilize digital information and technology appropriately. In the context of higher education and employment, these competencies are increasingly important because many professional activities involve digital systems and applications.

Students who possess adequate digital skills are generally better able to perform technology-related tasks, process information, and adapt to changes in the workplace. In particular, proficiency in applications such as Microsoft Excel can support students in organizing information, processing data, applying formulas, and conducting basic analyses. These abilities can contribute to more efficient and accurate task completion.

The development of digital workplaces also requires individuals to adapt not only to new technological tools but also to changes in working procedures and patterns of collaboration. Consequently, digital literacy can serve as an important foundation for students preparing to enter employment. Students who are confident in applying digital technology may have greater ability to respond to technology-based tasks and workplace demands.

The results of this study support the argument that stronger digital competencies can contribute to greater work readiness. As students become more capable of using digital technology, they may become better prepared to perform tasks and adapt to the requirements of an increasingly digital labor market.

#### *5.2.6 The Effect of Technology Access on Digital Literacy*

The findings indicate that technology access has a positive and significant contribution to students' digital literacy. This result suggests that students who have greater access to digital devices and technological resources have more opportunities to develop their digital competencies. Therefore, **H2 is accepted**.

Technology access includes the availability and usability of resources such as computers, laptops, smartphones, and internet connectivity. These resources provide students with opportunities to interact with digital applications, search for information, complete academic activities, and practice various technology-related skills.

Regular exposure to digital technology can increase students' familiarity with technological tools. For example, students who have consistent access to computers and software applications have more opportunities to practice Microsoft Excel functions and develop their ability to process and analyze data.

In contrast, limited access may restrict students' opportunities to practice digital skills. Students who experience difficulties in obtaining or using technological resources may have fewer opportunities to explore digital applications and develop their competencies. Thus, technology access can be regarded as one of the supporting conditions for the development of students' digital literacy.

The findings are consistent with previous research suggesting that access to technological resources contributes to the development of digital competencies. Greater

access provides students with more frequent opportunities to use technology and consequently strengthen their digital skills.

#### *5.2.7 The Effect of the Learning Environment on Digital Literacy*

The results further demonstrate that the learning environment has a positive and significant effect on students' digital literacy. This finding indicates that a more supportive academic environment is associated with stronger digital competencies. Consequently, **H3 is accepted**.

The learning environment encompasses various conditions that support students during the learning process, including technological facilities, instructional methods, and interactions between lecturers and students. An environment that provides adequate technological resources and opportunities for practical learning can encourage students to become more actively involved in developing their digital competencies.

The availability of appropriate facilities allows students to practice using digital applications in academic activities. At the same time, technology-oriented teaching methods can provide students with practical experience in applying digital tools. Support and guidance from lecturers can also help students overcome difficulties encountered when learning to use technology.

A comfortable and supportive learning atmosphere may further strengthen students' motivation to participate in learning activities. Students who feel supported are more likely to practice and explore digital technologies, which can gradually improve their level of digital literacy.

Therefore, the findings suggest that the development of digital literacy is influenced not only by students' individual abilities but also by the learning conditions in which those abilities are developed. A supportive learning environment can provide students with the facilities, experience, and guidance required to strengthen their digital competencies.

Overall, the results support previous findings that a conducive learning environment can positively contribute to students' digital literacy. The combination of adequate facilities, practical learning experiences, effective teaching strategies, and lecturer support can create better conditions for students to develop the digital skills required in contemporary education and employment.

## 6. Conclusion and Limitations

### *6.1 Conclusion*

Based on the findings and discussion presented in this study, several conclusions can be formulated as follows:

#### *6.1.1 Technology access has a positive and significant effect on digital literacy*

This finding indicates that students who have greater availability and easier access to technological devices and digital resources tend to demonstrate better digital competencies. Adequate access provides students with more opportunities to use, explore, and practice various digital technologies.

#### *6.1.2 The learning environment has a positive and significant effect on digital literacy*

A supportive learning environment, including adequate technological facilities, appropriate learning methods, and lecturer support, can provide students with better opportunities to develop their digital skills. Therefore, improvements in the learning environment are likely to contribute to higher levels of digital literacy.

#### *6.1.3 Digital literacy has a positive and significant effect on digital transformation*

This result demonstrates that individuals with stronger digital competencies are better able to utilize technology and adapt to changes associated with digital transformation. Higher levels of digital literacy can therefore support more effective implementation and adaptation to technology-based processes.

### *6.2 Limitations*

The coefficient of determination indicates that technology access, the learning environment, and digital literacy contribute to variations in the digital transformation process. Nevertheless, other factors may also play a role in explaining digital transformation that were not examined in this study. Therefore, future researchers are encouraged to incorporate additional variables to obtain a more comprehensive understanding of the factors associated with digital transformation.

Furthermore, the participants in this study were drawn from students studying in various faculties within Makassar City. Although this provides representation from different academic backgrounds, the geographical coverage of the research remains relatively narrow. Future research could expand the study area by involving respondents from several cities, regions, or provinces. A broader geographical scope may provide more diverse findings and increase the potential generalizability of the research results across different educational and regional contexts.

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# BUDGET ABSORPTION OF THE HEALTH OPERATIONAL ASSISTANCE FUND (BOK) AND ITS IMPLEMENTATION PROBLEMS IN PRIMARY HEALTH CARE SERVICES (A STUDY AT UPTD PUSKESMAS SINDANG, INDRAMAYU REGENCY, 2021-2025)

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***Abstract***
*This study analyzes budget absorption of the Health Operational Assistance Fund (BOK) and its implementation problems in primary health care services at UPTD Puskesmas Sindang, Indramayu Regency. It is motivated by the low and fluctuating BOK budget absorption at Puskesmas Sindang during 2021-2025, which still leaves a considerable gap between the allocated budget ceiling and its realization. This research employs a qualitative approach with a case study design and an interpretive paradigm. Data were collected through in-depth interviews with 11 key informants, comprising Puskesmas staff, a Health Office verifier, posyandu cadres, and community members, then analyzed using NVivo 12 Pro through coding, theme development, and data visualization. Results show that BOK budget absorption is influenced by six main themes: planning, organizing, implementation, supervision, supporting factors, and inhibiting factors. Fluctuations in absorption have contributed to the failure to meet most Minimum Service Standard (MSS) health indicators in the Puskesmas Sindang working area. This study confirms that the BOK absorption problem is systemic, rooted in weak public financial accountability at the street-level bureaucracy, requiring stronger planning, human resource capacity, and reporting mechanisms so that budget absorption can be more optimal and improve the quality of primary health care.*
**Keywords**: *Budget Absorption, Health Operational Assistance Fund (BOK), Qualitative Case Study, NVivo.*

## 1. Introduction

Health care is one of the most strategic forms of public service, as it has been shown to support the achievement of major development targets such as the Sustainable Development Goals (SDGs) and Universal Health Coverage (UHC) (Chotchoungchatchai et al., 2020). According to the World Health Organization (2025), most global health targets can be achieved through strengthening primary health care. In Indonesia, the Community Health Center (Puskesmas) serves as the spearhead of health services for the community, as it provides promotive, preventive, curative, and rehabilitative services at the level closest to the community (Solikha et al., 2025). Therefore, the existence and performance of Puskesmas greatly determine the success of achieving national health targets.

Since 2010, the government has launched the Health Operational Assistance Fund (Bantuan Operasional Kesehatan/BOK) program. The BOK fund is a Non-Physical Special Allocation Fund (Dana Alokasi Khusus/DAK) grant in the health sector, used to finance the operational expenditure of national priority programs for District/City Health Offices and Puskesmas as implementers of health programs, in accordance with prevailing laws and regulations. The national priority programs financed through BOK cover six main activity categories, ranging from improving public health services across the life cycle to strengthening Puskesmas management (Regulation of the Minister of Health No. 42 of 2022). To ensure these programs run effectively, BOK management must be accurate and measurable in terms of financial accountability, since effectiveness can be seen from the extent to which program targets are achieved, how optimally funds are absorbed, and the timeliness of implementation (Manu et al., 2022).

Under Regulation of the Minister of Health No. 37 of 2023, realization reports are a key requirement for fund disbursement at every stage. Second-stage disbursement can only occur once first-stage realization has been submitted and verified, and the same applies to subsequent stages. This provision makes reporting discipline a determining factor for the smooth cash flow of BOK funds at Puskesmas. Within the fiscal policy framework, BOK management is governed by a series of strict regulations, ranging from Law No. 1 of 2022 on Fiscal Relations between the Central and Regional Governments to Regulation of the Minister of Health No. 42 of 2022. However, the complexity of these regulations often becomes an obstacle for Puskesmas in absorbing and accounting for funds in a timely manner, creating a gap between the allocated budget ceiling and the realization achieved (Adiwijaya et al., 2025).

Since its inception, BOK has faced challenges in the form of many regions being unable to optimally absorb the funds. Although the total BOK budget has continued to increase from IDR 6.6 trillion in 2017 to IDR 12.6 trillion in 2023, the national absorption rate has only ranged around 70%, even falling to 50% in 2021 due to activity restrictions during the Covid-19 pandemic. West Java Province recorded the largest BOK budget ceiling nationally in 2024 and managed to realize around 90.9% of that ceiling, far above the national average absorption rate of 70.3%-73.7%.

A markedly different picture emerges when the actual conditions at UPTD Puskesmas Sindang, Indramayu Regency, are examined more closely. In 2021, the absorption rate reached only 11.19% of the total budget ceiling of IDR 537,789,000, with a realization of IDR 60,154,000 a condition reflecting serious public financial accountability problems. In subsequent years absorption showed an improving trend, yet still left a considerable gap between the allocated ceiling and realized funds, as presented in Table 1.

**Table 1 Budget Ceiling, Realization, and Percentage of BOK Fund Absorption at UPTD Puskesmas Sindang, 2021-2025**

| Year | Budget Ceiling (IDR) | Realization (IDR) | Percentage |
|---|---|---|---|
| 2021 | 537.789.000 | 60.154.000 | 11,19% |
| 2022 | 506.631.304 | 178.715.326 | 35,28% |
| 2023 | 288.396.000 | 126.770.155 | 43,96% |
| 2024 | 401.220.000 | 289.639.578 | 72,19% |
| 2025 | 283.938.000 | 204.002.520 | 71,85% |

Source: Data processed from UPTD Puskesmas Sindang (2025)

Overall, the data show that BOK fund absorption at Puskesmas Sindang fluctuated from year to year. This fluctuation indicates that BOK fund management at the Puskesmas level still faces various challenges that need to be examined more deeply, given that factors such as program planning, human resource capacity, inter-program coordination, and administrative and reporting mechanisms are presumed to influence the level of budget absorption.

Low and disproportionate absorption also affects the achievement of priority health programs. Based on the cumulative performance report of Puskesmas Sindang up to December 2025, of the 12 Minimum Service Standard (MSS) indicators in the health sector, nine had not yet reached the 100% target, such as health services for pregnant women, women giving birth, newborns, and the productive age and elderly population groups. Failure to reach the targets in these sectors indicates obstacles in mobilizing outreach services as well as the potential under-absorption of BOK funds that should have been used for tracing and screening target populations, in line with the findings of Shaleh et al. (2020) that obstacles to financing policy implementation at the regional level are often caused by regulations that do not yet fully accommodate local conditions and needs.

Based on the description above, this research is important to comprehensively analyze the absorption of the BOK budget and the problems associated with its implementation in primary health care services at UPTD Puskesmas Sindang. Specifically, this study aims to: (1) analyze the absorption of the BOK budget at UPTD Puskesmas Sindang based on budget ceiling and realization data for 2021-2025; (2) identify the administrative constraints, human resource capacity, and reporting mechanisms that hinder the accountability of BOK fund management; and (3) evaluate

the impact of fluctuations in fund absorption on the implementation of priority health programs in the working area of UPTD Puskesmas Sindang.

## 2. Literature Review

### *2.1 Health Operational Assistance Fund (BOK)*

The Health Operational Assistance Fund (BOK) was first launched by the central government in mid-2010 as operational financing support to enable Puskesmas to carry out promotive and preventive health efforts more optimally. In subsequent regulatory developments, BOK's status was formally established as part of the Non-Physical Special Allocation Fund (DAK Non Fisik) in the health sector, as regulated under Regulation of the Minister of Finance No. 204/PMK.07/2022 and Regulation of the Minister of Health No. 42 of 2022. Since 2023, the Ministry of Health has implemented a direct-disbursement mechanism, whereby BOK funds for Puskesmas are transferred directly from the Central Government to the Puskesmas bank account in three stages (30%, 40%, and 30%), based on approval of the Puskesmas Work and Budget Plan (RKAP) and periodically uploaded realization reports. This mechanism is designed to simplify the bureaucratic chain while enhancing accountability and transparency in fund management at the Puskesmas level.

### *2.2 Budget Absorption*

In public sector financial management, the budget ceiling is the maximum limit of fund allocation set for a program in a given fiscal year, while budget realization is the amount of funds actually disbursed and used for their intended purpose. Budget absorption is the ratio between realization and the set ceiling, and is commonly used as a performance indicator for the financial management of government agencies. The level of budget absorption is influenced by various factors, including the accuracy and maturity of activity planning, the timeliness of fund disbursement, the readiness of administrative documents, the capacity of financial management human resources, and the complexity of the procedures and regulations that must be complied with. Mature planning has been shown to contribute significantly to the effectiveness of budget absorption (Oktaliza et al., 2020).

### *2.3 Previous Research*

Several prior studies have examined topics related to fiscal decentralization, health financing, and BOK fund management, as summarized in Table 2.

**Table 2 Summary of Previous Research**

| Author (Year) | Research Focus | Difference from This Study | Key Findings |
|---|---|---|---|
| Christia & Ispriyarso (2019) | Fiscal decentralization as the basis for regional financing | A juridical-normative study at the national level, not specific to BOK | Fiscal decentralization in Indonesia is not yet regulated under a dedicated law |
| Desmita et al. (2022) | Management of health funds based on central regulation at primary care facilities | Object of study is JKN capitation funds, not BOK | Fund management is influenced by regional regulatory readiness and HR capacity |
| Noviani & Gani (2024) | Evaluation of BOK direct-disbursement budget absorption at Puskesmas | Formative evaluation method in Depok City, not a single case study | Absorption improved, but disbursement timeliness remains a constraint |
| Ponno et al. (2024) | BOK fund management at Puskesmas using a qualitative approach | Located in a mountainous geographic context | Main constraints occur at the planning stage and in access to the Health Office |

Source: Compiled from the literature review (2025)

Unlike these previous studies, this research combines quantitative analysis of budget ceiling and realization data over five years (2021-2025) with a qualitative thematic analysis based on NVivo at a single Puskesmas unit, thereby providing a more comprehensive picture of the pattern of budget absorption as well as the root causes of implementation problems from the perspective of actors in the field.

## 3. Research Methods

### *3.1 Research Type and Design*

This study employs a qualitative approach with a case study design. The qualitative approach was chosen because this research aims to gain an in-depth understanding of the processes, meanings, and experiences of the factors involved in managing BOK funds at UPTD Puskesmas Sindang. A case study design was used because the phenomenon under study fluctuations in BOK budget absorption is a contemporary phenomenon whose boundaries cannot be clearly separated from the real-life context in which it occurs (Yin, 2018). This research adopts an interpretive paradigm, in which the reality of BOK budget absorption is understood as a social construction shaped by the interaction between regulations, fund management actors, and the organizational context of the Puskesmas. Data management and analysis were carried out with the help of NVivo 12 Pro software to enhance the systematics of the coding process and auditability.

### *3.2 Research Subjects*

Research subjects were determined using purposive sampling, namely the deliberate selection of informants based on their direct involvement in the planning, management, implementation, supervision, and utilization of BOK funds. Where additional data were required, the researcher used snowball sampling. The number of informants followed the principle of data saturation, whereby data collection was stopped once recurring patterns emerged. This study involved 11 key informants, consisting of six UPTD Puskesmas Sindang staff members (the Head of Puskesmas, the financial management officer/PPTK, the treasurer, and program holders), one verifier from the Indramayu District Health Office, two posyandu cadres, and two community members within the Puskesmas working area.

### *3.3 Data Collection Techniques*

Data were collected through three techniques used simultaneously to enable triangulation of sources and methods. First, semi-structured in-depth interviews, using an interview guide while still allowing informants the freedom to explain their experiences openly. Second, non-participatory direct observation of the processes of activity planning, financial administration, preparation of accountability reports (SPJ), and the implementation of field activities funded by BOK. Third, documentation study of planning documents (RUK, RPK, RBA), BOK budget realization reports for 2021-2025, SPJ, and Puskesmas Sindang MSS achievement reports.

### *3.4 Data Analysis Tecniques*

Qualitative data analysis was conducted inductively and continuously, following three stages (Sugiyono, 2018). First, data reduction, namely transcription of interview results and recapitulation of observations and documentation, which were then coded using NVivo 12 Pro. Second, data display, namely grouping the coding results into themes and sub-themes visualized in the form of a mind map and a hierarchy (sunburst) chart. The coding results showed that all data were grouped under a single central theme (parent node), "BOK Budget Absorption," which was further broken down into six main themes and seventeen sub-themes, reflecting the POAC (Planning, Organizing, Actuating, Controlling) management framework. Third, conclusion drawing and verification, carried out by comparing reference values the number of coding references across sub-themes to identify the most dominant sub-variable within each theme.

## 4. Results And Discussion

### *4.1 Overview of the Research Object*

UPTD Puskesmas Sindang, Indramayu Regency, is a first-level health care facility overseeing five villages: Panyindangan Kulon, Rambatan Wetan, Panyindangan Wetan, Kenanga, and Terusan, with a working area of 1,891,830 hectares and a population of 49,826 people. Most residents work as students, agricultural laborers, and self-employed workers. As of 31 December 2025, Puskesmas Sindang had 45 staff members, consisting of general practitioners, a dentist, nurses, midwives, health promotion officers, a pharmacist, and administrative and financial support staff.

### *4.2 BOK Budget Absorption, 2021-2025*

As shown in Table 1, BOK budget absorption at Puskesmas Sindang shows a gradual, though not yet fully optimal, improvement. The absorption rate was at its lowest in 2021 (11.19%), then rose in 2022 (35.28%) and 2023 (43.96%), before improving significantly in 2024 (72.19%) and 2025 (71.85%). Although the trend over the past three years indicates improved management accountability, the unabsorbed remainder still hovers around 28% each year. In 2025, the first stage of BOK disbursement was only released in April, meaning realization for January-March remained at 0%, and even after funds were received in April, realization did not increase significantly in the following months. This condition indicates that disbursement delays, limited financial management HR capacity, and weak coordination between the Puskesmas and the Health Office in preparing the Fund Withdrawal Plan (RPD) also influenced the pattern of budget absorption throughout the year.

### *4.3 Thematic Analysis Results (NVivo)*

Thematic analysis using NVivo 12 Pro on data from 11 informants produced six main themes and seventeen sub-themes, visualized in the hierarchy (sunburst) chart in Figure 1. The larger the segment area of a theme in the chart, the greater the number of coding references, reflecting the intensity of informants' discussion of the issue concerned.



**Figure 1 Hierarchy (Sunburst) Chart of Themes and Sub-Themes in BOK Budget Absorption**
**Source: NVivo 12 Pro Data Processing Results (2026)**

**Table 3 Main Themes and Sub-Themes from the NVivo Analysis**

| Main Theme | Sub-Theme |
|---|---|
| Planning | Preparation of RUK/RPK; Stakeholder involvement |
| Organizing | Human resources; Division of tasks |
| Implementation | Administrative constraints; Field-level technical constraints; Disbursement timeliness; Program-based fund utilization |
| Supervision | Monitoring; Performance evaluation |
| Supporting Factors | Policy support; Understanding of technical guidelines; Reporting accountability |
| Inhibiting Factors | Reporting difficulties; Limited understanding; Disbursement delays; Regulatory changes |

Source: Data Processing Results (2026)

The planning theme shows that the quality of BOK program planning is determined not only by the technical accuracy of preparing the RUK/RPK documents, but also by the degree of stakeholder participation from the outset. The organizing theme shows that the issues of HR adequacy and clarity of task division have a relatively balanced proportion of references, where the availability of HR without a clear division of tasks has the potential to create role overlap.

The implementation theme has the largest number of sub-themes, with Field-Level Technical Constraints and Administrative Constraints accounting for the largest proportion of references, indicating that these two aspects are the most frequently cited real challenges by informants. Disbursement Timeliness also accounts for a fairly large proportion, indicating that disbursement delays remain a recurring issue. Within the supervision theme, the Monitoring sub-theme has a far larger proportion than Performance Evaluation, indicating that the supervisory function is more prominent in controlling ongoing processes than in assessing final outcomes.

Within the supporting factors theme, the Reporting Accountability sub-theme shows the largest proportion, followed by Policy Support, while Understanding of Technical Guidelines has the smallest proportion — a potential area of concern, since a good understanding of technical guidelines should form the basis for orderly reporting. Within the inhibiting factors theme, the four sub-themes (Reporting Difficulties, Limited Understanding, Disbursement Delays, and Regulatory Changes) have relatively even proportions, with Reporting Difficulties and Disbursement Delays slightly more prominent. These findings confirm that obstacles to BOK budget absorption are multidimensional, arising not only from external factors such as regulatory changes but also from internal factors such as administrative readiness and the level of understanding among managing staff.

### *4.4 Impact ob Minimum Service Stamdard (MSS) Achievement*

Low budget absorption during 2021-2023 contributed to delays in promotive and preventive outreach activities for priority target groups such as pregnant women, toddlers, and other at-risk groups. Improved absorption in 2024-2025 also indicates an improvement in the implementation of these programs, although a more measurable analysis of the achievement of each MSS indicator requires further study with a broader data scope.

## 5. Conclusion

Based on the analysis and discussion, it can be concluded that: (1) BOK budget absorption at Puskesmas Sindang from 2021 to 2025 shows a gradual improvement from 11.19% in 2021 to 71.85% in 2025, yet is not fully optimal, as the unabsorbed remainder still hovers around 28% each year; (2) the administrative constraints, HR capacity, and reporting mechanisms that hinder the accountability of BOK fund absorption are multidimensional, reflected in six main themes — planning, organizing, implementation, supervision, supporting factors, and inhibiting factors of budget absorption; and (3) fluctuations in BOK fund absorption have contributed to the failure to meet most Minimum Service Standard (MSS) health indicators in the Puskesmas Sindang working area, particularly during the period of low absorption (2021-2023).

Based on these findings, this study recommends strengthening the capacity of BOK financial management staff through regular training on the latest DAK Non-Physical regulations, preparing a more mature program planning schedule at the start of the fiscal year, accelerating the SPJ verification process, simplifying cross-sector coordination mechanisms, and synchronizing regional budget policy with the central government's DAK Non-Physical disbursement schedule. Future research is recommended to adopt a multiple case study design across several Puskesmas with different characteristics, or to combine qualitative and quantitative approaches (mixed methods) to strengthen the generalizability of the findings.

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# DIGITAL LEDGER OR SPENDING TRAP? HOW QRIS RESHAPES GEN Z'S CONSUMPTIVE LIFESTYLES AND FINANCIAL MANAGEMENT

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**Abstract**
*This study was conducted to determine the extent to which the use of QRIS affects financial management, identify the influence of a consumptive lifestyle on financial management, and analyze the relationship between the use of QRIS and the consumptive lifestyle of Generation Z in Makassar City. A total of 157 respondents were involved in this study using a quantitative approach, and they were selected through purposive sampling. After being collected, the research data were processed through simple linear regression analysis and multiple linear regression. The results showed that the use of QRIS has a positive and significant effect on financial management and a consumptive lifestyle. Conversely, a consumptive lifestyle was not proven to have a significant effect on financial management. These findings indicate that increasing the use of QRIS has the potential to strengthen the tendency of consumptive behavior in Generation Z; the ability to control oneself and awareness of financial conditions still play a role in maintaining relatively good financial management. The findings of this study can be used as considerations by relevant authorities and digital payment service providers in designing protection features, such as automatic spending limitation systems, to promote more responsible financial behavior.*
***Keywords***: *Consumer Lifestyle; Generation Z; Digital Payments; Financial Management; QRIS*

## 1. Introduction

The digitalization of the financial system has fundamentally shifted transaction practices from cash payments to electronic payment methods. In Indonesia, this transformation has been further accelerated by the introduction of QRIS as a national standard established by Bank Indonesia for QR code-based payments. A single QR code that is compatible with various payment services now serves as the primary gateway for users to conduct transactions more conveniently. By simply scanning the code, users can easily complete payments through various mobile banking applications and digital wallets. QRIS aims to create a more practical, secure, and efficient transaction process (Ekawati et al., 2024); (Anzie et al., 2024). The increasing adoption of digital payment systems has transformed economic behavior patterns, particularly among Generation Z, which demonstrates active participation in the use of financial technology.

Growing up in an environment with rapid technological developments has made it relatively easy for Generation Z to adapt to various digital innovations, including the use of various electronic payment systems. Currently, the use of QRIS has become part of economic activity in urban areas. Its use is found not only in modern shopping centers but also by MSMEs, coffee shops, and street vendors. The ease of completing payments, support for contactless transactions, and various promotional offers make QRIS increasingly chosen by Generation Z to meet their daily transaction needs, especially in urban environments (Astiansyah & Damayanti, 2024); (Putri S et al., 2024).

In addition to the various conveniences offered, the scan-and-go payment mechanism on QRIS also reduces the psychological barrier to spending money (pain in payment). As physical cash is replaced by digital payments, spending may feel less tangible, potentially reducing individuals' inclination to reconsider their purchasing decisions before completing a transaction. This situation has the potential to create a spending trap that encourages consumer behavior and impulse buying. This phenomenon is increasingly evident among Generation Z, a demographic closely associated with a digital lifestyle and a tendency to experience fear of missing out (FOMO), and various cashback offers integrated into payment platforms. (Astiansyah & Damayanti, 2024) found that the increase in payment activity among this generation was primarily driven by the convenience of

digital transactions and the various promotional offers available. These two factors were identified as key contributors in their research.

QRIS-based digital payment systems have significant potential to improve the effectiveness of financial management. Conceptually, this technology functions as a digital payment ecosystem that can facilitate the availability of digital transaction records that support expenditure monitoring and record each transaction accurately and in real time. The ability to systematically track cash flow is one of the main advantages of QRIS compared to cash transactions, which tend to be more difficult to monitor. Thus, users can monitor their income and expenses in a more structured manner through available digital records. Financial planning, expense allocation, and financial condition evaluation can be carried out more precisely through this feature.

As digital payment systems become increasingly integrated into everyday transactions, effective financial management is becoming increasingly important for Generation Z. While the convenience of digital payments allows for quick and easy purchases, it can also reduce awareness of how often money is spent. Therefore, transaction records alone cannot ensure proper financial management. Greater attention is also needed to monitor spending, prioritize spending, and control spending based on available financial resources. In this context, the way Generation Z manages their finances may be influenced by the use of digital payment systems such as QRIS. While the transaction records provided by QRIS can help users monitor their spending, the convenience of completing payments simultaneously may encourage them to make more frequent purchases.

Previous research has examined QRIS primarily from a technology adoption perspective, focusing on factors such as perceived usefulness, perceived ease of use, security, and trust that influence users' intention or decision to use QRIS (Harahap & Zoraya, 2024; Anzie et al., 2024; Putri S et al., 2024; Sugiarto et al., 2026). These studies provide important evidence regarding why Generation Z adopts QRIS, but provide little evidence regarding the behavioral consequences of QRIS use once integrated into daily transactions. In particular, limited attention has been paid to whether the convenience and digital record-keeping features of QRIS simultaneously support financial management and encourage more consumptive spending behavior.

Previous findings are also inconclusive regarding the relationship between digital payment usage and Individual financial behavior. On the one hand, digital transaction records can facilitate spending monitoring and financial planning. On the other hand, the convenience of cashless transactions can reduce spending awareness and encourage more frequent consumption. This inconsistency indicates an empirical gap in understanding the dual consequences of QRIS usage, particularly among Generation Z in the urban Indonesian context. Therefore, this study addresses this gap by simultaneously examining the relationship between QRIS usage and financial management and consumer lifestyle, as well as the relationship between consumer lifestyle and financial management among Generation Z in Makassar City.

The uniqueness of this study lies not only in examining QRIS usage among Generation Z, but also in demonstrating the dual behavioral consequences it generates. QRIS can function simultaneously as a digital ledger supporting financial management and as a potential spending trap that increases consumer tendencies. This perspective extends previous QRIS research, which has largely focused on technology adoption, by shifting attention to the behavioral consequences of digital payment use. Theoretically, this study integrates the technology acceptance perspective with a behavioral finance perspective to explain how the same digital payment technology can produce financially beneficial outcomes and increase consumption.

This research is based on the importance of ensuring that increasing digital financial inclusion goes hand in hand with strengthening financial literacy and financial resilience among the younger generation. Academically, this research expands theories related to consumer behavior and individual financial management by demonstrating that the use of digital payment technology can have two distinct impacts. Practically, the findings of this study can serve as a reference for Bank

Indonesia and digital payment service providers in developing electronic wallets. These features not only increase transaction frequency but also provide security mechanisms (protection) to help users establish healthier financial management patterns. Based on the developed research framework, the research hypothesis is formulated as follows. H1 states that the use of QRIS has a positive and significant relationship with the financial management of Generation Z. H2 states that a consumptive lifestyle has a negative and significant relationship with the financial management of Generation Z. Meanwhile, H3 states that the use of QRIS has a positive and significant relationship with the consumptive lifestyle of Generation Z.

## 2. Research Methods

This study adopts a quantitative approach, with the research data being processed in numerical form, which is then analyzed using statistical techniques to draw conclusions (Sugiyono, 2021). Based on the paradox that underpins the research, This theory focuses on examining two dimensions of *Quick Response Code Indonesian Standard* (QRIS) utilization as a digital payment instrument among Generation Z. On the one hand, QRIS can function as a digital ledger that helps users monitor and support financial management. On the other hand, the ease of transactions offered has the potential to become a spending trap that encourages an increase in consumptive lifestyles. In addition to examining these two consequences, This study also investigates the impact of a consumptive lifestyle on Generation Z's financial management capabilities.

Respondents in this study consisted of Generation Z residents of Makassar City who use QRIS for their daily transactions. The sample was selected using the 2019-2020 data collection technique.*non-probability sampling*with the method*purposive sampling*, where respondents are determined based on certain criteria that are in accordance with the research objectives (Sugiyono, 2021). Respondents involved must meet several requirements, namely: (1) domiciled in Makassar City and included in the Generation Z group, (2) actively using QRIS as a routine payment tool, and (3) willing to participate by filling out a questionnaire is one of the requirements in this study. Based on the data collection process that has been carried out, a total of 157 respondents met all the specified criteria so that they can be used as samples in this study.

The primary data for this study was obtained through an online questionnaire distributed to respondents via the Google Forms platform. This study used three main constructs: QRIS usage (X), consumer lifestyle (Z), and financial management (Y). Each construct was operationalized into several indicators developed or adapted from previous research relevant to the context of digital payments, consumer behavior, and personal financial management. All indicators were measured using a five-point Likert scale, with a score of 1 indicating "strongly disagree" and a score of 5 indicating "strongly agree" (Sugiyono, 2021).

QRIS usage is operationalized through indicators that represent aspects of QRIS use in respondents' transaction activities. Consumptive lifestyle is measured through indicators that represent individual consumption tendencies based on consumption patterns, preferences, and incentives. Meanwhile, financial management is operationalized through indicators that represent an individual's ability to organize, control, and evaluate their personal financial condition.

The indicators for each construct were adapted from previous research sources and tailored to the context of Generation Z QRIS users in Makassar City. The adaptation process was carried out by maintaining the substance of the construct being measured and adjusting the item wording to suit the characteristics of the respondents and the context of digital payments.

Prior to data analysis, the research instruments were tested for validity and reliability to ensure that each indicator accurately represented the variables studied and produced consistent results. Next, classical assumption tests, including normality, multicollinearity, and heteroscedasticity tests, were conducted to verify that the regression model met the required assumptions before proceeding with parametric analysis (Ghozali, 2021). Once all requirements were met, the research data were processed using IBM SPSS Statistics 30, with*statistical effect approach*to examine the causal

relationship between variables.

The hypothesis testing process was first carried out through simple linear regression to analyze the relationship between QRIS use and a consumptive lifestyle as stated in hypothesis H3. Next, multiple linear regression analysis was conducted to test the relationship between QRIS use and a consumptive lifestyle on financial management, both individually and simultaneously, in accordance with hypotheses H1 and H2. Hypothesis decisions were made based on the results of the t-test to assess the relationship between each variable, while the coefficient of determination ($R^2$) was used to determine the extent to which the independent variable explains the variation in the dependent variable. The test used a significance level of 5% ($\alpha = 0.05$), with the provision that the hypothesis is accepted if the significance value (Sig.) obtained is less than 0.05. (Ghozali, 2021).

## 3. Research Findings and Discussion

This research was conducted in Makassar City in July 2026 using a quantitative research approach. Primary data were obtained online through a questionnaire. Participants were Makassar residents from Generation Z, and used QRIS in payment activities. Respondents were selected using a purposive sampling technique, resulting in 157 participants who met the predetermined research criteria and were therefore eligible for inclusion in the analysis of QRIS use in payment activities. Based on age characteristics, respondents aged 20 years were the largest group with 54 people (34.40%). The 19-year-old age group numbered 29 people (18.48%), followed by respondents aged 21 years (28) people (17.83%), 22 years (12) people (7.64%), 18 years (9) people (5.73%), and 25 years (6) people (3.82%). Meanwhile, respondents aged 17, 23, and 24 years old each numbered 4 people (2.55%), respondents aged 26 years old numbered 3 people (1.91%), while respondents aged 27 and 28 years old each numbered 2 people (1.27%). The age distribution shows that the majority of participants are between 19 and 21 years old, a period when Generation Z is starting to develop financial independence and has a high level of acceptance of digital payment innovations in urban environments. In terms of gender, 116 respondents (73.89%) were female, while 41 respondents (26.11%) were male.

This composition provides unique insights into the research findings, as gender differences are often associated with variations in consumption behavior, digital shopping patterns, and responses to transaction convenience and various promotions offered in 33 digital payment ecosystems. Hypothesis testing was conducted by analyzing the research data using statistical software. Multiple linear regression analysis was applied to measure QRIS usage and the impact of a consumer lifestyle on financial management. Meanwhile, the relationship between QRIS usage and a consumer lifestyle was analyzed using simple linear regression. The analysis was conducted using a 5% significance level ($\alpha = 0.05$) as the basis for decision-making.

### 3.1 Data Analysis

#### 3.1.1 Validity Test

**Tabel 1. Validity Test**

| Variabel | Correlations | | | |
|---|---|---|---|---|
| | **Indikator** | **r hitung** | **r tabel** | **Kesimpulan** |
| X | X1.1.1 | ,693** | 0,157 | valid |
| | X1.1.2 | ,764** | 0,157 | valid |
| | X1.2.1 | ,825** | 0,157 | valid |
| | X1.2.2 | ,866** | 0,157 | valid |
| | X1.3.1 | ,787** | 0,157 | valid |
| | X1.3.2 | ,479** | 0,157 | valid |
| | X1.4.1 | ,764** | 0,157 | valid |
| | X1.4.2 | ,741** | 0,157 | valid |
| | X1.5.1 | ,711** | 0,157 | valid |
| | X1.5.2 | ,466** | 0,157 | valid |
| Z | Z1.1.1 | ,715** | 0,157 | valid |
| | Z1.1.2 | ,780** | 0,157 | valid |

| Variabel | Correlations | | | |
|---|---|---|---|---|
| | **Indikator** | **r hitung** | **r tabel** | **Kesimpulan** |
| | Z1.2.1 | ,772** | 0,157 | valid |
| | Z1.2.2 | ,730** | 0,157 | valid |
| | Z1.3.1 | ,754** | 0,157 | valid |
| | Z1.3.2 | ,735** | 0,157 | valid |
| | Z1.4.1 | ,767** | 0,157 | valid |
| | Z1.4.2 | ,690** | 0,157 | valid |
| | Z1.5.1 | ,782** | 0,157 | valid |
| | Z1.5.2 | ,727** | 0,157 | valid |
| Y | Y1.1.1 | ,655** | 0,157 | valid |
| | Y1.1.2 | ,769** | 0,157 | valid |
| | Y1.2.1 | ,816** | 0,157 | valid |
| | Y1.2.2 | ,669** | 0,157 | valid |
| | Y1.3.1 | ,762** | 0,157 | valid |
| | Y1.3.2 | ,772** | 0,157 | valid |
| | Y1.4.1 | ,707** | 0,157 | valid |
| | Y1.4.2 | ,661** | 0,157 | valid |
| | Y1.5.1 | ,705** | 0,157 | valid |
| | Y1.5.2 | ,630** | 0,157 | valid |

Source: Processed data, 2026

The test results in Table 1 indicate that all indicators in the variables QRIS Use (X), Consumptive Lifestyle (Z), and Financial Management (Y) are declared valid. This is indicated by the calculated r value for all indicators, which is greater than the table r value of 0.157. Thus, all 30 indicators meet the validity criteria and can be used in research.

### 3.1.2 Reliability Test

Reliability testing was conducted to see whether the use of QRIS, consumer lifestyle, and financial management could provide consistent results in measuring research variables.

**Table 2. Realibility Test**
**Realiability Statistics**

| Cronbach's Alpha | N of Items |
|---|---|
| ,908 | 30 |

Source: Processed data, 2026

The results of the reliability test in Table 2 show that the research instrument had a Cronbach's Alpha of 0.908 with a total of 30 questions. This value is greater than 0.70, indicating that all items in the instrument are reliable.

## 3.2 Classical Assumption Test

### 3.2.1 Normality Test

A normality test was conducted to determine whether the residuals in the regression model were normally distributed. This test was necessary because the study used regression analysis to examine the relationship between QRIS usage, consumer lifestyle, and financial management.

**Table 3. Normality Test**
**One-Sample Kolmogorov-Smirnov Test**
**Unstandardized Residual**

| | | | |
|---|---|---|---|
| N | | | 157 |

| | | | |
|---|---|---|---|
| Normal Parameters[a,b] | Mean | | ,0000000 |
| | Std. Deviation | | 6,92298399 |
| Most Extreme Differences | Absolute | | ,044 |
| | Positive | | ,024 |
| | Negative | | -,044 |
| Test Statistic | | | ,044 |
| Asymp. Sig. (2-tailed)[c] | | | ,200[d] |
| Monte Carlo Sig. (2-tailed)[e] | Sig. | | ,641 |
| | 99% Confidence Interval | Lower Bound | ,628 |
| | | Upper Bound | ,653 |

Source: Processed data, 2026

The results of the normality test using One-Sample Kolmogorov-Smirnov showed an Asymp. Sig. (2-tailed) value of 0.200 for 157 respondents. Since the significance value is greater than 0.05, the residuals in the regression model are normally distributed, thus the normality assumption is met.

### 3.2.2 Multicollinearity Test

A multicollinearity test was conducted to determine whether there was an excessively strong relationship between the independent variables used in the model. QRIS Use and Consumptive Lifestyle were both used to explain Financial Management. Therefore, it was necessary to ensure that the two variables were not excessively correlated to better understand their respective impacts on Financial Management.

**Table 4. Multicollinearity Test**

**Coefficients[a]**

| Model | Sig. | Tolerance | VIF | |
|---|---|---|---|---|
| 1 | (Constar)t | <,001 | | |
| | USING QRIS | <,001 | ,922 | 1,084 |
| | CONSUMPTIVE LIVESTYLE | ,069 | ,922 | 1,1084 |
| Collinearity Statistics | | | | |
| a. Dependent Variable: Financial Management | | | | |

Source: Processed data, 2026

Based on table 5, the Tolerance value for the QRIS Use and Consumptive Lifestyle variables is 0.922 > 0.10, while the VIF value is 1.084 < 10. Thus, it can be concluded that there are no symptoms of multicollinearity between the independent variables in the regression model.

### 3.2.3 Heteriscedasiticity Test

A heteroscedasticity test was conducted to determine whether there was inequality in residual variance in the regression model. This test was necessary to ensure that the regression model used did not experience residual dispersion issues, so that the analysis results regarding the relationship between QRIS Use and Consumptive Lifestyle on Financial Management could be used for further testing.

**Table 5. Heteroscedasticity test**

**Coefficients[a]**

| Model | | Unstandardized Coefficients B | Std. Error | Standardized Coefficients Beta | t | Sig. |
|---|---|---|---|---|---|---|
| 1 | (Constant) | 3,943,942 | 2,073 | | 1,902 | ,059 |
| | X1 | ,052 | ,049 | ,088 | 1,050 | ,295 |
| | X2 | -,020 | ,040 | -,042 | -,502 | ,616 |

a. Dependent Variable: Abs_RES

Source: Processed data, 2026

Based on Table 6 using the Glejser method, the significance value of X1 is 0.295 and X2 is 0.616, both greater than 0.05. Thus, it can be concluded that there are no symptoms of heteroscedasticity in the regression model.

### 3.3 Hypothesis Testing

#### 3.3.1 F Test (Simultaneous)

The F-test was conducted to determine whether QRIS usage and a consumer lifestyle were jointly related to financial management. This test was used to determine whether the independent variables in the study were able to explain overall financial management through the regression model used.

Based on the results of Table 7, the calculated F value was 14.029 with a significance value of <0.001 <0.05. This means that QRIS Use (X1) and Consumptive Lifestyle (X2) simultaneously have a significant effect on Financial Management (Y1). Thus, the regression model used is appropriate to explain the relationship between variables.

**Table 6. F (Simultaneous)**

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1362,259 | 2 | 681,129 | 14,029 | <,001[b] |
| | Residual | 7476,722 | 154 | 48,550 | | |
| | Total | 8838,981 | 156 | | | |

a. Dependent Variable: Y1
b. Predictors: (Constant), X2,X1

#### 3.3.2 Hypothesis Testing

**Table 8. Hypothesis test**

| No. | Hypothesis | Relationship | B | t | p | Decision |
|---|---|---|---|---|---|---|
| 1 | H1 | QRIS → Financial Management | 0,329 | 4.265 | < 0,001 | Supported |
| 2 | H2 | Consumerist Lifestyle → Financial Management | 0,141 | 1.828 | 0,069 | Not Supported |
| 3 | H3 | QRIS → Consumerist Lifestyle | 0,279 | 3.614 | < 0,001 | Supported |

Source: Processed data, 2026

The results of the H1 test indicate that QRIS use has a positive and significant effect on financial management, with a β value of 0.329, a t-test of 4.265, and a significance value <0.001. Because the significance value is less than 0.05, H1 is

accepted. The acceptance of the first hypothesis (H1) in this study confirms that QRIS has a positive and significant influence on Generation Z's financial management. The results of the hypothesis testing indicate that respondents' ability to organize and manage their financial conditions tends to increase along with the increasing frequency of QRIS use. From the perspective of individual financial records, some of the advantages offered by QRIS include ease of transactions, fast payment processing, and automatic recording of each transaction in a digital ledger that allows users to track cash flow, develop budget plans, and manage their finances in a more organized manner. With systematically documented transaction records, users can evaluate spending patterns, thus making the financial decision-making process more effective.

The findings of this study are in line with this perspective. *Technology Acceptance Model*(TAM) developed by Davis (1989). This theory states that the acceptance and adoption of technology by individuals are shaped by perceptions of its usefulness and ease of use. In this study, the assessment of these two aspects encourages Generation Z to continue using QRIS in various transaction activities, so that the use of digital payments can contribute to improving the quality of financial management. This finding is also consistent with the results of previous studies (Oktri Rahmadania, Helmi Herawati, 2025) and (Yuliani & Pertiwi, 2025) which revealed that QRIS use has a positive impact on transaction activities while contributing to improving digital literacy skills among young users.

In contrast to previous research which generally focused on technology acceptance and adoption, this study found that QRIS use also has implications for user consumption patterns.The results of the H3 test show that QRIS use has a positive and significant effect on consumer lifestyles, with a β value of 0.279, a t-test of 3.614, and a significance value <0.001. Because the significance value is less than 0.05, H3 is accepted.The analysis shows that QRIS usage has a positive and significant impact on consumer lifestyles, leading to the acceptance of the third hypothesis (H3). These results further demonstrate the phenomenon of spending traps that can arise as a result of the convenience offered by digital payment systems. This psychological sensation of feeling like you're losing money when making a payment, known as*pain in paying*, can be minimized through*scan and go*A mechanism that offers fast and convenient transactions. When these psychological barriers are reduced, purchasing decisions tend to be made without a thorough evaluation of actual needs or available financial capacity. Thus, the use of QRIS can encourage increased consumer tendencies and trigger impulsive buying behavior among Generation Z.

Although QRIS usage indicates an increasing tendency towards a consumptive lifestyle, the results of the second hypothesis test (H2) indicate that a consumptive lifestyle does not have a significant influence on financial management. This is evident from the valueβ is 0.141, t-test is 1.828, and the significance value is 0.069. This is because the significance value is greater than 0.05.Therefore, H2 is rejected. Although the regression coefficient indicates a positive relationship, it does not meet the criteria for statistical significance. This result underscores the paradox raised in this study: increased consumer behavior due to QRIS usage has not significantly impacted the quality of Generation Z's financial management.

This phenomenon can be explained through the perspective of Theory*Planned Behavior*(TPB) developed by (Ajzen, 1991) and the Behavioral Life Cycle Theory introduced by (Shefrin & Thaler, 1988). Both theoretical perspectives suggest that individual financial behavior is inseparable from the ability to control actions and decisions made (perceived behavioral control). In this study, the majority of respondents were students or young adults who generally had relatively limited income levels. This situation makes awareness of financial management and budget constraints

factors that limit consumption behavior. Although respondents tend to follow developments in digital consumption trends and activities, limited financial conditions encourage them to consider spending more carefully. Therefore, an increase in consumptive lifestyles is not enough to put pressure on the quality of financial management carried out by respondents. These results are in line with research by (Mardianto et al., 2024), (Maulana et al., 2025), and (Rafi et al., 2025) which show that financial management is more strongly influenced by internal factors, particularly self-control and financial literacy, than simply lifestyle patterns.

Overall, the results of this study demonstrate two sides to the use of QRIS. Acceptance of the first hypothesis (H1) confirms that the technology functions as a digital ledger, enabling more structured financial management. Meanwhile, the third hypothesis (H3), which was also accepted, indicates that QRIS has the potential to become a spending trap that encourages consumptive behavior. The test results indicate that the second hypothesis (H2) is rejected because a consumptive lifestyle was found to have no significant influence on financial management. This condition indicates that financial awareness and self-control among Generation Z remain relatively strong in mitigating the negative impacts of consumptive habits, thus maintaining the stability of their financial management.

In this study, Artificial Intelligence (AI) was used to a limited extent as a tool to support the processing and understanding of the initial interpretation of the quantitative data analysis results. The primary statistical analysis was performed using SPSS/SmartPLS/R, in accordance with the research objectives and data characteristics. AI was utilized to help understand the statistical output and identify possible patterns or relationships that emerged in the analysis results. However, the results obtained through AI assistance were not used directly as a basis for research decision-making; instead, they were reviewed and verified by the researcher based on the statistical procedures and methodological foundations used. AI was also not used to determine research results, modify data, or determine acceptance or rejection of hypotheses. The selection of analysis techniques, hypothesis testing, final interpretation, and drawing conclusions remain the responsibility of the researcher.

## 4. Conclusion

The use of QRIS among Generation Z in Makassar City shows two contrasting consequences in the context of the paradox of "Digital Ledger or Spending Trap?". The research findings indicate that QRIS use is positively and significantly related to Generation Z's financial management. These results provide empirical support for the first hypothesis (H1), which indicates that QRIS use is related to respondents' ability to record, track, and monitor financial flows more systematically through the availability of digital transaction records.

In addition, the third hypothesis (H3) also received empirical support. The results of the study showed a positive and significant relationship between QRIS usage and consumer lifestyles in Generation Z. The ease and speed of transactions through the QR scanning mechanism can reduce psychological perceptions of spending or*pain of paying*, potentially increasing the tendency to make purchases without adequate consideration. This finding reinforces the indication of a "spending trap" phenomenon in digital payment usage.

In contrast, the second hypothesis (H2) did not receive empirical support. Although the coefficient of the relationship between a consumer lifestyle and financial management indicated a positive trend, the relationship was not statistically significant. Thus, an increase in consumer tendencies did not demonstrate a strong enough relationship with a decline in respondents' financial management quality. This situation suggests that limited financial resources and the ability to maintain self-control can still play a role in helping Generation Z prioritize needs and allocate budgets. In other words, changes in consumer behavior related to the convenience of digital

payments have not been directly related to disruptions in respondents' financial management practices.

Based on these findings, Generation Z, particularly students, are advised to utilize QRIS not only as an efficient payment method but also as part of efforts to build disciplined financial management habits by recording expenses and regularly evaluating financial conditions. For Bank Indonesia and digital payment service providers, the results of this study provide practical implications in the form of the importance of developing supporting features, such as:*smart budgeting and* automatic spending limits. This feature is expected to help reduce potential overspending while strengthening digital financial literacy, enabling more responsible use of digital payments.

Interpretation of the research results requires considering several limitations. First, this study involved 157 respondents from Makassar City, so the results cannot be fully generalized to represent the conditions of Generation Z at the national level. Second, the research model only included three main variables, so a number of other psychological and behavioral factors potentially related to financial management, such as financial literacy and*locus of control*, cannot be analyzed yet. Third, the data was obtained through a questionnaire based on*self-report*, so there is a possibility of subjective bias in respondents' answers.

It is recommended that future research expand the scope of the region and the characteristics of the respondents to strengthen the generalizability of the findings. Furthermore, future research should consider other internal factors, particularly self-control and an individual's ability to prioritize budget allocation when faced with limited financial resources. To gain a more comprehensive understanding of the relationships between variables, future research could also consider using more advanced analytical methods, such as*Structural Equation Modeling*(SEM), so that the relationship mechanism between variables can be analyzed in more depth.

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# A STUDY ON IMPROVING GOVERNANCE AS AN EFFORT TO REDUCE CORRUPTION IN INDONESIA

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***Abstract***
*Corruption remains one of the most persistent institutional challenges hindering economic development and public welfare in Indonesia. Despite various government initiatives, including bureaucratic reforms, public service digitalization, and strengthened law enforcement institutions, corruption continues to undermine the quality of governance and public trust. This study aims to examine the effects of corruption control and the rule of law on Indonesia's Corruption Perceptions Index (CPI) during 2010–2023. A quantitative explanatory approach was employed using multiple linear regression analysis based on secondary data obtained from the World Bank and Transparency International. The findings reveal that corruption control has a positive and statistically significant effect on the Corruption Perceptions Index, indicating that stronger corruption control contributes to improved perceptions of corruption. In contrast, the rule of law does not exhibit a statistically significant influence on the Corruption Perceptions Index. These findings suggest that strengthening corruption control mechanisms plays a more dominant role than legal enforcement alone in improving governance quality and combating corruption in Indonesia. The study contributes to the empirical literature on governance and provides policy implications for strengthening anti-corruption strategies through institutional reforms, transparency, accountability, and effective oversight.*
***Keywords:*** *corruption, governance, corruption control, rule of law, corruption perceptions index*

## 1. Introduction

Corruption has become one of the most persistent and systemic challenges facing Indonesia, significantly hindering economic growth, weakening institutional performance, and reducing public confidence in government institutions. Beyond its economic consequences, corruption undermines the quality of public services, distorts resource allocation, and limits sustainable development. According to Ahmad et al. (2022), corruption in Indonesia has evolved into a deeply rooted institutional problem that requires comprehensive governance reforms rather than isolated legal interventions.

Over the past decade, the Indonesian government has introduced various initiatives to combat corruption, including bureaucratic reforms, digitalization of public services, strengthening supervisory institutions, and improving legal enforcement mechanisms. Despite these efforts, Indonesia's Corruption Perceptions Index (CPI) continues to indicate that corruption remains a major governance issue. This condition reflects a considerable gap between existing governance practices and the principles of good governance, particularly regarding transparency, accountability, and the effective enforcement of laws.

Theoretically, good governance emphasizes transparency, accountability, participation, and the rule of law as essential components for preventing corruption. Effective corruption control reduces opportunities for the abuse of public authority, while a strict rule of law provides a legal foundation for ensuring fair and consistent law enforcement. Previous empirical studies have demonstrated that effective corruption control contributes significantly to improving governance quality and institutional performance. However, existing studies have generally examined corruption control and the rule of law separately and have rarely investigated their combined influence on Indonesia's Corruption Perceptions Index

Therefore, this study seeks to address this research gap by examining how corruption control and the rule of law influence corruption perceptions in Indonesia between 2010 and 2023.

Specifically, the study investigates whether improvements in governance through stronger corruption control and legal enforcement contribute to better corruption perception outcomes. The findings are expected to enrich the empirical literature on governance and provide evidence-based recommendations for strengthening anti-corruption policies in Indonesia.

## 2. Literature Review

### *2.1 Good Governance and Corruption*

Good governance is widely recognized as a fundamental element in promoting sustainable economic development and improving public sector performance. It emphasizes transparency, accountability, participation, effectiveness, and the rule of law as essential principles for ensuring that public institutions operate efficiently and responsibly. In the context of corruption prevention, good governance reduces opportunities for the misuse of public authority while strengthening institutional integrity.

Corruption remains one of the major obstacles to achieving good governance because it distorts public decision-making, weakens institutional credibility, and decreases public trust in government. According to Ahmad et al. (2022), corruption in Indonesia has become a structural and systemic issue that requires comprehensive institutional reforms rather than isolated legal interventions. Similarly, Firmansyah and Syam (2022) argue that strengthening governance institutions is essential to improving the effectiveness of anti-corruption policies.

### *2.2 Corruption Control*

Control of Corruption (CC) is one of the Worldwide Governance Indicators developed by the World Bank to measure the extent to which public power is exercised for private gain, including both petty and grand corruption as well as state capture by elites and private interests. Higher levels of corruption control indicate stronger institutional capacity to prevent the abuse of authority and improve government accountability.

Previous empirical studies consistently demonstrate that corruption control contributes significantly to improving governance quality and institutional performance. Lustrilanang et al. (2023) found that stronger corruption control positively influences governance quality across ASEAN countries. Likewise, Celik and Kostekci (2025) identified corruption control as one of the most important determinants of institutional effectiveness and human development, highlighting its critical role in promoting sustainable development. These findings suggest that strengthening corruption control mechanisms can substantially reduce corruption risks and improve public sector performance.

### *2.3 Rule of Law*

The Rule of Law (ROL) reflects the degree to which citizens have confidence in and abide by societal rules, including the quality of contract enforcement, property rights protection, judicial independence, and the effectiveness of law enforcement institutions. A strong rule of law creates legal certainty and provides an institutional framework that discourages corrupt behavior.

Although legal enforcement is generally expected to reduce corruption, empirical evidence has produced mixed findings. Mohd-Rashid et al. (2023) argue that strengthening the rule of law contributes to lower corruption levels in Asia-Pacific countries. However, other studies indicate that legal enforcement alone may not significantly reduce corruption unless supported by effective governance, institutional quality, and transparent public administration. Consequently, the effectiveness of the rule of law depends not only on the existence of legal regulations but also on their consistent implementation.

### *2.4 Corruption Perceptions Index*

The Corruption Perceptions Index (CPI), published annually by Transparency International, measures perceived levels of public sector corruption based on expert

assessments and business surveys. Higher CPI scores indicate lower perceived corruption and better governance quality. Because corruption is often difficult to observe directly, the CPI has become one of the most widely accepted indicators for evaluating anti-corruption performance across countries.

Several studies have shown that improvements in governance indicators, particularly corruption control and institutional effectiveness, are associated with higher CPI scores. Therefore, the CPI serves as an appropriate proxy for assessing the effectiveness of governance reforms and anti-corruption policies.

### *2.5 Research Hypotheses*

Based on the theoretical framework and previous empirical findings, this study proposes the following hypotheses:

**H1:** Corruption Control has a positive and significant effect on the Corruption Perceptions Index in Indonesia.
**H2:** Rule of Law has a positive and significant effect on the Corruption Perceptions Index in Indonesia.

## 3. Research Methods

This study employed a quantitative explanatory research design to examine the influence of Control of Corruption (CC) and Rule of Law (ROL) on the Corruption Perceptions Index (CPI) in Indonesia. The explanatory approach was selected to identify and analyze the causal relationships between the independent variables and the dependent variable through statistical analysis.

The study utilized secondary data collected from internationally recognized institutions. Data on the Corruption Perceptions Index (CPI) were obtained from Transparency International, while data on Control of Corruption (CC) and Rule of Law (ROL) were collected from the Worldwide Governance Indicators (WGI) published by the World Bank. The observation period covered fourteen years, from 2010 to 2023, providing sufficient time-series data to analyze governance performance and corruption trends in Indonesia.

The dependent variable in this study is the Corruption Perceptions Index (CPI), which measures the perceived level of public sector corruption. The independent variables consist of Control of Corruption (CC) and Rule of Law (ROL). Control of Corruption measures the extent to which public power is exercised for private gain, whereas Rule of Law reflects the degree of public confidence in legal institutions and the effectiveness of law enforcement.

To examine the relationships among the variables, this study employed multiple linear regression analysis using IBM SPSS Statistics. Before estimating the regression model, classical assumption tests were conducted to ensure that the model satisfied the assumptions of ordinary least squares (OLS). These tests included the normality test, multicollinearity test, and heteroscedasticity test. The normality test was performed using the Kolmogorov–Smirnov test, while multicollinearity was evaluated using the Variance Inflation Factor (VIF) and tolerance values. Heteroscedasticity was assessed using the Glejser test. The regression model used in this study is expressed as follows:

$$CPI = \beta 0 + \beta 1\, CC + \beta 2\, ROL + \varepsilon \quad (1)$$

Where:
CPI = Corruption Perceptions Index
CC = Control of Corruption
ROL = Rule of Law
$\beta_0$ = Constant
$\beta_1$, $\beta_2$ = Regression coefficients
$\varepsilon$ = Error term

## 4. Research Findings and Discussion

### *4.1 Descriptive Statistics 1*

Based on Table 1, the descriptive statistical analysis provides an initial overview of the data characteristics for the variables Corruption Perceptions Index (CPI), Control of Corruption (CC), and Rule of Law (ROL) during the 2010–2023 period. This analysis serves as a crucial foundation for understanding general data patterns before further testing.

**Table 1. Descriptive Statistics**

| Statistik | IPK | CC | ROL |
|---|---|---|---|
| Mean | 35.15385 | -0.510231 | -0.370000 |
| Median | 36.00000 | -0.473000 | -0.350000 |
| Maximum | 40.00000 | -0.299000 | -0.150000 |
| Minimum | 28.00000 | -0.803000 | -0.660000 |
| Std. Dev. | 3.236411 | 0.144740 | 0.147309 |
| Skewness | -0.650045 | -0.451104 | -0.520643 |
| Kurtosis | 2.913325 | 2.624451 | 2.550983 |
| Jarque-Bera | 0.919613 | 0.517301 | 0.696525 |
| Probability | 0.631406 | 0.772093 | 0.705914 |
| Sum | 457.0000 | -6.633000 | -4.810000 |
| Sum Sq. | 16191.00 | 3.635757 | 2.040100 |
| Sum Sq. Dev. | 125.6923 | 0.251396 | 0.260400 |
| Observations | 13 | 13 | 13 |

Source**:** Data processed by the authors (2026).

The average CPI score of 35.15 indicates that the level of perceived corruption in Indonesia remains low, implying that the actual prevalence of corruption remains relatively high. This finding aligns with research by Ratmono et al. (2021), which states that Indonesia continues to face significant corruption issues despite various reform efforts. Meanwhile, the average scores for Control of Corruption (CC) at -0.51 and Rule of Law (ROL) at -0.37—both negative values—indicate that the quality of governance, particularly regarding corruption control and law enforcement, remains suboptimal. This is supported by Lustrilanang et al. (2023), who found that indicators of corruption control in developing countries tend to be weak, thereby contributing to high levels of corruption.

Regarding data dispersion, the CPI standard deviation of 3.23 is higher than the standard deviations for CC (0.14) and ROL (0.14), indicating greater year-to-year fluctuation in the CPI. This suggests that perceptions of corruption in Indonesia are unstable, likely influenced by policy dynamics and socio-political conditions. Furthermore, the minimum and maximum value ranges reveal significant variation in the CPI—spanning from 28 to 40—whereas CC and ROL scores fall within narrower ranges. This indicates that even minor changes in governance variables can have a substantial impact on corruption perceptions. These findings are consistent with Koeswayo et al. (2024), who noted that changes in governance quality significantly influence public perception.

### *4.2 Classical Assumption Test Results 2*

Normality test results, conducted using histograms and the Jarque-Bera test, indicate a Jarque-Bera value of 0.921383 with a probability value (p-value) of 0.630847. Since the p-value exceeds the significance level of 0.05 (0.630847 > 0.05), the null hypothesis ($H_0$) is accepted. This indicates that the residuals in the research model are normally distributed. These results demonstrate that the data used in the analysis of corruption in Indonesia generally satisfy the normality assumption, allowing the regression model to be utilized optimally. Furthermore, these findings are consistent with Mohd-Rashid et al. (2023), who stated that governance data—such as corruption control and law enforcement—tend to exhibit stable distributions and meet classical assumptions in econometric analysis. Thus, the data in this study satisfy the normality assumption, making them suitable for regression analysis, and the resulting estimates can be

considered valid and unbiased. Type your paragraphs here. Text must be in Times New Roman, font size must be 11.

Thus, it can be concluded that the data in this study meet the assumption of normality, making them suitable for use in regression analysis, and the resulting estimates can be considered valid and unbiased.

**Table 2. Normality Test Results**

Breusch-Godfrey
Serial Correlation LMTest :
Null hypothesis: No serial correlation at up to 2 lags

| | |
|---|---|
| F-statistic | 0.439195 |
| Obs*R-squared | 1.286165 |

Source: Data processed by the author (2026)

The multicollinearity test was conducted by examining the Variance Inflation Factor (VIF) values for each independent variable. The test results show that the centered VIF values for the Control of Corruption (CC) and Rule of Law (ROL) variables are 2.139909 each.

These values fall below the general threshold (VIF < 10), indicating no evidence of serious multicollinearity among the independent variables. This implies that the two variables do not exhibit an excessively high correlation with each other and can still be used together in the regression model.

**Table 3. Multicollinearity Test Results**

Variance Inflation Factors Sample : 114
Included observations : 13

| Variable | Coefficient | | Variance |
|---|---|---|---|
| C | 4.472132 | 14.47092 | NA |
| CC | 34.19781 | 30.94790 | 2.139909 |
| ROL | 33.01537 | 16.76508 | 2.139909 |

Source: Research data, processed by the author (2026)

These results align with the study by Koeswayo et al. (2024), which found that governance indikators such as control of corruption and rule of law tend to exhibit moderate correlations, thereby avoiding multicollinearity issues within the analysis model. Furthermore, research by Lustrilanang et al. (2023) indicates that the study variables can generally be used simultaneously, as they do not distort regression estimation results.

Thus, it can be concluded that this research model satisfies the assumption regarding multicollinearity; consequently, the resulting regression coefficient estimates can be considered stable and reliably interpreted.

**Table 4. Heteroskedasticity Test Results**

Heteroskedasticity Test Breusch-Pagan-Godfrey Null hypothesis: Homoskedasticity

| | |
|---|---|
| F-statistic | 0.204955 |
| Obs*R-squared | 0.511910 |
| Scaled explained SS | 0.312510 |

*Source: Research data, processed by the author (2026)*

A heteroskedasticity test was conducted using the Breusch-Pagan-Godfrey method to determine whether unequal residual variances exist within the regression model. In this test, the null hypothesis ($H_0$) states that heteroskedasticity is absent (i.e., the data are homoskedastic).

Based on the test results, the probability value of Obs*R-squared exceeds 0.05; therefore, $H_0$ is accepted. This indicates the absence of heteroskedasticity issues in the research model, allowing the residual variance to be considered constant.

This condition suggests that the regression model effectively explains the relationships between variables without the interference of unequal variances. Consequently, the regression estimation results can be considered more accurate and unbiased.

These findings align with research by Koeswayo et al. (2024), which demonstrates that models incorporating governance variables such as corruption control and law enforcement typically do not suffer from heteroskedasticity when utilizing relatively stable time-series data. Furthermore, a study by Mohd-Rashid et al. (2023) found that research models satisfying the homoskedasticity assumption tend to yield more consistent and reliable estimates.

Thus, it can be concluded that this research model satisfies the assumption regarding heteroskedasticity, making it suitable for further regression analysis.

### *4.3 Multiple Linear Regression Test Results*

A multiple linear regression approach was employed to analyze the impact of corruption control and law enforcement as measures to improve governance on the Corruption Perceptions Index (CPI) in Indonesia. The test results indicate that the corruption control (CC) variable has a positive and significant effect on the CPI, whereas law enforcement (ROL) does not have a significant effect.

Theoretically, the positive effect of Control of Corruption (CC) on the Corruption Perceptions Index (CPI) indicates that better corruption control within a governance system enhances the effectiveness of anti-corruption efforts, as reflected by a higher CPI score. This finding is consistent with the good governance perspective, which emphasizes the importance of transparency and accountability in improving institutional performance.

This result is consistent with the study conducted by Celik and Kostekci (2025), which identified corruption control as a key determinant of institutional performance and sustainable development because it promotes greater efficiency in resource allocation and public sector management.

**Table 5. Multiple Linear Regression Test Results**

Dependent Variable: IPK Method;
Least Squares Sample: 114
Included observations: 13

| Variable | Coefficient | Std. Error | t-Statistic | Sig |
|---|---|---|---|---|
| C | 44.56734 | 2.114742 | 21.07461 | 0.0000 |
| CC | 18.88614 | 5.847889 | 3.229565 | 0.0090 |
| ROL | -0.602140 | 5.745900 | -0.104795 | 0.9186 |
| R-squared | 0.680366 | Mea dependent Var | 35.15385 | |
| Adjusted R-squared | 0.616439 | S.D. dependent var | 3.236411 | |
| S.E. of regression | 2.004384 | Akaikeinfo Criterion | 4.427725 | |

| Variable | Coefficient | Std. Error | t-Statistic | Sig |
|---|---|---|---|---|
| Sum squared resid | 40.17556 | Schwarz criterion | 4.558098 | |
| Log likelihood | -25.78021 | Hannan-Quinncriter. | 4.400927 | |
| F-statistic | 10.64288 | Durbin-Watson | 1.888067 | |
| Prob(F-statistic) | 0.003336 | stat | | |

Source: Research data, processed by the author (2026)

To gain deeper insight into these findings, a more comprehensive interpretation from both theoretical and empirical perspectives is required.

$$CPI = 44.567 + 18.886\,CC - 0.602\,ROL \quad (2)$$

Furthermore, Abraham (2021) found that corruption control has a positive impact on economic development by enabling a more efficient allocation of public resources through the reduction of corrupt practices. Therefore, the findings of the present study reinforce previous empirical evidence that effective corruption control has a positive and statistically significant relationship with institutional performance, including improvements in the Corruption Perceptions Index (CPI) as an indicator of governance outcomes (Abraham, 2021).

In contrast, the Rule of Law (ROL) variable does not have a statistically significant effect on the CPI. This finding suggests that the existence of legal regulations alone is insufficient to improve governance outcomes unless they are accompanied by effective implementation and enforcement. In other words, the effectiveness of the rule of law depends not only on the legal framework itself but also on regulatory quality and the effectiveness of law enforcement institutions.

Similarly, Khan et al. (2024) reported that the impact of the rule of law on economic performance and development tends to be indirect, operating through mediating variables such as institutional quality and government effectiveness. This evidence supports the present findings by indicating that the insignificant effect of the rule of law may result from suboptimal implementation or the presence of other governance factors that exert a stronger influence on the Corruption Perceptions Index (CPI) (Khan et al., 2024).

The R-squared value of 0.680366 indicates that the regression model explains approximately 68.03% of the variation in the Corruption Perceptions Index (CPI), suggesting that the model possesses relatively strong explanatory power. This finding is also supported by previous studies demonstrating that the combined indicators of good governance, particularly corruption control and the rule of law, are capable of explaining a substantial proportion of institutional performance and development outcomes (Celik & Kostekci, 2025).

Moreover, the statistically significant F-statistic indicates that Control of Corruption (CC) and Rule of Law (ROL) jointly exert a significant influence on the Corruption Perceptions Index (CPI). This result is in line with previous empirical studies showing that governance indicators generally exhibit stronger explanatory power when analyzed simultaneously rather than individually (Celik & Kostekci, 2025).

Overall, these findings suggest that Control of Corruption (CC) is the most influential determinant of the Corruption Perceptions Index (CPI) in the estimated model, whereas the Rule of Law (ROL) functions as a supporting factor whose effectiveness largely depends on the quality of its implementation. These results are consistent with the principles of good

governance and further strengthen previous empirical evidence highlighting corruption control as a fundamental element in improving institutional performance and governance outcomes.

## 5. Conclusion

This study examined the effects of Control of Corruption (CC) and Rule of Law (ROL) on the Corruption Perceptions Index (CPI) in Indonesia during the 2010–2023 period using multiple linear regression analysis. The findings indicate that Control of Corruption has a positive and statistically significant effect on the Corruption Perceptions Index, suggesting that stronger corruption control mechanisms contribute to improved governance quality and lower perceived levels of corruption. Effective corruption control strengthens institutional accountability, enhances transparency, and increases public trust in government institutions.

In contrast, Rule of Law does not have a statistically significant effect on the Corruption Perceptions Index. This finding suggests that legal enforcement alone is insufficient to improve corruption perceptions unless accompanied by effective institutional governance, transparency, and accountability. Therefore, strengthening anti-corruption efforts requires not only improvements in the legal framework but also comprehensive governance reforms that reinforce institutional capacity and public sector integrity.

Overall, this study highlights the importance of strengthening corruption control as a strategic approach to improving governance and combating corruption in Indonesia. The findings provide empirical evidence that can support policymakers in designing more effective anti-corruption policies through institutional reform, enhanced transparency, stronger accountability mechanisms, and consistent supervision. Future studies are encouraged to include additional governance indicators and longer observation periods to provide a more comprehensive understanding of the determinants of corruption in Indonesia.

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# THE ROLE OF RENEWABLE ENERGY IN ACHIEVING SUSTAINABLE ECONOMIC GROWTH

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***Abstract***
*Indonesia must transition to sustainable economic development immediately, given the problems of climate change and environmental degradation caused by carbon dioxide (CO2) emissions. This study investigates the impact of renewable energy use on sustainable economic growth in Indonesia. This research used a quantitative method and secondary data from 2010-2024 from the World Bank and the Green Growth Index. The analysis used a simple linear regression. The results demonstrate that renewable energy plays a vital role in achieving sustainable economic development. Increasing renewable energy consumption will reduce carbon emissions and encourage sustainable economic growth, thereby enhancing sustainable development in Indonesia. These findings underscore the importance of policy consistency in advancing the energy transition to renewable sources and balancing economic growth with environmental preservation in Indonesia. This study also has practical implications for national energy policy. This underscores the significance of sustainable economic and environmental strategies.*
***Keywords****: renewable energy, carbon emissions, sustainable economic growth, simple linear regression, sustainable development.*

## 1. Introduction

Climate change and environmental degradation are currently becoming increasingly serious global challenges. One of the main factors driving these problems is the increase in carbon dioxide ($CO_2$) emissions generated by industrial activity and the use of fossil-based energy. Environmentally unfriendly energy consumption can worsen environmental conditions and hinder sustainable development (Bhuiyan et al., 2022).

Within the framework of sustainable development, energy plays a very important role as a primary driver of economic activity. However, dependence on fossil energy not only harms the environment but also increases the risk to long-term economic sustainability. Therefore, a transition to cleaner, more sustainable energy sources is needed (Xie et al., 2023).

Indonesia has considerable potential to enable sustainable economic growth and minimise dependence on fossil fuels by utilising renewable energy (Firmansyah et al., 2024). Renewable energy also positively impacts the economy by creating jobs, increasing added value, and contributing to Gross Domestic Product (GDP). Increased investment and the use of renewable energy technology offer a chance to improve national energy security and promote more environmentally sustainable economic growth.

In this case, implementing renewable energy in Indonesia still faces numerous barriers. Major challenges include high initial investment costs, reliance on fossil energy subsidies, and inconsistent policy execution. This results in a relatively low share of renewable energy in overall national energy consumption (Solikah & Bramastia, 2024).

Relatedly, increased industrial activity is also a substantial contributor to carbon emissions. High carbon emissions from the industrial sector may hinder sustainable economic growth. Hence, a strategy is needed to reconcile economic growth and environmental preservation through a green growth approach.

Moreover, renewable energy use is positively related to and helps achieve sustainable

economic development. This implies that deploying renewable energy is not only beneficial to the environment but also conducive to stronger economic growth. The transition to renewable energy is a deliberate move toward achieving sustainable development.

Based on the above description, it is vital to study the effect of renewable energy consumption on sustainable economic growth. The analysis uses time series data for the period 2010-2024. The study provides an empirical picture of the interaction between factors and supports the creation of a sustainable energy strategy. This work is expected to contribute to the literature on sustainable economics and be used as a reference to promote more targeted policy formation, especially in boosting the use of clean energy and regulating carbon emissions.

## 2. Research Methods

### 2.1 *Research Design*

This study uses a quantitative approach to analyse the relationship between renewable energy use and sustainable economic growth in Indonesia. The research steps include methodical data collection, processing, and analysis using appropriate statistical techniques. The data are sourced from a reliable organisation (World Bank), ensuring high validity and trustworthiness. The data are processed according to the study objectives to ensure accurate and objective results.

### 2.2 *Data and Data Sources*

The current analysis employs secondary time-series data for the observation period between 2010 and 2024. Secondary data were selected since they come from official entities whose legitimacy and validity have been verified, supporting the research analysis objectively and properly. The data sources for this analysis were the World Bank and the Green Growth Index, both of which provide detailed data on economic and environmental indices. The data used are sustainable economic growth (green growth) and renewable energy usage.

**Table 1. Data Source Description**

| Variable | Name | Description | Expected sign | Source |
|---|---|---|---|---|
| LGG | Green Growth | The role of government in formulating and implementing policies related to the environment. In this study, green growth data is expressed in natural logarithms. | - | Green Growth Index |
| LRET | Renewable Energy Consumption | The use of energy derived from renewable sources within a country. In this study, renewable energy consumption data is expressed in natural logarithms. | Positive | World Bank |

*Source: Research data, processed by the authors (2026)*

### 2.3 *Data Analysis Technique*

The data analysis technique used in this study is based on grouping the research variables, along with their explanations, descriptions, and data sources. The variables used are green growth (LGG) as an indicator of sustainable economic growth and renewable energy consumption (LRET), which reflects the level of energy use from renewable sources associated with emissions from economic activity. Each variable is explained operationally to facilitate the analysis process, with data sourced from trusted institutions to support accurate and relevant research results.

### *2.3.1 Classical Assumption Test*

The classical assumption test is an important stage for interpreting and validating the analysis model (Hutagaol, 2025). The purpose of this classical assumption test is to ensure that the resulting regression equation is estimated accurately, free from bias, and optimally consistent (Sholihah et al., 2023). Therefore, to ensure the results were accurate and trustworthy, a classical assumption test was conducted to meet the BLUE standards. This involved checking for heteroscedasticity and autocorrelation. As a result, the analysis results held up and were considered valid and reliable.

Heteroscedasticity Test: The heteroscedasticity test was carried out using the Breusch-Pagan-Godfrey method to determine whether the variance of the residuals in the regression model is constant. The testing process compared the Obs*R-Squared probability value with the predetermined significance level of $\alpha = 5\%$ (Rizki et al., 2023). A good regression model does not experience heteroscedasticity. If the Heteroskedasticity Test: Breusch-Pagan-Godfrey probability value is > 0.05, it can be concluded that there is no heteroscedasticity problem in the regression model, meaning that the model satisfies the assumption of homoscedasticity.

Autocorrelation Test: The autocorrelation test aims to determine whether there is a relationship between the residuals in the current period (t) and the residuals in the previous period (t-1) in the regression model. A good regression model is free from autocorrelation because the residuals must be independent across time. The test was carried out using the Breusch-Godfrey Serial Correlation LM Test, which aims to determine whether residuals are correlated across periods (Azielia & Darmawati, 2026). If the probability value of the Breusch-Godfrey Serial Correlation LM Test is > 0.05, it can be concluded that there is no autocorrelation in the regression model, meaning that the residuals across periods are not correlated with one another.

### **2.3.2** ***Simple Linear Regression***

Simple linear regression is a statistical method used to examine the extent of the causal relationship between a predictor variable and its response variable. The causal factor is generally denoted by X, or also referred to as the Predictor, while Y denotes the resulting variable, or also referred to as the Response. Simple linear regression is also a statistical method used in production to forecast or predict qualitative or quantitative characteristics (Ningsih et al., 2024).

The data in this study are presented numerically and analysed using simple linear regression. The data are sourced from the Green Growth Index and the World Bank and therefore fall into the category of secondary data. These quantitative data allow for a more systematic and measurable analysis of the relationship between the research variables.

The purpose of this method is to determine whether there is an effect of the independent variable on the dependent variable, as expressed in the following formula:

$$LGG_t = \beta_0 + \beta\ LRET_t + \varepsilon_t$$

Where: $LGG_t$ is Sustainable Economic Growth in period t, $\beta_0$ is the constant, $\beta$ is the regression coefficient of the independent variable, $LRET_t$ is Renewable Energy Consumption in period t, and $\varepsilon$ is the error term.

This study uses data on sustainable economic growth for the years 2010–2024. The data are sourced from the Green Growth Index and World Bank renewable energy consumption data. The independent variable is renewable energy consumption, and the dependent variable is Green Growth.

#### 2.3.3 *Hypothesis Testing (t-Test)*

The t-test is used to determine the effect of the independent variable on the dependent variable. The t-test examines the extent to which renewable energy consumption partially affects green growth by comparing the calculated t-value with the t-table value or the significance value. This test aims to assess whether the independent variable has a significant effect within the regression model (Zuhriadi, 2026). The hypotheses are $H_0$, which states that renewable energy consumption has no significant effect on green growth, and $H_a$, which states that it does. The decision-making criteria are based on the p-value: if $p < 0.05$, $H_0$ is rejected; if $p > 0.05$, $H_0$ cannot be rejected.

## 3. Research Findings and Discussion

### 3.1 *Results*

This section presents the results of the data analysis and the empirical interpretation regarding the effect of the independent variable on the dependent variable. The method used is a quantitative approach with a simple linear regression model, which aims to explain the role of the independent variable in predicting the dependent variable. Through this analysis, it is expected that a clearer picture can be obtained regarding the direction and strength of the relationship between the variables under study.

#### 3.1.1 *Descriptive Statistics*

Descriptive statistics is a way to examine data and understand what it tells us. It helps us summarise and describe the data without drawing big conclusions (Maharani & Merina, 2025). This type of analysis shows us what the data looks like, without trying to interpret what it means. By using descriptive statistics, we can get a sense of what's going on with the data we've collected and see what's typical for each variable we're studying. It's like taking a snapshot of the data to see what it looks like, and it can help us identify patterns or trends worth exploring further.

**Table 2. Descriptive Statistics Results**

| | LGG | LRET |
|---|---|---|
| Mean | 3.867166 | 1.86062 |
| Median | 3.852910 | 1.759581 |
| Maximum | 3.970669 | 2.405142 |
| Minimum | 3.827554 | 1.266948 |
| Std. Dev. | 0.037527 | 0.443586 |
| Skewness | 1.368837 | -0.006833 |
| Kurtosis | 4.762549 | 1.367696 |
| Jarque-Bera | 6.625902 | 1.665376 |
| Probability | 0.036409 | 0.434879 |
| Sum | 58.00749 | 28.03593 |
| Sum Sq. Dev. | 0.019716 | 2.754757 |
| Observations | 15 | 15 |

*Source: Data processed by the authors (2026)*

Based on the descriptive statistics in Table 2, the sustainable economic growth variable (LGG) has a mean of 3.867166% and a median of 3.852910%, indicating that the data distribution is centred around this value, with some values below and some above the median. The maximum LGG value is 3.970669%, and the minimum is 3.8275%. In comparison, the standard deviation of 0.037527% indicates relatively low dispersion, so the data tend to be stable. Meanwhile, the renewable energy consumption variable (LRET) has a mean of 1.86062%, a median of 1.759581%, a maximum of

2.405142%, and a minimum of 1.266948%. The standard deviation of LRET (0.443586%) indicates that this variable has greater variation than LGG. Overall, LGG tends to be more stable than LRET, and the relatively small difference between the mean and median values for both variables indicates that the data distribution is relatively normal, without significant skewness.

### 3.1.2 *Classical Assumption Test Results*

The heteroscedasticity test examines whether the variance of the residuals is constant across the entire range of values of the independent variable; if it is not constant, the estimation becomes biased and inefficient.

**Table 3. Heteroscedasticity Test Results**

| **Heteroscedasticity Test: Breusch-Pagan-Godfrey** | | | |
|---|---|---|---|
| Null hypothesis: Homoscedasticity | | | |
| F-statistic | 0.069530 | Prob. F(1,13) | 0.7963 |
| Obs*R-Squared | 0.079800 | Prob. Chi-Square(1) | 0.7776 |
| Scaled explained SS | 0.286596 | Prob. Chi-Square(1) | 0.5924 |

*Source: Research data, processed by the authors (2026)*

Based on the results presented in Table 3 above, the Obs*R-Squared probability value is 0.079800 (> 0.05); therefore, the heteroscedasticity assumption is satisfied, and the data pass the heteroscedasticity test.

The autocorrelation test is a classical assumption test in linear regression and aims to detect correlation between residuals across periods.

**Table 4. Autocorrelation Test Results**

| **Breusch-Godfrey Serial Correlation LM Test** | | | |
|---|---|---|---|
| Null hypothesis: No serial correlation at up to 2 lags | | | |
| F-statistic | 0.493092 | Prob. F(2,11) | 0.6236 |
| Obs*R-Squared | 1.234150 | Prob. Chi-Square(2) | 0.5395 |

*Source: Research data, processed by the authors (2026)*

Based on the results presented in Table 4 above, the Obs*R-Squared value of 1.234150 has an associated probability greater than 0.05, so it can be concluded that the assumption of no autocorrelation is satisfied.

Simple Linear Regression is used to analyse the effect of the independent variable on the dependent variable. This method is used to make predictions or estimates of a value, whether qualitative or quantitative. The results show that LRET has a positive and significant effect on LGG, as indicated by a probability value of 0.0396, which is below the 0.05 significance threshold.

**Table 5. Simple Linear Regression Results**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 3.782466 | 0.037993 | 99.55592 | 0.0000 |
| LRET | 0.045317 | 0.019813 | 2.287182 | 0.0396 |
| R-squared | 0.286937 | Mean dependent var | | 3.867166 |
| Adjusted R-squared | 0.232086 | S.D. dependent var | | 0.037527 |
| S.E. of regression | 0.032885 | Akaike info criterion | | -3.868024 |
| Sum squared resid | 0.014059 | Schwarz criterion | | -3.773617 |
| Log likelihood | 31.010118 | Hannan-Quinn criter. | | -3.869029 |
| F-statistic | 5.231204 | Durbin-Watson stat | | 1.985504 |
| Prob(F-statistic) | 0.039589 | | | |

*Source: Research data, processed by the authors (2026)*

These results indicate a positive and significant effect of renewable energy consumption (LRET) on sustainable economic growth (LGG). The coefficient value of 0.045317 indicates that every increase in renewable energy will be followed by an increase in sustainable economic growth, assuming other variables remain constant. The significance of this relationship is reinforced by the probability value of 0.0396 < 0.05, which means that the LRET variable has a statistically significant effect on LGG. In addition, the t-statistic value of 2.287182, which is greater than the t-table value, also indicates that this effect can be accepted empirically.

More broadly, the findings suggest that greater dependence on renewable energy can promote higher-quality and more sustainable economic growth. This is because renewable energy not only reduces negative environmental impacts but also improves energy efficiency and creates new economic opportunities. Renewable energy is therefore one of the main variables in promoting sustainable economic development.

### 3.2 *Discussion*

Based on the simple linear regression results, the LRET variable has a positive coefficient of 0.045317 with respect to LGG. This finding indicates that an increase in the use or contribution of renewable energy is associated with an increase in sustainable economic growth. In other words, the effect of renewable energy on economic growth is unidirectional (positive), indicating that the higher the utilization of renewable energy, the better the quality of economic growth achieved. This is consistent with the concept of sustainable development, which stresses the importance of balancing economic progress, environmental protection, and social welfare.

In fact, renewable energy is employed in many forms, for example, biodiesel as a replacement for diesel fuel, solar energy via photovoltaic panels, and wind and hydro power to generate electricity. For instance, biodiesel decreases dependence on fossil fuels, but it also stimulates economic activity in the agricultural and raw material processing sectors, generating a multiplier impact in the economy. Conversely, fossil energy use such as coal and petroleum tends to generate negative externalities, including environmental pollution, natural resource degradation, and increased greenhouse gas emissions, which can hinder the sustainability of development in the long term (Wuri et al., 2024).

The test results show that the LRET variable has a positive and significant effect on LGG, with a probability value of 0.0396, which is below the 5% significance level. This indicates that an increase in renewable energy has a statistically significant contribution to sustainable economic growth. Theoretically, this can be explained by renewable energy's ability to increase energy-use efficiency, reduce environmental costs, and create new economic opportunities, such as job creation in the renewable energy sector and innovation in environmentally friendly technology. Increased utilisation of renewable energy therefore not only impacts the

environment but also provides sustainable economic benefits.

These findings align with Khoirunnisa et al. (2024), who explain that the utilisation of renewable energy helps reduce carbon emissions and is significantly related to economic variables, thereby supporting more sustainable development. Solikah & Bramastia (2024) also explain that renewable energy has great potential to support sustainable economic development by increasing energy security and reducing dependence on fossil fuels. These results support the empirical findings that the rising use of renewable energy is one of the main drivers of sustainable economic growth in Indonesia, either through energy efficiency, reduced environmental consequences, or the creation of new economic opportunities.

However, the coefficient of determination ($R^2$) of 0.286937 implies that renewable energy explains only a moderate share of the variation in sustainable economic growth. Thus, while renewable energy has an important impact, many other elements not included in the model also affect economic growth, such as fiscal and monetary policy, investment levels, technological progress, and the state of the global economy. The comparatively low value of Adjusted $R^2$ also implies that this research model is still limited in properly capturing the complexity of the interaction between variables.

Classical assumption testing shows that the regression model meets the required criteria. The heteroscedasticity test reveals that residual variance is constant and there is no bias in the estimation. Moreover, the autocorrelation test shows no correlation between residuals; therefore, the model does not suffer from autocorrelation. These assumptions are met, so the regression model is appropriate and the estimation results can be trusted.

The findings of this study generally validate the favourable and considerable contribution of greater utilisation of renewable energy, such as biodiesel, solar energy, wind energy, and hydropower, in supporting sustainable economic growth. Conversely, dependence may be detrimental to economic sustainability because of its environmental impact and the limited availability of resources. Therefore, renewable energy development should be supported through suitable regulations, greater investment, and technological innovation to build a more sustainable, efficient, and environmentally friendly economic system in the future.

## 4. Conclusion

This study shows that the utilisation of renewable energy plays an important role in driving sustainable economic growth. Based on the simple linear regression results, the renewable energy variable has a positive and significant effect on sustainable economic growth. These findings indicate that a linear increase in renewable energy utilisation can improve the quality of economic growth in line with the principles of sustainable development. These results also confirm the importance of policies that support increased investment and the use of renewable energy in Indonesia.

The model's credibility is supported by the fulfilment of all classical assumption criteria, so the estimation model can be categorised as a Best Linear Unbiased Estimator (BLUE). Theoretically and practically, these findings reinforce the urgency of the energy transition from fossil-based resources to renewable energy, such as biodiesel, solar, wind, and hydropower. This structural transformation not only mitigates negative environmental externalities but also creates economic value through increased energy efficiency and new economic opportunities. In addition, this energy transition also has the potential to increase national economic competitiveness in facing global challenges related to climate change.

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# THE EFFECT OF DIGITAL PAYMENT UTILIZATION ON MICRO-ENTERPRISE PERFORMANCE: THE MEDIATING ROLE OF BUSINESS OWNER SATISFACTION

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***Abstract***
*The rapid development of digital financial technology has encouraged micro-enterprises to adopt digital payment systems as an essential component of business operations. Digital payment services, including Quick Response Code Indonesian Standard (QRIS), electronic wallets, mobile banking, and internet banking, provide faster, safer, and more efficient transaction processes than conventional cash payments. Nevertheless, the effectiveness of digital payment adoption in improving business performance depends not only on the technology itself but also on business owners' satisfaction with its utilization. This study aims to examine the effect of digital payment utilization on the performance of micro-enterprises and to investigate the mediating role of business owner satisfaction. A quantitative research approach was employed using a survey of 75 micro-enterprise owners operating in the Special Region of Yogyakarta who had adopted digital payment systems. Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to examine the data. The results show that micro-enterprise performance is positively and significantly impacted by the use of digital payments. Additionally, the association between digital payment utilization and business performance is substantially mediated by business owner happiness, indicating that greater satisfaction amplifies the benefits of digital payment adoption.These findings support Organizational Transformation Theory, emphasizing that successful technological transformation depends on users' acceptance and satisfaction. The study provides practical implications for micro-enterprises, digital payment service providers, and policymakers seeking to accelerate digital transformation among small businesses.*
***Keywords****: digital payment, micro-enterprises, business performance, business owner satisfaction, PLS-SEM.*

## 1. Introduction

Micro-enterprises constitute one of the most important pillars of Indonesia's economy by creating employment opportunities, generating household income, and stimulating regional economic development. Micro-enterprises are defined under Law Number 20 of 2008 governing Micro, Small, and Medium Enterprises as profitable companies run by people or individual business entities that meet certain asset and yearly income requirements.

In the Special Region of Yogyakarta, micro-enterprises play a strategic role in supporting economic growth, particularly in the trade, culinary, tourism, creative industry, and service sectors. Their contribution has become increasingly significant as regional economic activities continue to expand.

Due in large part to the widespread use of digital payment methods, the quick development of digital technology has completely changed how businesses operate. The Quick Response Code Indonesian Standard (QRIS), electronic wallets, internet banking, mobile banking, and other digital payment methods have grown in popularity among consumers and company owners. Businesses may execute transactions more quickly, use less cash, maintain better financial records, and give customers more convenience thanks to these technology. As a result, using digital payments has emerged as a crucial tactic for enhancing operational effectiveness and preserving competitiveness in a market that is becoming more and more digital.

In Yogyakarta, where consumers are mostly made up of university students, domestic tourists, and technologically educated people who regularly use cashless payment methods, the growing adoption of digital payments is especially pertinent. In order to match market expectations and

maintain their competitive edge, micro-enterprises are encouraged to implement digital payment technology by this shifting consumer behavior. It is anticipated that companies that successfully incorporate digital payment systems into their operations will see an increase in customer satisfaction, transaction efficiency, and overall business performance.

Previous studies have consistently reported positive relationships between digital payment adoption and business outcomes. Research by Ambarita and Simanjuntak (2024) demonstrated that QRIS implementation improves operational efficiency, increases revenue, and enhances user satisfaction among micro, small, and medium enterprises. Similarly, Erika et al. (2024) found that digital payment systems contribute positively to business performance by facilitating faster, safer, and more efficient financial transactions. However, several studies have also suggested that technology adoption alone does not necessarily guarantee improved organizational performance. Instead, users' satisfaction with the technology plays an important role in determining whether its potential benefits can be fully realized.

Business owner satisfaction represents an important psychological factor that reflects the extent to which digital payment systems meet users' expectations regarding convenience, security, efficiency, and business value. Satisfied business owners are more likely to continue utilizing digital payment technologies, integrate them into daily business activities, and maximize their benefits. Consequently, business owner satisfaction may function as a mediating mechanism through which digital payment utilization influences business performance.

This study is grounded in Organizational Transformation Theory proposed by Rothwell, Stavros, and Sullivan (2015), which emphasizes that organizational performance improves when technological changes are successfully accepted and integrated into organizational processes. From this perspective, digital payment utilization represents a form of technological transformation within micro-enterprises. The effectiveness of this transformation depends not only on the implementation of new technology but also on users' ability to adapt to and derive satisfaction from its utilization.

Based on these factors, the study intends to evaluate the mediating function of business owner satisfaction among micro-enterprises in the Special Region of Yogyakarta as well as the direct impact of digital payment adoption on micro-enterprise performance. In the context of Indonesian micro-enterprises, the results are anticipated to add to the expanding body of literature on digital transformation and offer empirical proof of the ways in which digital payment systems improve business performance.

## 2. Literature Review

### *2.1 Digital Payment Utilization*

Digital payment refers to the use of electronic technologies that enable financial transactions without relying on physical cash. According to Bank Indonesia (2021), digital payment systems facilitate the transfer of funds through electronic platforms, including QRIS, electronic wallets, mobile banking, internet banking, and other digital payment instruments. The increasing availability of these technologies has changed the way businesses conduct transactions by providing greater speed, security, and convenience.

The use of digital payments for micro-enterprises goes beyond just being an alternate form of payment. Additionally, it facilitates business operations by streamlining transaction processing, minimizing cash handling, enhancing financial documentation, and boosting operational effectiveness. Adoption of digital payment systems allows micro-enterprises to adapt to shifting market demands while retaining company competitiveness as customers favor cashless transactions more and more.

According to Davis's (1989) Technology Acceptance Model (TAM), people are more likely to adopt a technology if they believe it to be practical and simple to use. In the framework

of this study, it is anticipated that business owners who understand the advantages and practicality of digital payment systems will incorporate these technologies into their day-to-day operations, enhancing business performance.

Five indicators transaction convenience, transaction security, transaction efficiency, simplicity of business operations, and accessibility of payment services—are used to measure the use of digital payments based on prior research and the conceptual framework of this study. These metrics show how much company owners believe digital payment systems will help them with their business operations.

### *2.2 Business Owner Satisfaction*

Business owner satisfaction describes the positive evaluation formed after using digital payment systems in business operations. Kotler and Keller (2016) explain that satisfaction emerges when the performance of a product or service meets or exceeds users' expectations. In the present study, satisfaction reflects business owners' perceptions regarding the benefits, convenience, and effectiveness of digital payment services in supporting their businesses.

Owners of businesses who encounter seamless transactions, dependable payment processing, and increased productivity are more likely to form positive opinions about digital payment systems. These satisfying encounters boost users' confidence in incorporating digital payments into regular business operations and promote ongoing use of the technology.

The theoretical foundation for comprehending this relationship is provided by Oliver's (1980) Expectation Confirmation Theory (ECT). According to the hypothesis, users get satisfied when they believe a technology meets or exceeds their initial expectations. As a result, happy users are more likely to stick with the technology and reap more long-term rewards.

In this study, business owner satisfaction is evaluated using five dimensions: satisfaction with ease of use, satisfaction with perceived benefits, satisfaction with operational efficiency, confirmation of expectations, and intention to continue using digital payment services.

### *2.3 Micro-Enterprise Performance*

Business performance represents the extent to which an enterprise successfully achieves its operational and financial objectives. For micro-enterprises, performance can be observed through improvements in sales growth, profitability, customer growth, operational effectiveness, and competitive capability.

The usage of digital payment systems is expected to boost business performance by simplifying payment procedures, expediting transaction processing, lowering administrative errors, and enhancing customer convenience. These improvements may increase productivity and competitiveness in an increasingly digital business environment.

In keeping with previous research, this study measures micro-enterprise performance using five indicators: sales growth, profit growth, customer growth, business effectiveness, and corporate competitiveness. These metrics provide a comprehensive assessment of business outcomes following the use of digital payment technologies.

### *2.4 Organizational Transformation Theory*

This study adopts Organizational Transformation Theory developed by Rothwell, Stavros, and Sullivan (2015) as its primary theoretical foundation. The theory emphasizes that organizational transformation involves planned changes in organizational processes, technology, and human behavior to improve organizational effectiveness.

Adopting digital payment systems is a technology shift that transforms conventional transaction procedures into digitally assisted business processes in the context of

microenterprises. It is anticipated that this change will increase operational effectiveness while motivating company owners to adjust to changing technological settings.

### *2.5 Hypothesis Development*

Microbusinesses are able to handle transactions more effectively and give clients more convenience thanks to the growing use of digital payment technology. Prior research has consistently demonstrated that the use of digital payments enhances operational effectiveness and increases business prospects, both of which have a favorable impact on corporate performance. Consequently, the following is the initial theory put forth:

**H1**: Digital payment utilization has a positive and significant effect on micro-enterprise performance.

**H2**: Business owner satisfaction significantly mediates the relationship between digital payment utilization and micro-enterprise performance.

## 3. Research Methods

This study used a quantitative research methodology to investigate the connections between micro-enterprise success, business owner happiness, and the use of digital payments. Partial Least Squares Structural Equation Modeling (PLS-SEM), which can handle relatively small sample sizes and is suitable for assessing complicated structural relationships containing mediation effects, was used to test the suggested conceptual model.

### *3.1 Research Design*

In order to examine the direct impact of digital payment usage on micro-enterprise performance as well as the indirect impact through business owner satisfaction, the study used an explanatory design. The Organizational Transformation Theory, Technology Acceptance Model (TAM), and Expectation Confirmation Theory (ECT), which together describe how technological adoption and users' perceptions contribute to organizational performance, served as the foundation for the conceptual framework.

### *3.2 Population and Sample*

The population consisted of micro-enterprises operating in the Special Region of Yogyakarta that had implemented digital payment systems in their business activities. The study focused on businesses using digital payment instruments such as QRIS, electronic wallets, mobile banking, and internet banking.

Samples were selected using purposive sampling. Respondents were required to satisfy the following criteria: (1) owning or managing a micro-enterprise located in the Special Region of Yogyakarta; (2) actively utilizing digital payment services in daily business transactions; and (3) having sufficient experience with digital payment systems to evaluate their impact on business operations.

A total of 75 valid questionnaires were collected and included in the data analysis. This sample size fulfilled the minimum requirement for PLS-SEM analysis because the method is suitable for studies involving relatively small samples while maintaining adequate statistical power.

### *3.3 Data Collection*

Google Forms was used to deliver an online survey that was used to gather primary data. The purpose of the questionnaire was to gage respondents' opinions about micro-enterprise performance, business owner satisfaction, and the use of digital payments. All answers were kept private, and participation was entirely voluntary.

A five point Likert scale, with 1 denoting "strongly disagree" and 5 denoting "strongly agree," was used to rate each questionnaire item. The scale was chosen because it makes

quantitative statistical analysis easier and allows respondents to express different levels of agreement.

### *3.4 Measurement of Variables*

The research model contained three latent variables. Five indicators transaction convenience, transaction security, transaction efficiency, company operational support, and business competitiveness were used to gage the use of digital payments. These metrics evaluated how much digital payment platforms help entrepreneurs carry out their everyday business operations.

Five indicators sales growth, profit growth, customer growth, business effectiveness, and business competitiveness were used to evaluate micro-enterprise success. These metrics were chosen to reflect both non-financial and financial facets of company performance.

### *3.5 Data Analysis*

The collected data were analyzed using SmartPLS software. The analysis consisted of two main stages: evaluation of the measurement model (outer model) and evaluation of the structural model (inner model).

The measuring model was assessed using convergent validity, discriminant validity, indicator reliability, and construct reliability. Convergent validity was considered adequate when indicator loadings were greater than 0.70 and the Average Variance Extracted (AVE) was greater than 0.50. Discriminant validity was evaluated using cross-loading values to ensure that each indicator demonstrated better associations with its corresponding concept than with other conceptions. Internal consistency dependability was assessed using Cronbach's Alpha and Composite dependability; results higher than 0.70 denoted satisfactory reliability.

The coefficient of determination ($R^2$), effect size ($f^2$), and hypothesis testing using the bootstrapping method were used to assess the structural model. While effect size evaluated each exogenous construct's contribution to the endogenous variables, R2 values were utilized to calculate the model's explanatory power. When the bootstrapping findings showed statistically significant connections at the 95% confidence level, with a t-value more than 1.96 and a p-value below 0.05, the hypotheses were accepted.

## 4. Research Findings and Discussion

### *4.1 Measurement Model Evaluation*

Before evaluating the suggested hypotheses, the measuring model was assessed to determine the reliability and validity of the study constructs. Internal consistency reliability, discriminant validity, and convergent validity were all assessed.

### *4.2 Convergent Validity*

The outer loading values of each indicator were used to assess convergent validity. Indicator loadings greater than 0.70, according to Hair et al. (2022), show that the observable variables accurately reflect the corresponding latent constructs.

According to the analysis, loading values over the suggested threshold of 0.70 were attained by all parameters assessing the use of digital payments, business owner satisfaction, and micro-enterprise performance. As a result, every measurement item showed enough convergent validity and was kept for further examination.

**Table 1. Outer Loading Values**

| Construct | Indicator | Loading |
|---|---|---|
| Digital Payment Utilization | X1 | 0.812 |
| | X2 | 0.866 |
| | X3 | 0.736 |
| | X4 | 0.838 |
| | X5 | 0.839 |
| Business Owner Satisfaction | M1 | 0.800 |
| | M2 | 0.795 |
| | M3 | 0.785 |
| | M4 | 0.844 |
| | M5 | 0.842 |
| Micro-enterprise Performance | Y1 | 0.798 |
| | Y2 | 0.873 |
| | Y3 | 0.814 |
| | Y4 | 0.885 |
| | Y5 | 0.861 |

*Source: Processed SmartPLS Output*

### *4.3 Discriminant Validity*

The cross-loading criterion was used to evaluate discriminant validity. The measuring items successfully discriminated one latent variable from another, as each indicator showed a larger loading on its respective construct than on the other constructs. These results show that the research models meet the suggested criteria for discriminant validity.

### *4.4 Reliability Analysis*

Internal consistency was evaluated using Cronbach's Alpha and Composite Reliability. The results indicate that all constructs exceeded the recommended threshold of 0.70, demonstrating satisfactory reliability.

**Table 2. Reliability Statistics**

| Construct | Cronbach's Alpha | Composite Reliability |
|---|---|---|
| Digital Payment Utilization | 0.877 | 0.911 |
| Business Owner Satisfaction | 0.872 | 0.907 |
| Micro-enterprise Performance | 0.901 | 0.927 |

*Source: Processed SmartPLS Output*

These results indicate that all constructs consistently measured the intended concepts and were suitable for structural model evaluation.

## 5. Structural Model Evaluation

### *5.1 Coefficient of Determination ($R^2$)*

The explanatory power of the structural model was assessed using the coefficient of determination ($R^2$).

**Table 3. Coefficient of Determination**

| Endogenous Variable | $R^2$ | Adjusted $R^2$ |
|---|---|---|
| Business Owner Satisfaction | 0.580 | 0.575 |
| Micro-enterprise Performance | 0.650 | 0.641 |

*Source: Processed SmartPLS Output*

The model accounts for 65.0% of the variation in micro-enterprise performance and 58.0% of the variation in company owner satisfaction. These results show a moderate level of

explanatory power, indicating that the endogenous constructs are sufficiently explained by the suggested model, according to Chin (1998).

### *5.2 Effect Size ($f^2$)*

The contribution of each exogenous construct was evaluated using the effect size ($f^2$).

**Table 4. Effect Size**

| Relationship | $f^2$ |
|---|---|
| Digital Payment Utilization → Business Owner Satisfaction | 1.383 |
| Digital Payment Utilization → Micro-enterprise Performance | 0.093 |
| Business Owner Satisfaction → Micro-enterprise Performance | 0.396 |

*Source: Processed SmartPLS Output*

The results indicate that digital payment utilization has a substantial effect on business owner satisfaction. Business owner satisfaction also demonstrates a relatively strong contribution to micro-enterprise performance, whereas the direct effect of digital payment utilization on business performance is comparatively smaller.

### *5.3 Hypothesis Testing*

The hypotheses were tested using the bootstrapping procedure in SmartPLS.

**Table 5. Hypothesis Testing Results**

| Hypothesis | Path Coefficient | t-value | p-value | Decision |
|---|---|---|---|---|
| H1: Digital Payment Utilization → Micro-enterprise Performance | 0.278 | 2.550 | <0.001 | Supported |
| H2: Digital Payment Utilization → Business Owner Satisfaction → Micro-enterprise Performance | 0.438 | 5.180 | <0.001 | Supported |

*Source: Processed SmartPLS Output*

Both hypotheses were supported because the t-values exceeded 1.96 and the p-values were below the 0.05 significance level.

## 6. Discussion

### *6.1 The Effect of Digital Payment Utilization on Micro-enterprise Performance*

The findings demonstrate that digital payment utilization has a positive and statistically significant effect on micro-enterprise performance. This result suggests that businesses adopting digital payment systems experience better business outcomes than those relying primarily on conventional cash transactions.

The implementation of digital payment technologies simplifies transaction processes, reduces cash-handling activities, and improves the efficiency of financial management. In addition, offering multiple payment options enhances customer convenience, encourages purchasing decisions, and contributes to improved business competitiveness. These operational improvements ultimately support higher business performance.

The findings are consistent with the Technology Acceptance Model (Davis, 1989), which proposes that perceived usefulness and perceived ease of use encourage technology adoption. When business owners recognize that digital payment systems improve business operations, they are more likely to utilize the technology consistently, resulting in better organizational outcomes.

The present findings also support previous studies reporting that digital payment adoption contributes positively to operational efficiency, sales performance, and overall business growth among micro and small enterprises.

### *6.2 The Mediating Role of Business Owner Satisfaction*

The analysis further indicates that business owner satisfaction significantly mediates the relationship between digital payment utilization and micro-enterprise performance. Interestingly, the indirect effect ($\beta = 0.438$) is stronger than the direct effect ($\beta = 0.278$), suggesting that satisfaction represents an important mechanism through which digital payment utilization improves business performance.

Business owners who perceive digital payment systems as convenient, secure, and beneficial tend to report higher levels of satisfaction. Positive experiences encourage continuous utilization of digital payment technology, allowing businesses to maximize operational efficiency and customer service quality. As a result, satisfied users obtain greater business benefits than those who merely adopt the technology without experiencing positive outcomes.

These findings are consistent with Expectation Confirmation Theory (Oliver, 1980), which argues that satisfaction develops when users perceive that a technology performs according to or beyond their expectations. Continued technology utilization following satisfaction contributes to sustained improvements in organizational performance.

### *6.3 Implications of Organizational Transformation Theory*

The findings provide empirical support for Organizational Transformation Theory proposed by Rothwell, Stavros, and Sullivan (2015). Digital payment utilization represents a form of technological transformation that reshapes business processes within micro-enterprises. However, the study demonstrates that successful technological transformation depends not only on technology implementation but also on users' responses to that technology.

Business owner satisfaction reflects successful adaptation to digital transformation. When business owners perceive digital payment systems as valuable and compatible with their business needs, they are more willing to integrate the technology into daily operations. Consequently, technological transformation creates tangible improvements in organizational effectiveness and business performance.

Overall, these findings reinforce the argument that digital transformation is not merely a technological issue but also a human-centered process in which user satisfaction plays a crucial role in translating technological innovation into sustainable business success.

## 7. Conclusion

Using business owner satisfaction as a mediating variable, this study looked at how digital payment usage affected microbusiness performance. The results show that micro-enterprise performance is positively and significantly impacted by the use of digital payments. Business owners can execute transactions more effectively, streamline financial administration, enhance client convenience, and boost their competitiveness by implementing digital payment solutions. In the context of microenterprises, these benefits lead to improved organizational performance.

Additionally, the analysis reveals that business owner satisfaction has a substantial mediating function. Higher levels of satisfaction are typically reported by business owners who view digital payment services as practical, dependable, and helpful. This reinforces the beneficial effects of digital payment adoption on business performance. This result suggests that unless consumers have pleasant interactions with the system, technology adoption alone is insufficient to maximize company outcomes.

Additionally, the results offer empirical backing for Organizational Transformation Theory, which highlights that when technology innovation is effectively incorporated into organizational procedures and embraced by users, organizational performance improves. Digital payment systems are more than just a technology advancement in the context of microbusinesses; they are a strategic shift that improves operational efficacy through the active involvement and contentment of business owners.

By highlighting the significance of business owner satisfaction as a mechanism connecting digital payment utilization to business performance, this study adds to the expanding body of literature on digital transformation and micro-enterprise development. From a practical standpoint, the results indicate that in order to improve business owners' satisfaction and promote the long-term adoption of digital financial technologies, policymakers and digital payment service providers should concentrate not only on growing digital payment infrastructure but also on enhancing system usability, transaction security, and user support.

Despite offering insightful information, this study has a number of drawbacks. The study's rather small sample of microbusinesses in Yogyakarta's Special Region may limit how far the results may be applied to other areas or industries. To gain a more thorough understanding of the factors influencing micro-enterprise performance in the digital economy, future research is encouraged to include larger and more diverse samples as well as additional variables like digital literacy, trust, innovation capability, or technology readiness.

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# THE IMPACT OF GREEN FINANCE IMPLEMENTATION ON THE FINANCIAL PERFORMANCE OF BANKS IN INDONESIA

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***Abstract***
*The purpose of this study is to see if the implementation of green finance has any influence on the financial performance of Indonesian banks. The population consists of Indonesian banks that use green finance within their products and services, listed in the Indonesia Stock Exchange (IDX), and publish their sustainability reports and annual reports from 2020 to 2024. The technique used for sampling was non-probability sampling, specifically purposive sampling, with a total of seven banks as samples.The data utilized in this study were derived from 35 secondary data observations (panel data across seven banks and five years). The data analysis technique applied was simple linear regression with the assistance of IBM SPSS Statistics 27, with a Cochrane-Orcutt correction applied to address autocorrelation. The results indicate that the hypothesis that green finance implementation has a significant effect on the financial performance of banks in Indonesia is only partially supported: green finance has no significant effect on Return on Assets (ROA) or Return on Equity (ROE), but has a significant positive effect on Net Interest Margin (NIM).*
***Keywords****: Green Finance, Return on Assets, Return on Equity, Net Interest Margin.*

## 1. Introduction

Environmental issues are no longer considered simple issues, but rather major issues concerning the sustainability of human life. In 2013, the World Economic Forum stated that environmental and economic issues were the two biggest risks facing the world (Romli & Reza Zaputra, 2022). This awareness has driven consumers to demand that businesses change their operating methods and strategies to be more environmentally friendly (Riyanti et al., 2025).

For example, Jakarta's air pollution levels are high, with an Air Quality Index (AQI) of 127, categorized as "unhealthy for sensitive groups" due to high PM2.5 levels, significantly higher than Switzerland's score of 21 (IQAir, 2025). In addition to pollution, climate change due to global warming also increases the risk of natural disasters, prompting the global community, including COP26 members, to commit to reducing greenhouse gas emissions (Ma et al., 2025).

In response to this sustainability issue, banking institutions have begun developing green finance practices as a means of raising and allocating funds to support environmentally conscious projects (Riyanti et al., 2025). Some Indonesian banks continue to issue reports of their activities in support of sustainability, and they continue to pursue green finance policies through the issuance of green loans. Additional research is necessary to determine the degree to which green financing will affect the profitability of these banks.

The study developed from the above described background was designed to answer the following question: How does the implementation of green finance affect the financial performance of Indonesian banks, based on measurements of Return on Assets (ROA), Return on Equity (ROE) and Net Interest Margin (NIM)? It is anticipated that this study will provide a valuable academic resource for those interested in green finance; serve as a tool for potential green entrepreneurs to evaluate the feasibility of their venture; and provide input to Indonesian banks so that they can develop long-term business strategies which meet their commitments toward achieving the country's Net Zero Emission target by 2060.

## 2. Literature Review

### *2.1 Green Finance*

The concept of green finance is the environmentally friendly business operation, which ensures the sustainability of the environmental quality and provides credit or financing to the clients who do not cause any environmental pollution (Suharto, 2023). In relation to the banking sector, this method is used to promote the growth of environmentally-friendly financing and to alter investment behavior to respond to the challenges related to climate change mitigation (Riyanti et al., 2025). According to research conducted in Bangladesh by Bose and Khan (2022), there is a connection between bank financial performance and green banking implementation, which proves that sustainable financing is a key strategy of financial institutions.

### *2.2 Bank Profitability*

Profitability is the ratio that is utilized to calculate a company's capability to earn profits through its regular operations (Hery, 2015). Three profitability indicators are utilized within this study: Return on Assets (ROA) – the indicator of the firm's ability to earn net profit through total assets; Return on Equity (ROE) – the ratio that represents the capability of earning profit through the company's capital; and Net Interest Margin (NIM) – the indicator that shows the efficiency of disbursing credits (Samosir & Faddila, 2023).

### *2.3 Hypothesis*

The above-stated theoretical concept forms the basis for the following hypothesis proposed in this research work:

$H_1$: The application of green finance contributes to positive financial performance of banks in Indonesia.

The conceptual framework of this study is shown in Figure 1.

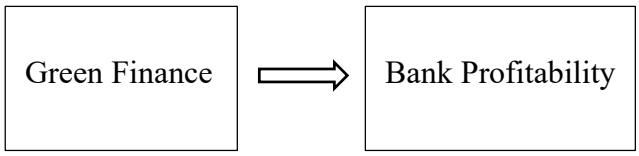



**Figure 1. Conceptual framework**
*Source*: Azzahra et al. (2023); Subastine et al. (2025)

## 3. Research Findings and Discussion

### *3.1 Findings*

A summary of the green finance ratios of the seven sample banks from 2020 to 2024 shows considerable variation. BRI consistently recorded the highest green finance ratio, ranging from 63.9% to 67.5%, while BCA and Bank Mandiri recorded relatively lower but stable ratios. Conversely, Bank Maybank Indonesia and Bank Danamon showed a downward trend in their green finance ratios towards the end of the study period, from 42.82% to 19.4% and from 37% to 21%, respectively.

The t-test results show that green finance has no significant effect on Return on Assets (significance value 0.586 > 0.05) or Return on Equity (significance value 0.808 > 0.05). In contrast, green finance has a positive and significant effect on Net Interest Margin, with a significance value of 0.001 ≤ 0.05 and a B coefficient of 0.037. The R Square value in the NIM model of 0.295 indicates that green finance is able to explain 29.5% of the variation in NIM, while the ability of green finance to explain variations in ROA and ROE is very low (0.9% and 0.2%, respectively). Thus, $H_1$ is only partially accepted.

**Table 1. Hypothesis Testing Results**

| Dependent Variable | Koef. | Sig. | Decision |
|---|---|---|---|
| ROA | 0.008 | 0.586 | Not significant |
| ROE | 0.023 | 0.808 | Not significant |
| NIM | 0.037 | 0.001 | Significant |

*Source:processed data (2026)*

### *3.2 Discussion*

The finding that green finance had no significant effect on ROA and ROE indicates that the implementation of green finance by banks in Indonesia has not yet significantly impacted banks' overall profit-generating capabilities, both in terms of assets and capital. This finding aligns with research (Riyanti et al., 2025), which also found that green finance has not significantly increased bank profitability. This reinforces the hypothesis that the benefits of green finance on profitability take longer to be seen, given that investments in the green sector are generally long-term.

Conversely, the significant effect on NIM indicates that green finance is quite effective in increasing banks' net interest income, as NIM more specifically measures a bank's efficiency in disbursing credit, including green credit. The differences in results between these indicators are also influenced by the study period, which encompasses the pandemic and post-COVID-19 recovery period, when ROA and ROE are influenced by many other operational factors beyond the scope of the study, making them more volatile than NIM.

## 4. Conclusion

### *4.1 Conclusion*

Based on the analysis of seven banks listed on the Indonesia Stock Exchange (IDX) that implemented green finance during the 2020–2024 period, green finance had varying impacts on each profitability indicator. Green finance had no significant effect on ROA and ROE, but did significantly affect NIM. Therefore, during this research period, green finance had a greater impact on the efficiency of bank interest income than on the bank's overall ability to generate profits. Consequently, the research hypothesis was only partially accepted.

### *4.2 Implications*

For Indonesian banks, the finding that green finance significantly impacts NIM suggests that green financing can be a strategy to increase net interest income efficiency, thus warranting continued strengthening of the green finance product portfolio. However, because green finance has not yet significantly impacted ROA and ROE, banks also need to comprehensively evaluate their risk management strategies and operational efficiency. Future researchers are advised to expand the research area to other sectors, extend the research period, increase the sample size, and include other variables such as credit risk, operational efficiency, company growth, or macroeconomic factors.

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# DO CORPORATE GOVERNANCE AND FINANCIAL PERFORMANCE INFLUENCE FIRM VALUE? EVIDENCE FROM FOOD AND BEVERAGE COMPANIES

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***ABSTRACT***
*This paper investigates how institutional ownership, independent commissioners, audit quality, leverage, and profitability jointly shape firm value among food and beverage companies listed on the Indonesia Stock Exchange (IDX) between 2021 and 2024. The study responds to two gaps in the literature: prior research has produced conflicting conclusions about these relationships, and empirical evidence specific to the food and beverage sector remains limited. A quantitative design was adopted, drawing on purposively sampled firms whose financial statements and annual reports are published through the IDX website. Applying the study's sampling criteria narrowed an initial population of 97 companies to 30, yielding 120 firm-year observations; after outliers were removed, 116 observations remained for analysis. Multiple linear regression, supported by the standard classical assumption tests, was performed in Eviews 13. The results show that institutional ownership, independent commissioners, audit quality, leverage, and profitability exert an influence on firm value.*
***Keywords****: institutional ownership, independent commissioners, audit quality, leverage, profitability, firm value*

## 1. Introduction

The food and beverage subsector is one of the important sectors supporting Indonesia's economic growth due to its contribution to employment and national income. According to CNBC Indonesia (2025), this subsector plays a strategic role in the national economy due to its contribution to employment and Gross Domestic Product (GDP). However, companies in this sector continue to face challenges in maintaining investor confidence and firm value amid increasing competition and economic uncertainty.

Firm value functions as a barometer of how investors read a company's present standing and future trajectory. When firm value is high, it signals that the market trusts the company's capacity to sustain returns and build shareholder wealth over time (Brigham & Houston, 2016). This is precisely why firms invest continuously in governance quality and financial performance as levers for raising their valuation (Subiyanto et al., 2022).

Corporate governance mechanisms are considered important factors in mitigating the conflicts of interest that arise between a company's management and its shareholders. According to agency theory proposed by Jensen & Meckling, (1976), differences in interests between principals and agents may encourage managerial actions that are not aligned with shareholder objectives. Institutional ownership and independent commissioners are commonly positioned as correctives to this problem, functioning as oversight channels that strengthen managerial supervision and accountability (Jensen & Meckling, 1976; Saputri, 2025).

Institutional ownership can act as an external monitoring mechanism because institutional investors generally have greater resources and incentives to oversee managerial decisions. Meanwhile, independent commissioners play an important role in ensuring that the board performs its supervisory function objectively and effectively. Effective governance mechanisms are

expected to reduce agency problems and improve investor confidence, which may contribute to higher firm value (Damarani et al., 2024; Yonathan & Apriwenni, 2025).

Audit quality is also an important component of corporate governance because it guarantees the trustworthiness and accuracy of the financial data provided to stakeholders. High-quality auditors are expected to detect material misstatements and provide more reliable financial reports, thereby reducing information asymmetry between companies and investors (Holly, Jao, Mardiana, et al., 2023). Based on signalling theory, credible financial information can provide positive signals regarding company performance and prospects, which may influence investors' assessments of firm value (Setianingrum & Hendrani, 2024).

In addition to governance factors, financial performance also influences investors' perceptions of firm value. Profitability captures how efficiently a company converts its assets into earnings, while leverage represents the company's financial risk related to debt usage (Purwanti et al., 2025). According to signaling theory, strong profitability and appropriate leverage management send investors a favorable signal about the firm's stability and its capacity to keep growing (Setianingrum & Hendrani, 2024).

Previous studies examining the relationship between institutional ownership, independent commissioners, audit quality, leverage, profitability, and firm value have produced inconsistent results. Several studies found that institutional ownership and independent commissioners positively influence firm value, whereas other studies reported negative or insignificant relationships (Damarani et al., 2024; Hidayat et al., 2025; Wardoyo & Fauziah, 2024). Similar inconsistencies were also found in studies related to profitability and leverage, indicating that further research is needed to obtain a more comprehensive understanding of factors affecting firm value (Satriani et al., 2024; Wahyuningrum & Sunarto, 2023).

A further gap is sectoral: the bulk of prior empirical work concentrates on banking, mining, and infrastructure, leaving the food and beverage subsector comparatively under-examined. The characteristics of this subsector, which are influenced by consumer demand, competition, and changes in production costs, may create different factors affecting firm value compared with other industries. The objective of this research is to assess how a set of corporate governance and financial performance factors collectively affect firm value, with empirical evidence drawn from food and beverage firms on the IDX during the 2021-2024 period.

## 2. Literature Review

### *2.1 Agency Theory*

Agency theory elucidates the contractual bond between principals (shareholders) and agents (managers), in which each party has different objectives and interests (Jensen & Meckling, 1976). These differences may encourage managers to prioritize personal interests over shareholders' wealth, resulting in agency conflicts that can reduce firm value (Jensen & Meckling, 1976). To minimize these conflicts, companies need effective monitoring mechanisms that ensure managerial decisions remain aligned with shareholders' interests. Institutional ownership and independent commissioners are considered important governance mechanisms because they strengthen supervision and improve managerial accountability (Halim & Suhartono, 2021).

### *2.2 Signalling Theory*

Signaling theory posits that companies disclose information to external parties in order to minimize the information asymmetry that exists between management and investors (Spence, 1973). Financial information disclosed by companies serves as a signal that helps investors evaluate corporate performance and prospects (Setianingrum & Hendrani, 2024). Positive signals, such as strong profitability, credible disclosures, and high-quality audit, are anticipated to bolster investor trust in the company. Conversely, negative signals may reduce investors' confidence and negatively affect market valuation (Spence, 1973).

### *2.3 Institutional Ownership*

Institutional ownership can be defined as the percentage of a company's shares held by institutional entities, such as banks, insurance companies, investment firms, and pension funds (Liliana & Karina, 2025). Institutional investors generally possess greater expertise, experience, and resources to monitor managerial performance than individual investors (Mahadewi & Budiasih, 2021). Effective monitoring by institutional investors is anticipated to help prevent opportunistic managerial behavior and improve overall corporate governance. Strong institutional ownership may also enhance investor confidence because management is subject to greater supervision. The formula used to calculate institutional ownership is as follows:

$$\textit{Institutional Ownership}\ (\text{IOW}) = \frac{Number\ of\ institutional\ shares}{Total\ shares\ outstanding}$$

### *2.4 Independent Board of Commissioners*

Independent commissioners are members of the board of commissioners who have no financial, managerial, or family relationships with controlling shareholders or company management (Laksana & Handayani, 2022). Their primary responsibility is to oversee managerial activities objectively and ensure that corporate decisions are made in the best interests of shareholders. Through independent supervision, companies are expected to improve transparency, accountability, and compliance with corporate governance principles (Yonathan & Apriwenni, 2025). Effective oversight by independent commissioners may also reduce agency conflicts and strengthen investor confidence. The following formula is used to determine the proportion of independent commissioners:

$$\textit{Independent Commissioner}\ (\text{IC}) = \frac{Number\ of\ Independent\ Commissioners}{Total\ Number\ of\ Company\ Commissioners}$$

### *2.5 Audit Quality*

Audit quality denotes an auditor's competence in surfacing and reporting material misstatements with objectivity and independence (Susanty, 2022). High-quality audits improve the credibility of financial reporting by reducing information asymmetry between management and investors (Holly, Jao, & Thody, 2023). Reliable financial statements enable investors to make more accurate investment decisions and increase confidence in the company's reported performance. Companies audited by reputable auditors are generally perceived as having more transparent and reliable financial information. In the present study, audit quality is assesd through the reputational ranking of the public accounting firm, using a dummy or binary variable (a value of 1 for companies audited by a Big Four firm and 0 for non-Big Four firms).

### *2.6 Leverage*

Leverage describes how heavily a company relies on debt financing to support its assets and day-to-day business operations (Nopianti et al., 2023). The use of debt may increase the company's growth opportunities, but excessive leverage can also expose the company to greater financial risk (Soleman et al., 2022). In their evaluation of corporate financial soundness, investors frequently consider leverage as a proxy for the firm’s ability to service long-term liabilities. Therefore, companies are expected to maintain an optimal capital structure to balance financial risk and potential returns. The Debt to Assets Ratio (DAR), which has the following calculation, is the leverage ratio utilized in this study:

$$\text{DAR} = \frac{Total\ Debt}{Total\ Assets}$$

### *2.7 Profitability*

Profitability reflects a company's ability to generate earnings through the effective utilization of its assets and operational activities (Purwanti et al., 2025). Higher profitability

indicates better managerial efficiency in utilizing available resources to create value for shareholders (Hanafi, 2016). Companies with strong profitability generally have greater capacity to finance future investments and distribute returns to investors. As a result, profitable companies are more likely to receive positive market assessments and attract investment. In this study, profitability is measured using Return on Assets (ROA) with the following formula:

$$\text{ROA} = \frac{Net\ Income}{\text{Total Assets}}$$

### *2.8 Firm Value*

Firm value expresses how investors read a company's current standing together with its growth trajectory (Novaliza & Nursiam, 2025). Companies carrying a higher value are generally viewed as having stronger financial performance and better long-term sustainability, making them more attractive to investors (Meifari, 2023). Increasing firm value is a primary objective of corporate financial management because it is closely related to shareholder wealth. In empirical studies, firm value is commonly quantified using Tobin's Q because it captures market assessments more comprehensively than book value (PBV). Tobin's Q is calculated as:

$$\text{Q} = \frac{MVE\ +\ Debt}{Total\ Assets}$$

Notes:
Q = Tobin's Q Value
MVE = Market Value of Equity
Debt = Total liability (long-term liability + short-term/current liability)
TA = Total assets

### *2.9 Theoretical Framework*

This study examines dependent and independent variables. The following figure presents the research framework, illustrating how firm value is hypothesized to be influenced by a set of governance and financial indicators.

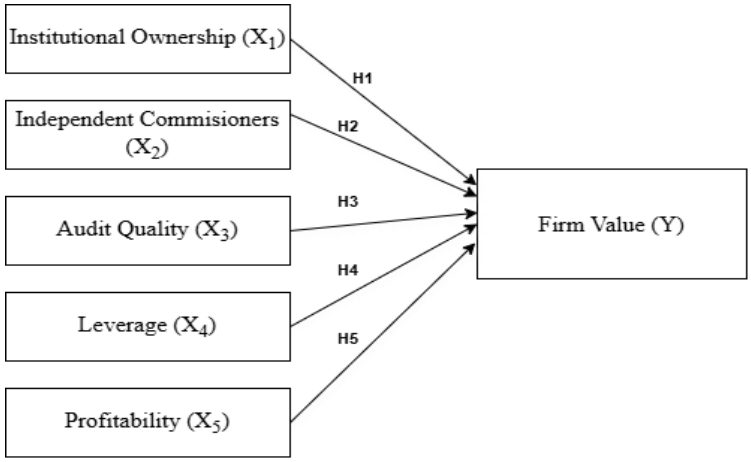



Figure 1. Theoretical Framework

Building on this conceptual framework and drawing support from theory and previous research, the research hypotheses are next subjected to empirical testing, as delineated below:

H1: Institutional ownership affects firm value
H2: Independent commissioners affect firm value
H3: Audit quality affects firm value
H4: Leverage affects firm value
H5: Profitability affects firm value

## 3. Research Methods

### *3.1 Research Design*

The research is underpinned by a quantitive methodology, utilizing secondary data derived from the annual reports and financial statements of food and beverage enterprises listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. These documents were sourced directly from IDX's official portal (www.idx.co.id) and from the respective official websites maintained by sampled company.

### *3.2 Population and Sample*

Sugiyono (2023) population is a set of objects or subjects, bounded by particular traits and a defined scope, which a researcher designates as the object of inquiry and the ground from which conclusions are drawn. Here, the population comprises every food and beverage company listed on the IDX. From that population, a sample was drawn through purposive sampling, guided by four selection criteria: (a) the company operates within food and beverage manufacturing and maintained continuous IDX listing across 2021–2024; (b) it published complete annual and financial reports throughout the period; (c) its financial statements are denominated in Indonesian rupiah; and (d) it supplies full data on every variable under study, which is institutional ownership, independent commissioners, audit quality, leverage, profitability, and firm value. These criteria narrowed the sample to 30 companies, yielding 116 firm-year observations once outliers had been removed.

### *3.3 Data Analysis Techniques*

This study employs multiple linear regression as an analytical tool. Prior to running the regression itself, classical assumption tests were carried out to confirm the model met the basic prerequisites of multiple linear regression.

#### *3.3.1 Classical assumption testing*

Before running the regression itself, classical assumption tests were conducted to confirm the model met the basic prerequisites of multiple linear regression (Ghozali & Ratmono, 2017). These tests included normality, multicollinearity, autocorrelation, and heteroskedasticity checks. Meeting these assumptions was essential to avoid bias and guarantee the validity of the regression outcomes. More boardly, Classical assumption testing is a way of checking that regression model is fit for hypothesis testing. These tests determine whether the research model meets the statistical requirements so that the relationship between the independent and dependent variables can be properly analyzed. The results of those tests, as applied to this study's data, follow below.

***a. Normality test***

Residual normality was verified through the Jarque-Bera test, where a probability value exceeding 0.05 indicated normal distribution, ensuring the regression model's reliability (Ghozali & Ratmono, 2017).

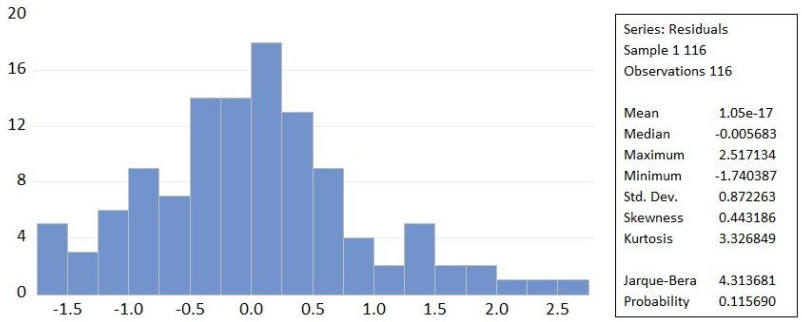



Figure 2. Histogram Normality Test

*Source:* Data Processed Eviews 13 (2026)

As Figure 2 shows, the Jarque-Bera probability value came out to 0.1157. Because this exceeds the 0.05 threshold, the residuals may be regarded as normally distributed, confirming that the normality assumption holds and that the model can proceed to subsequent testing.

***b. Multicollinearity test***

The multicollinearity check probes whether the independent variables are too tightly correlated with each other, which would compromise the regression's reliability. This study relies on the Centered Variance Inflation Factor (VIF) for that purpose, treating any VIF reading under 10 as evidence the model is free of multicollinearity (Ghozali & Ratmono, 2017).

**Table 1. Multicollinearity test result**

| Variable | Coefficient Variance | Uncentered VIF | Centered VIF |
|---|---|---|---|
| C | 0,2861 | 41,7265 | NA |
| IOW | 0,1268 | 11,9071 | 1,1229 |
| IC | 1,0710 | 25,4107 | 1,0293 |
| AQ | 0,0310 | 2,0625 | 1,1202 |
| LEV | 0,1168 | 4,1661 | 1,0235 |
| PROFIT | 1,1152 | 2,8496 | 1,0314 |

*Source:* Data Processed Eviews 13 (2026)

Notes:

IOW = Institutional Ownership
IC = Independent Commissioner
AQ = Audit Quality
LEV = Leverage
PROFIT = Profitability

Based on the results of the multicollinearity test in the table above, the institutional ownership (IOW) variable has a Centered VIF value of 1.1229, independent commissioners (IC) 1.0293, audit quality (AQ) 1.1202, leverage (LEV) 1.0235, and profitability (PROFIT) 1.0314. None of these figures approach the threshold of concern, so the model can be considered free of multicollinearity.

***c. Heteroscedasticity test***

Heteroscedasticity testing checks for uneven variance across a regression's residuals. This study applies the Glejser test to examine that consistency. The Glejser test was applied to examine variance consistency. A significance probability above 0.05 indicated no heteroskedasticity, confirming the model's stability (Ghozali & Ratmono, 2017).

**Table 2. Heteroscedasticity test result**

| Variable | Coefficient | Std. Error | *t-statistic* | Prob. |
|---|---|---|---|---|
| C | 1,3859 | 0,2625 | 5,2816 | 0,0000 |
| IOW | -0,4552 | 0,1692 | -2,6897 | 0,0083 |
| IC | -1,6175 | 0,4629 | -3,4945 | 0,0007 |
| AQ | 0,1454 | 0,1015 | 1,4319 | 0,1550 |
| LEV | -0,1565 | 0,1671 | -0,9368 | 0,3509 |
| PROFIT | 2,4954 | 0,6156 | 4,0535 | 0,0001 |

*Dependent variable: Absolute Residual*
*Source:* Data Processed Eviews 13 (2026)

According to the result of the Glazer test, it was found that the audit quality (AQ) variable had a probability value of 0.1550 and a leverage of 0.3509; thus, neither variable exhibited heteroscedasticity because their probability values were greater than 0.05. Meanwhile, the institutional ownership variable (IOW) has a probability value of 0.0083, the independent commissioner variable (IC) has a value of 0.007, and the profitability variable (PROFIT) has a value of 0.0000. The probability values for these three variables are less than 0.05, indicating the presence of heteroscedasticity. However, in this study, heteroscedasticity was addressed using the Heteroscedasticity-Consistent Variance and Standard Error method with the Huber-White approach. This correction was necessary to ensure that the regression model could still be used for further testing and that the results of the hypothesis testing would not be misleading (Ghozali & Ratmono, 2017).

***d. Autocorrelation test***

An autocorrelation test was perfomed to examine residual correlation across consecutive periods. The autocorrelation test in this study used the Durbin-Watson (DW) test, that employed to detect autocorrelation, with the model was deemed valid if DW values fell within the range dU < DW < 4 – dU (Ghozali & Ratmono, 2017).

**Table 3. Autocorrelation test result**

| Variable | dU | DW | 4 – dU |
|---|---|---|---|
| Unstandardized residual | 1,7878 | 1,9466 | 2,2122 |

*Source:* Data Processed Eviews 13 (2026)

Based on the test results, the Durbin-Watson statistic was found to be 1.9466. This value falls between dU and 4 – dU (1.7878 < 1.9466 < 2.2122), which confirm the absence of autocorrelation in the regression model, as determined through EViews analysis.

## 4. Research Findings and Discussion

### *4.1 Descriptive Statistical Analysis Processed*

Descriptive statistical analysis is used to describe the research data, including the minimum value, maximum value, mean, and standard deviation of each research variable.

**Table 4. Descriptive Statistical Test Results**

| | IOW | IC | AQ | LEV | PROFIT | FV |
|---|---|---|---|---|---|---|
| Mean | 1,8938 | 0,7637 | 0,3951 | 0,4569 | 0,4296 | 0,1057 |
| Maximum | 5,5738 | 0,9979 | 0,6667 | 1,0000 | 1,4330 | 0,4888 |
| Minimum | 0,5100 | 0,0013 | 0,3333 | 0,0000 | 0,0600 | 0,0001 |
| Std. Deviation | 1,1131 | 0,2475 | 0,0815 | 0,5003 | 0,2462 | 0,0800 |
| Observations | 116 | 116 | 116 | 116 | 116 | 116 |

*Source:* Data Processed Eviews 13 (2026)

The “observations” column in the table shows the number of observations employed in the analysis, namely 116 observations from firm operating in the food and beverage subsector during the study period.

### *4.2 Multiple linear regression analysis*

#### *4.2.1 Coefficient of Determination (R-squared)*

The coefficient of determination ($R^2$), which ranges from 0 to 1, indicates the extent to which the variation in the dependent variable can be accounted for by the

independent variables.

**Table 5. Result of coefficient determination**

| R-squared | Adjusted R-squared |
|---|---|
| 0,3859 | 0,3580 |

*Source:* Data processed in Eviews 13 (2026)

The adjusted R-squared value obtained from the test was 0.3580, indicating that institutional ownership, independent commissioners, audit quality, leverage, and profitability collectively explain 35.80% of the variation in firm value, while the remaining 64.20% is explained by variables outside the scope of this study.

### *4.2.2 F-test*

The F-test assesses whether the independent factors collectively exert a substantial influence on the dependent variable, in other words, this test aims to assess whether the regression model used is appropriate for testing the research hypotheses (Ghozali & Ratmono, 2017).

**Table 6. Result of F test**

| F table | F-statistic | Prob(F-statistic) |
|---|---|---|
| 2,30 | 13,8272 | 0,0000 |

*Source:* Data Processed Eviews 13 (2026)

The test outcomes indicate that the computed F-value (F-statistic) exceeds the tabulated F-value (13.8272 > 2.30), and the probability value (F-statistic) of 0.0000 is lower than 0.05; therefore, these outcomes confirm that the variables of institutional ownership processed in Eviews, independent commissioners, audit quality, leverage, and profitability simultaneously influence firm value. Thus, the regression model in this study is appropriate for hypothesis testing.

## *4.3 Hypothesis testing (t-test)*

Known as the partial significance test, the t-test evaluates the separate contribution of every independent variable to the dependent variable. The purpose of this test is to identify which independent variables significantly influence the dependent (Ghozali & Ratmono, 2017).

**Table 7. Result of t test**

| Variabel | Coefficient | Std. Error | t table | *t-statistic* | Prob. |
|---|---|---|---|---|---|
| C | 3,3534 | 0,5502 | 1,981 | 6,0946 | 0,0000 |
| IOW | -1,5592 | 0,3780 | | -4,1249 | 0,0001 |
| IC | -2,1194 | 0,7796 | | -2,7187 | 0,0076 |
| AQ | 0,4462 | 0,1925 | | 2,3175 | 0,0223 |
| LEV | -0,7666 | 0,3153 | | -2,4316 | 0,0166 |
| PROFIT | 6,5625 | 1,4810 | | 4,4313 | 0,0000 |

*Dependent variable: Firm Value*

*Source:* Data Processed Eviews 13 (2026)

Based on the test results, it was concluded that:

a. The institutional ownership (IOW) variable yields a t-statistic of -4.1249, which is less

than the t-table value of 1.981, and a probability value of 0.0001. Since this probability is below 0.05, the institutional ownership has a significant effect on firm value, thus H1 is accepted.

Referring to agency theory, institutional ownership is expected to strengthen monitoring of management and consequently increase firm value. Nevertheless, this study finds the opposite result. This situation may arise because institutional investors—who are expected to enhance oversight—are perceived as unable to perform their monitoring function optimally. Furthermore, institutional investors are suspected of prioritizing short-term profit generation over increasing firm value in the long term. Consequently, higher institutional ownership leads to a decline in firm value.

b. Independent commissioners (IC) shows a t-statistic of -2.7187, which is less that the t-table value of 1.981, and a p-value of 0.0076 < 0.05, indicating a significant impact on firm value. Hence, H2 is accepted.

Agency theory posits that the presence of independent commissioners is fundamentally intended to enhance the effectiveness of oversight regarding a company's management policies and performance. However, the results of this study indicate that increasing the proportion of independent commissioners has not yet yielded a positive impact on firm value. This situation may arise because the oversight function performed by independent commissioners is not yet functioning optimally, thereby limiting the effectiveness of management control. Furthermore, in some companies, the presence of independent commissioners may still be focused on regulatory compliance rather than strengthening oversight functions, leading investors to question the quality of that oversight. The market may also perceive a high number of independent commissioners as a source of inefficiency for the company.

c. The audit quality (AQ) variable exhibit a t-statistic of 2.3175, surprasing the critical t-value of 1.981, alongside a probability value of 0.0223. As this p-value is less than 0.05 significance level, we conclude that audit quality significantly influences firm valu, thereby supporting H3.

Signaling theory explains these results, proposing that audit quality corporate information serves as a signal that helps investors assess a company's future condition. The results of this study indicate that companies utilizing the services of "Big Four" public accounting firms tend to receive more favorable assessments from investors. This suggests that high audit quality enhances the credibility and reliability of the financial information presented by the company, thereby boosting market confidence and, ultimately, increasing firm value.

d. Leverage (LEV) has a t-statistic of -2.4316 < 1.981 (t-table) and a p-value of 0.0166; indicating a significant effect on firm value. Therefore, H4 is accepted.

These findings align with signaling theory, which posits that leverage serves as a signal for investors to assess the company's future condition. A company with high leverage indicates that it relies heavily on debt to finance its assets. Such high debt usage can increase the company's financial risk, thereby causing firm value to decline.

e. Profitability (PROFIT) has a t-statistic of 4.4313 > 1.981 (t-table) and a probability value of 0.0000. Thus, profitability has an effect on firm value. The higher a firm’s profitability, the more its firm value tends to increase. So, it can be concluded that H5 is accepted.

This outcome is consistent with signaling theory, which holds that profitability functions as a signal that investors use to assess a company's prospects. Firms with high profitability are often regarded more favorably by investors, since profitability shows the efficiency

with which a corporation utilizes its assets to produce earnings. A high level of profitability reflects sound asset management in producing earnings, which strengthens investor trust and ultimately increases firm value.

## 5. Conclusion

Drawing together the findings, this study arrives at five conclusions:

a. Institutional ownership negatively affects firm value. This indicates that higher institutional ownership is associated with lower firm value.
b. Independent commissioners negatively affect firm value. This indicates that a higher proportion of independent commissioners leads to a decline in firm value.
c. Audit quality positively affects firm value. This indicates that higher audit quality contributes to greater firm value.
d. Leverage negatively affects firm value. This indicates that higher leverage is associated with lower firm value.
e. Profitability positively affects firm value. This indicates that higher profitability contributes to greater firm value.

The present study acknowledges considerable limitations, chiefly its narrow focus on food and bavarage firms on the IDX (2021-2024), with five independent variables, institutional ownership, independent commissioners, audit quality, leverage, and ptofitability, limiting generalizability. This research strengthens the theoretical discourse on firm value through agency and signaling lenses. Practically, it assists firms in refining governance and financial strategies, supports investor decision-making, and lays groundwork for future ivestigations using alternative variables or sectors.

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# DYNAMICS OF ORGANIZATIONAL CHANGE THROUGH THE USE OF DELIVERY SERVICES, DIGITAL PAYMENT METHODS, AND SOCIAL MEDIA TO IMPROVE THE PERFORMANCE OF MICROENTERPRISES IN YOGYAKARTA

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***Abstract***
*This study aims to analyze the dynamics of organizational change in microenterprises in Yogyakarta through the use of delivery services, digital payment methods, and social media to improve business performance. The study employs a qualitative approach using qualitative content analysis. Data were collected through semi-structured interviews with 20 microbusiness owners who have been operating their businesses for several years and have implemented various forms of digital technology in their business activities. The results show that by providing goods delivery services, vehicle pickup, and out-of-area shipping, delivery services drive changes in service systems. Business transactions and financial record-keeping are made easier through digital payments, particularly QRIS. Social media is also used to promote products and interact with customers through live streams and content. With the integration of these three technologies, business systems have become more flexible, services have improved, and microenterprises have become more competitive. The results indicate that digital transformation plays a crucial role in facilitating change and ensuring the sustainability of microenterprises in the digital age.*
***Keywords****: organizational change, microenterprises, delivery services, digital payments, social media.*

## 1. Introduction

Today, microenterprises are significantly influenced by advances in information and communication technology. This situation requires microenterprises to adapt to an increasingly dynamic business environment. Some of the most common changes occurring in microenterprises include the use of delivery services, digital payments, and social media. First, the use of app-based delivery services has opened up new opportunities for businesses to reach a wider customer base without having to establish branches in other locations. Product delivery has become easier and faster with delivery services. Delivery services are one way for micro-businesses to boost their competitiveness amid increasingly fierce competition. Business owners can monitor incoming orders through the digital platforms provided by delivery services. Production, packaging, customer service, and work schedule management must be adjusted to accommodate these changes.

Second, it has become increasingly easy for the public to use various cashless payment methods thanks to advances in financial technology. Today, consumers can make payments via digital wallets, bank transfers, and QRIS, and this convenience is driving an increase in the use of digital payments across various business transactions. The Indonesian government, through Bank Indonesia (BI), has also been actively promoting the acceleration of payment system digitization by spearheading the National Cashless Movement (GNNT) and the widespread adoption of QRIS (Quick Response Code Indonesian Standard) since 2020 (Bank Indonesia, 2025). Digital payment methods make transactions more convenient, faster, and safer compared to cash payments. In addition, digital payments help businesses keep better records of transactions, which in turn helps them manage their operations more effectively. Third, social media has become one of the most effective ways to promote products and build relationships with customers. Various platforms such as Instagram, Facebook, TikTok, and WhatsApp Business allow business owners to introduce their businesses to the public at a relatively low cost compared to conventional promotional strategies. This means that business owners can showcase their products, provide information about Literature Review.

## 2. Literature Review

### *2.1 Organizational Change*

Change is a deviation from the current state. This means moving not only toward a goal, an ideal state, or a vision of what should be, but also away from the current situation, beliefs, or attitudes. On this topic, there are three levels of change: alpha, beta, and gamma (Golembiewski, 1990 in Rothwell et al., 2016): Alpha change is a shift from the pre-change state to the post-change state, in which the measurement methods and variables remain the same. Sometimes, incremental change is associated with this. Beta change signifies a shift; it is a transition from the pre-change state to the post-change state in which the variables and measurement methods themselves remain valid. As group members engage in change efforts, they encounter new problems they were not initially aware of, and they adjust their perspectives on what should happen, thereby altering the direction of the change effort itself.

In addition to beta change, gamma change indicates a radical shift from the pre-change state to the post-change state. This is sometimes referred to as a paradigm shift, a quantum leap, transformational change, or a radical departure from the status quo. It involves a total revolution in "how we do things" or "what outcomes we strive to achieve."

### *2.2 Definition of MSMEs*

According to the Organization for Economic Cooperation and Development (OECD), the number of employees in small and medium-sized enterprises (SMEs) is not largebin fact, it is relatively small and this number varies from country to country. Micro and small businesses differ in the number of employees they have. Micro enterprises have 10 or even fewer than 5 employees, while small enterprises have more than 50 employees. As noted by Permana in Pitoyo and Sudaryatno (2023), small and medium-sized enterprises (SMEs) engage in economic activities and are typically categorized as small-scale enterprises. These enterprises are managed simply and use traditional technology in their operations.

According to Law No. 20 of 2008 on Micro, Small, and Medium Enterprises (MSMEs), the objective is to provide special recognition and protection for MSMEs in order to develop economic potential and reduce disparities between the large and small business sectors. This regulation provides legal recognition as well as support in the form of easier access to capital, training, marketing, and various incentives for MSMEs.

### *2.3 Characteristics of MSMEs*

Suryadinata (2014) explains that the characteristics of MSMEs are as follows: Business scale. MSMEs are small- to medium-scale businesses.

a. Capital. MSMEs have limited capital.
b. Market. MSMEs tend to serve local markets.
c. Management. The management structure of MSMEs is relatively simple
d. Limited resources. MSMEs face constraints in terms of human, financial, and technological resources.
e. Flexibility and resilience. MSMEs can adapt quickly to change and are resilient to economic shocks.
f. Local markets. MSMEs focus on local markets and have in-depth knowledge of local consumer needs.

### *2.4 Strengths, Weaknesses, and Advantages of MSMEs*

#### *Strengths and Weaknesses of MSMEs*

Suryadinata (2014) explains that MSMEs have several advantages, disadvantages, and strengths, which are outlined as follows:

a. Flexibility and speed of adaptation. MSMEs tend to adapt more easily to changes in the market and consumer preferences, allowing them to respond more quickly to market needs and demands.

b. Close relationships with customers. SMEs are able to build stronger, more personal relationships with customers
c. Operational flexibility. MSMEs have a simpler structure, making it easier to adjust operations to meet market needs.
d. Rapid decision-making. The decision-making process tends to be faster due to a flatter hierarchy.

In addition to these advantages, SMEs also have several disadvantages, namely:

a. Limited resources. Many small and medium-sized enterprises (SMEs) face constraints in terms of financial resources, human resources, and access to technology, which can hinder their scalability and capacity.
b. Limited capital. It is often difficult for SMEs to secure funding.
c. Production capacity is limited. Small and medium-sized enterprises (SMEs) cannot produce goods in large quantities.
d. Lack of competitiveness. Small and medium-sized enterprises (SMEs) may have more limited resources compared to large companies.
e. The strengths and weaknesses of SMEs are accompanied by advantages that allow them to compete with various types of businesses. The following are the advantages of SMEs:
f. Their small size often allows SMEs to be more innovative and creative in developing new products and implementing innovations quickly and efficiently.
g. In terms of product customization, SMEs can tailor products or services to meet specific customer needs.
h. In terms of sustainability, MSMEs tend to have stronger ties to local communities, which can help businesses survive over the long term.

### *2.5 Definition and Characteristics of Microenterprises*

Zulkarnain et al. (2022) define a microenterprise as a small-scale, traditional, and informal economic activity meaning it is unregistered, unrecorded, and lacks legal entity status. The annual sales revenue of such businesses is at most 100 million rupiah. Nurhayaty & Aliudin (2022) explain that, according to Government Regulation No. 7 of 2021, a microenterprise is a productive business owned by an individual and/or a sole proprietorship that meets the criteria for a microenterprise namely, having a net worth of at most 1 billion rupiah, excluding land and business premises, or having annual sales revenue of at most 2 billion rupiah. Pitoyo and Sudaryatno (2023) explain that the criteria for determining whether such a business qualifies as an MSME can be assessed based on business volume, capital, asset value, net worth, and the number of employees.

Sastradinata (2024) explains that a microenterprise is the smallest-scale business within the MSME classification. The criteria used to identify microenterprises are as follows:

a. Total business assets (land, buildings, machinery, and equipment) valued at no more than 50 million rupiah.
b. Annual revenue does not exceed 300 million rupiah.
c. A workforce of no more than nine employees.
d. A simple management structure.
e. The owner may also serve as the manager.

### *2.6 Definition of Delivery Services*

The rise of online transportation has been met with a positive response from the public, including businesses and microenterprises are no exception—as it can improve time efficiency. According to Wardiana (2002, as cited in Salma & Rachmawati, 2022), online delivery services are information technology applications that support various professions ranging from science to trade and business without the constraints of distance or time. In this digital and internet-integrated era, food delivery services have also adapted. One of the food delivery apps have been popping up and have become a new trend in people's daily lives (Az-Zahra et al., 2021).

Istvanic (2017, as cited in Taufik et al., 2020) explains that the consistent and significant increase in the number of smartphone users has created opportunities for online businesses, with a trend toward greater efficiency and creativity in product marketing. On the business side, there has been an increase in revenue for MSME businesses through the use of digital marketing. One of these digital marketing tools is the food delivery system—a third-party platform in the form of an app that offers partnership opportunities with SMEs (Taufik et al., 2020).

### *2.7 Definition of Digital Payments*

Developments in microenterprises have also influenced the evolution of payment systems. During the COVID-19 pandemic, which restricted physical activities, microenterprises began shifting from conventional payments to digital payments. Some commonly used digital payment apps include DANA, Gopay, OVO, QRIS, and internet banking. Oktariana & Hermansyah (2023) explain that various types of payments and transactions can be conducted through digital payments, which simplify financial record-keeping and planning by providing a transaction history. The concept of cashless payment mechanisms offers numerous benefits and advantages, one of which is its great convenience.

Cashless payment methods are generally more convenient because they offer greater privacy, and all a person has to do is swipe or scan in less than a minute. Danuri (2019, in Mubarak & Akhmadi 2022) categorizes technological transformation activities into three types. First, digital transactions involving third parties in activities such as buying and selling, auctions, and payments conducted via internet banking, SMS banking, e-money, and mobile banking. Second, digital activities carried out by the public via the internet, such as e-tickets, e-learning, and e-libraries. Third, digital companies that serve as access providers for both third parties and the general public.

### *2.8 Definition of Social Media*

Currently, consumers tend to use social media to interact, search for, and share information, opinions, and experiences regarding a product. Keller (2009, as cited in Damayanti et al., 2021) defines social media as playing a crucial role in brand building. Chandra (2021) explains that social media is a communication tool used by its users in social processes. In general terms, social media is described as a medium utilized as a means of social interaction. Therefore, it is crucial to understand that customers' perceptions of a brand are no longer influenced solely by what the company communicates, but also by what customers say about a particular brand. The widespread viral spread of information among social media users is far more powerful than :

a. Traditional media such as TV, radio, and print advertisements. Chandra (2021) outlines the functions of social media as follows
b. Expanding human social interaction through the internet and web technology.
c. Transforming one-way broadcast communication—from a single media institution to a large audience into a dialogic communication practice among multiple audiences.
d. Supporting the democratization of knowledge and information—that is, transforming people from consumers of content into creators of content themselves.
e. Building personal branding, seeking popularity, or asserting one's presence.

Social media has become an option for businesses to adapt to consumer needs and the changing times. Chandra (2021) explains the benefits of social media for businesses, including:

a. Making it easier to obtain important data about potential consumers.
b. Helping businesses target consumers more effectively.
c. Increasing website traffic and search engine rankings.
d. Enabling promotions at an affordable cost.
e. Sharing information more quickly.
f. Analyzing competitors.

## 3. Research Method

### *3.1 Research Focus.*

This study focuses on organizational development in micro enterprises in Yogyakarta. The researcher aims to identify the organizational changes occurring in micro enterprises through the use of delivery services, payment methods, and social media that enhance the performance of micro enterprise owners in Yogyakarta.

### *3.2 Research Type and Designs*

Qualitative research is exploratory in nature; that is, it relies on data in the form of participants' statements or narratives to explore the phenomenon that is the focus of the study (Supratiknya, 2015). The researcher conducted qualitative content analysis through a systematic classification process involving coding and the identification of various themes or specific patterns (Hsieh & Shannon, 2005, as cited in Supratiknya, 2015). The purpose of this qualitative content analysis is to identify the content or meaning of a text in reference to the research domain.

### *3.3 Research Participants*

The participants in this study are twenty micro businesses in Yogyakarta. The respondents interviewed have been operating their micro businesses for approximately six years. The respondents were selected based on the changes they have implemented over time, including delivery methods, payment methods, and social media.

### *3.4 Data Collection Methods*

The data collection method used by the researcher was interviews. The interviews conducted in this study were semi-structured. These semi-structured interviews were designed to identify issues more openly, so interviewees were asked to share their opinions and ideas (Sugiyono, 2018). The data collection method used was semi-structured interviews, which allow the researcher to ask questions freely and have the flexibility to determine the time and place (Herdiansyah 2013). Semi-structured interviews are particularly appropriate for research aimed at exploring respondents' answers in greater depth. During the data collection process, the researcher used a recording method to ensure the accuracy of the data and information obtained.

### *3.5 Research Instruments*

The primary focus of this qualitative study is the researcher herself, who participates in planning the study, collecting data, conducting observations and interviews, analyzing data, and drawing conclusions. In addition, the researcher used an interview guide as a supporting tool to facilitate the data collection process in line with the study's focus. This study aimed to acquire more comprehensive information on the organizational changes implemented by micro enterprises to improve their business performance. The researcher examined the changes that had been implemented in these micro enterprises as well as the constraints faced by micro enterprise owners.

## 4. Research Findings and Discussion

### *4.1 Description of Delivery Service Utilization*

Based on the results of the interviews conducted, three out of twenty respondents mentioned changes in service delivery. This was done to accommodate the needs of customers who cannot make purchases in person. Delivery or pickup services, of course, have their own terms and conditions. Additionally, using a delivery app will incur fees in accordance with the applicable terms. With advances in communication technology, it has become increasingly convenient for consumers to obtain goods or services. This is evidenced by several micro-businesses that offer delivery and pickup services to make things easier for consumers.

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who cannot make purchases in person. Delivery or pickup services, of course, have their own terms and conditions. Additionally, using a delivery app will incur fees in accordance with the applicable terms. With advances in communication technology, it has become increasingly convenient for consumers to obtain goods or services. This can be seen in several micro-businesses that offer delivery and pickup services to make things easier for consumers. Interviews with micro-businesses revealed several examples of delivery services.

At micro businesses that sell household essentials, such as convenience stores, one of the services they offer is the delivery of items like water tanks and gas canisters. This is certainly an example of how micro businesses are evolving in the way they serve their customers. Although these services make it easy to purchase items, customers should be aware of the wait times required. Even though shipping is free, customers must be patient while waiting for their orders to be delivered. This is due to limited human resources and efficiency issues in the delivery process.

In some cases, food vendors also offer delivery services. Instead of using an online app to deliver orders, they have one employee who assists in delivering the food. A similar trend is also evident among micro enterprises in the service sector. One type of service offered is the pickup of motorcycles for repair. The intended purpose of this service is to accommodate customers who cannot stop by or have limited time but need immediate repairs; in such cases, the repair shop will pick up the customer's vehicle. However, this door-to-door pickup service is still dependent on distance.

Social media isn't just a tool for promoting a business it's also a way to communicate with customers. One micro business, for example, has leveraged the growth of social media to take orders and ensure that food is delivered to customers.

### *4.2 Description of the utilization of digital payment methods*

In the process of managing their businesses, seventeen informants reported using digital payment methods. The only digital payment method they used was QRIS. This is considered to have several advantages, including faster transactions and prioritizing customer satisfaction. Additionally, according to ten informants, customers are more likely to use cashless payments than cash. This trend has prompted them to switch from their previously conventional transaction systems to digital ones.

### *4.3 Description of Social Media Utilization*

The respondents interviewed view social media as a great tool for communicating with consumers, as well as a useful way to market their products to them. The rise of social media has prompted them to make several changes to their businesses, such as increasing digital promotional activities on TikTok, creating content about their products, responding to customers more quickly, and using suggestions or feedback from customers in live comment sections or on posts as a basis for making decisions about the future of their businesses. In addition, business owners can boost customer loyalty by building closer relationships with customers using social media.

One way to use social media to boost sales is to host live streams on TikTok. During these live streams, sellers can interact with potential buyers. When displaying the items, buyers can ask questions about the products via live chat. Additionally, buyers can join the TikTok live stream and chat with the seller. This interactive relationship between sellers and buyers allows buyers to gain a deeper understanding of the products or items being sold.

### *4.4 Changing Organizational Dynamics Through Delivery Services*

The study results showed that some micro-businesses have switched to providing delivery or pickup services to consumers. These changes were driven by technological advancements and shifting consumer preferences, as people increasingly seek to obtain goods and services

conveniently without having to visit the business location in person. According to the perspective of organizational change, the use of delivery services indicates a shift in the service processes of micro-businesses. Previously, business transactions were conducted exclusively in person at the business location; however, business owners have now adapted their service models by utilizing communication and transportation technologies to reach a broad consumer base.

The micro-businesses are also benefiting from the implementation of delivery services. Micro-businesses obtain convenience in sourcing products, while consumers gain convenience in obtaining the products they need. An example is an auto repair shop that offers a vehicle pickup service to assist customers with limited time. For businesses that sell fish and pet birds, the use of delivery services enables them to sell their products outside their local area, thereby expanding their market reach.

Furthermore, this study also identified several issues related to the use of delivery services. Due to limited human resources, micro-entrepreneurs must coordinate delivery schedules by combining multiple orders into a single trip. However, this situation indicates that the organizational changes implemented still face various resource constraints typical of micro-businesses. Therefore, the success of delivery services is heavily influenced by the ability of micro-entrepreneurs to manage their available resources.

### *4.5 The Organizational Change Dynamics Using Digital Payment Methods*

Study results show that half of the respondents interviewed have used the QRIS digital payment method. Changes are a response to advancements in payment technology that are becoming increasingly popular among the public. While transactions were previously conducted in cash, microbusinesses now offer digital payment options to meet customer preferences. Micro-businesses benefit greatly from the implementation of QRIS. The main advantage is that transactions become faster and more convenient, as there is no need to calculate change. Digital payments are also easier for customers who are more accustomed to cashless payments. These findings indicate that service aspects and transaction systems are undergoing organizational changes.

Organizational change perspective, using QRIS shows that microbusinesses have adapted to an ever-changing external environment. Business owners realize that to stay competitive, they must adapt as consumer behavior shifts toward digital transactions. Therefore, adopting digital payments is an innovative approach that allows businesses to maintain customer satisfaction while boosting productivity. Digital payments can improve business financial management in addition to making transactions easier. Digital payments modernize microbusiness management systems because every QRIS transaction is automatically recorded, making it easier for microbusiness owners to track and monitor their cash flow.

### *4.6 Social Changing Organizational Dynamics Through the Utilization of Social Media*

This study suggests that micro-business owners use social media as a key tool for communicating with customers and promoting their products. These platforms have transformed how business owners market their products, a process that previously relied on in-person interactions or word-of-mouth promotion. Increased digital promotional activity on platforms such as TikTok has encouraged business owners to create content, host live streams, showcase digital products, and interact directly with potential buyers.

Social media also improves communication and interaction between businesses and consumers. In addition to making purchases, consumers can offer criticism, suggestions, and feedback through direct messages and comment sections. Businesses then use this information to make business decisions. Therefore, social media has made organizational communication more open and engaging. Social media enhances customer loyalty and market reach in addition to improving communication. By establishing closer relationships with consumers, businesses

can better understand market needs. Consequently, the use of social media can be viewed as a form of organizational change that helps microbusinesses become more competitive in the computer and internet age.

### *4.7 Integrating Delivery Methods, Digital Payments, and Social Media to Enhance Business Performance*

The research indicates that the growth of microbusinesses is driven by the use of delivery services, digital payments, and social media. Collectively, these three innovations create a business system that is more flexible, effective, and responsive to customer needs. Social media facilitates promotion and engagement with customers. Customers who are interested in the products offered can complete transactions using digital payments via QRIS, and products can be delivered through delivery services, making the purchasing process easier for customers at every stage. The integration of these three elements results in a better customer experience compared to conventional business methods.

The integration of these elements enhances operational efficiency, expands markets, increases customer satisfaction, and creates opportunities for micro businesses to generate more revenue. Although there are still some limitations such as constraints in human resources and technology micro businesses that can integrate these three elements demonstrate a greater ability to adapt to changes in the business environment. Therefore, the use of digital delivery services, digital payments, and social media can be viewed as a form of organizational transformation for micro-enterprises. These changes indicate that businesses are not merely maintaining old ways of working but are also adapting to technological advancements and shifting consumer behavior in the digital age.

## 5. Conclusion

According to research and studies on the dynamics of organizational change in micro enterprises, it can be concluded that micro enterprises have adapted to technological advances and changing consumer needs in various ways. This is evident in their use of digital delivery services, digital payments, and social media in their operations. Micro enterprises can serve customers more easily and reach more people by using delivery services. Digital payments via QRIS are easier, faster, and more efficient. Furthermore, the use of social media helps businesses with promotion, communicating with customers, and expanding their market reach. This shows that micro enterprises can adapt to changes in the business environment. The integration of delivery services, digital payments, and social media enhances service quality, customer satisfaction, and the competitiveness of micro businesses in the digital age.

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# DETERMINANTS OF FIRM VALUE IN IDX30 COMPANIES: THE ROLE OF CSR DISCLOSURE, INDEPENDENT COMMISSIONERS, PROFITABILITY, AND FIRM SIZE

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***Abstract***
*The purpose of this study is to investigate the impact of Corporate Social Responsibility (CSR) disclosure, independent commissioners, profitability, and firm size on firm value. This study focused on firms listed on the Indonesia Stock Exchanges IDX30 index from 2021 to 2024. On the Indonesia Stock Exchange, the IDX30 index represents a group of companies with significant liquidity, substantial market capitalization, and reasonably strong fundamentals. This study used a quantitative methodology. Secondary data sources for this study included sustainability reports, financial statements, and corporate annual reports. Purposive sampling was employed, and a total of 21 companies were selected. Multiple linear regression with Eviews 13 was used to analyze the data. According to the findings of this study, Corporate Social Responsibility (CSR) disclosure affects firm value, independent commissioners affect firm value, profitability has no effect on firm value, and firm size affects firm value.*
***Keywords****: Corporate Social Responsibility (CSR) disclosure, independent commissioners, profitability, firm size, firm value.*

## 1. Introduction

In the era of globalization and increasingly tough business competition, companies are required to create good firm value. Firm value becomes the main indicator for assessing the performance and prospects of a business entity. For investors and shareholders, firm value is a key indicator because it reflects market perception of a company's future potential and its capacity to generate returns. Firm value reflects a company's performance and share price, which can shape investor perceptions of the company (Valentino & Setiawan, 2024). For investors, financial and nonfinancial performance, as well as firm value, are crucial because firm value serves as a benchmark for making investment decisions in target companies.

The objective of a corporation in executing its commercial operations is to maximize profit to enhance the firm's worth, as shown by share prices and market perception. Stock indexes serve a pivotal function in facilitating the advancement of the Indonesian capital market. They serve as benchmarks for assessing capital market performance and investment product performance (Yoda et al., 2023). This study focuses on companies included in the IDX30 index, a group of companies with high liquidity, large market capitalization, and relatively sound fundamentals on the Indonesia Stock Exchange (Setiawan & Warsitasari, 2023). Despite comprising leading companies, the IDX30 index's movement during the 2021–2024 period was volatile. The IDX30 index experienced a 1% decline in 2021, suspected to be the ongoing impact of the COVID-19 pandemic. It then fell again by 1.8% in 2022, due to pressure from global economic conditions, inflation, and interest rate policies. It increased by 1.4% in 2023 in line with improving market conditions and a stable economy. It then experienced a significant decline of 14.5% in 2024, influenced by external factors such as political uncertainty leading up to the election. These fluctuations indicate that the firm value remains influenced by various economic conditions and market sentiment, making it an important concern for investors in assessing the company's prospects.

The fluctuations in stock prices indicate that although this index comprises stocks of large companies with relatively strong fundamentals, its movements are still influenced by various external factors. Several factors suspected of influencing firm value include Corporate Social

Responsibility (CSR) disclosures, independent commissioners, profitability, and firm size. These four factors are of interest to investors because they reflect a company's commitment to sustainability, the effectiveness of corporate governance, its ability to generate profits, and its capacity to conduct and develop its business activities. Therefore, these factors are expected to influence investor perceptions and impact firm value.

Firm value is significantly impacted by disclosures on corporate social responsibility (CSR), independent commissioners, firm size, and profitability, according to prior research findings and empirical data. Nevertheless, there are inconsistent outcomes from the correlations between these variables. The sectors our study looked at are another drawback. Since the majority of empirical research has concentrated on sectors like banking, mining, food and beverage, and infrastructure, companies in the IDX30 index have received very less attention. Companies with significant market capitalization, great liquidity, and comparatively solid footing on the Indonesia Stock Exchange make up the IDX30 index. Therefore, the goal of this study is to investigate and present the most recent empirical data regarding how a firm value is impacted by the disclosure of information about independent directors, profitability, corporate social responsibility, and firm size. In order to do this, the study will concentrate on businesses that are listed on the Indonesia Stock Exchange (IDX) between 2021 and 2024 and are part of the IDX30 index.

## 2. Literature Review

### *2.1 Signaling Theory*

Spence (1973) in Valentino & Setiawan (2024), this theory relates to a signal in the form of information from a company that describes the company's condition to interested recipients. The information received can be positive or negative. Positive information can attract investors, and vice versa.

### *2.2 Agency Theory*

Jensen and Meckling (1976), as cited in Aprianti et al (2022) state that agency theory explains the contractual relationship between shareholders and management within a company. Agency theory explains that in a company, there is a separation between the ownership function of shareholders (principals) and the management function of management (agents).

### *2.3 Firm Value*

Firm value reflects the level of management's success in managing assets, capital, and resources to create wealth for shareholders. Puspita & Fitria (2022) Firm value reflects investors' perceptions of a company's success after carrying out its operational activities since its inception. Increasing firm value is an important indicator used to assess the extent to which a company's performance and reputation are accepted by the market. The formula for calculating firm value is as follows:

$$Tobin's\ Q: \frac{MVE + Debt}{Total\ Asset}$$

### *2.4 Corporate Social Responsibility Disclosure*

Safira & Widajantie (2021) a company's pledge to support sustainable development by taking into account social, economic, and environmental issues is known as corporate social responsibility, or CSR. CSR disclosure is both a way for a company to win over stakeholders and a moral duty. Disclosure of information about a company's social and environmental initiatives is known as corporate social responsibility (CSR) disclosure. The formula for calculating CSR disclosure is as follows:

$$\text{CSRDI} = \frac{\sum X_yi}{Ni}$$

### *2.5 Independent Commissioners*

An independent commissioner is a member of the board of commissioners who comes from outside the company and has no relationship with the major shareholders, directors, or other members of the board of commissioners (Yonathan & Apriwenni, 2025). The presence of independent commissioners is expected to minimize agency conflict between management and shareholders. The formula for calculating independent commissioners as follows:

$$\text{KI} = \frac{Number\ of\ Independent\ Commissioners}{Total\ Number\ of\ Commissioners}$$

### *2.6 Profitability*

Profitability is a company's ability to generate profit through its operational activities during a given period. The company's goal in conducting its operational activities is to generate profit. Profitability ratios are measures of a company's ability to generate profit from its business activities (Puspita & Fitria, 2022). The formula for calculating ROA is as follows:

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

### *2.7 Firm Size*

Firm size is an indicator of a company's scale of operations and resources. Santoso & Junaeni (2022) Firm size can be measured by the company's total assets, taken as the natural logarithm (Ln) of total assets. Large companies generally have broad access to funding and are more resilient in the face of economic instability. Firm size plays a significant role in increasing firm value, as a large size can send a positive signal to the market. The formula for calculating firm size is as follows:

$$Size = LN\ (Total\ Asset)$$

### *2.8 Theoretical Framework*

This study examines dependent and independent variables. The dependent variable is firm value, measured using Tobin's Q. The independent variables are corporate social responsibility disclosure, independent commissioners, profitability (ROA), and firm size (Ln).

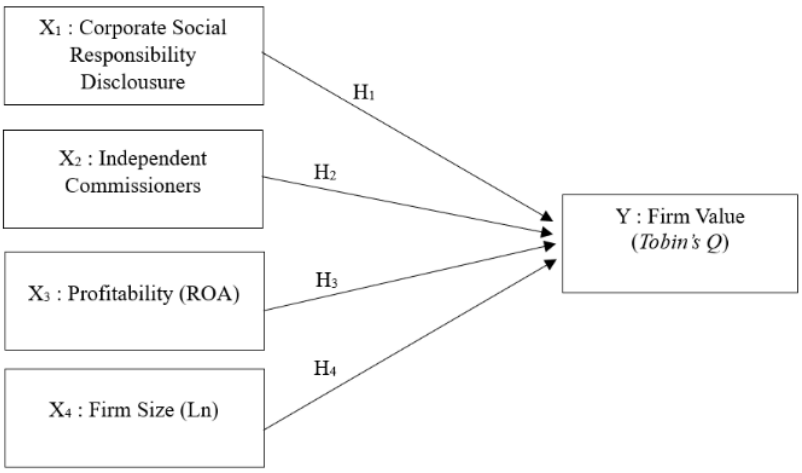



Figure 1. Theoretical Framework

The research hypotheses are thereafter empirically evaluated in accordance with the conceptual framework and reinforced by theoretical principles and supplementary research, as demonstrated below:

H1: Corporate social responsibility disclosure affects the firm value of companies listed on the IDX30 index.

H2: Independent commissioners affect the firm value of companies listed on the IDX30 index.

H3: Profitability affects the firm value of companies listed on the IDX30 index.

H4: Firm size affects the firm value of companies listed on the IDX30 index.

## 3. Research Methods

### *3.1 Research Approach*

This study employed a quantitative research design. Sugiyono quantitative research is undertaken by investigating a specified population or sample with standardised instruments to collect data, which is then analysed statistically to uncover correlations between variables and test hypotheses. The goal of quantitative descriptive approaches is to objectively describe situations or information about research variables using numerical data. The study's findings are presented statistically to observe and explain the causal association between the independent variables Corporate Social Responsibility (CSR) disclosure, independent commissioners, profitability, and firm size, with the dependent variable, which is firm value.

#### *3.1.1 Population*

Sugiyono (2018), a population is a generalized area composed of objects or persons with a specific quantity and set of attributes selected by the researcher as the study's scope, allowing analysis and conclusions. The population of the study was the IDX30 index companies that were listed on the Indonesia Stock Exchange between 2021 and 2024.

#### *3.1.2 Sample*

According to Sugiyono (2018), a sample is a portion of a population that possesses characteristics consistent with that population. In this study, sampling was conducted using purposive sampling, a technique for determining samples based on specific considerations or criteria established by the researcher. The sample in this study consisted of companies indexed on the IDX30 on the Indonesia Stock Exchange during the 2021-2024 period that published sustainability reports, annual reports, and financial statements. The established criteria are as follows: First, IDX30-indexed companies that were consistently listed on the Indonesia Stock Exchange during the 2021-2024 period. Second, IDX30-indexed companies that consistently published financial reports and complete annual reports consecutively on the Indonesia Stock Exchange (IDX) during the 2021-2024 period. Third, IDX30 index companies that consistently published complete sustainability reports during the 2021-2024 period using GRI Standards guidelines. Fourth, companies with complete data related to the research variables used can be accessed through the Indonesia Stock Exchange website and each company's website. The total sample size for this study was 21 companies. The application of the research sampling criteria narrowed the initial population of 30 companies down to 21 companies, resulting in 84 observations; after removing the outliers, 74 observations remained for analysis.

### *3.2 Data Analysis Techniques*

This study employs multiple linear regression as the analytical tool. Before conducting the multiple linear regression analysis, we conducted classic assumption tests, including a normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test.

#### *3.2.1 Classical Assumption Testing*

The classical assumption test can be employed in this study to examine the viability of the regression model used. The classical assumption test is designed to guarantee the regression model satisfies the basic statistical assumptions to make the analysis results reliable.

***a. Normality Test***

**Table 1. Normality Test Results**

| | | Unstandardized Residual |
|---|---|---|
| N | | 74 |
| Normal Parameters[a,b] | Mean | 0.0000000 |
| | Std. Deviation | 0.81178708 |
| Most Extreme Differences | Absolute | 0.089 |
| | Positive | 0.089 |
| | Negative | -0.074 |
| Test Statistic | | 0.089 |
| Asymp. Sig. (2-tailed)[c] | | 0.200[d] |

*Source: Data processed by author (2026)*

According to the aforementioned table, the Kolmogorov-Smirnov statistic is 0.089, along with the significance level. The value of 0.200 indicates that it exceeds 0.05 (0.200 > 0.05), thus confirming the normal distribution of the data.

***b. Multicollinearity Test***

**Table 2. Multicollinearity Test Results**

| Model | | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| 1 | CSR | 0.923 | 1.084 |
| | IC | 0.880 | 1.136 |
| | ROA | 0.879 | 1.137 |
| | *SIZE* | 0.730 | 1.369 |

Source: Data processed by the author (2026)

**Notes:**
CSR: Corporate Social Responsibility
IC: Independent Commissioners
ROA: Profitability
SIZE: Firm Size

The tolerance values for CSR are 0.923, IC 0.880, ROA 0.879, and SIZE 0.730 > 0.10, with Variance Inflation Factor (VIF) values of 1.084, 1.136, 1.137, and 1.369 < 10, according to the multicollinearity test results in the above table. It is clear from this data that multicollinearity is not present in this investigation.

***c. Autocorrelation Test***

**Table 3. Autocorrelation Test Results**

| | | | |
|---|---|---|---|
| F-statistic | 1.8454 | Prob. F(2.67) | 0.1659 |
| Obs*R-squared | 3.8637 | Prob. Chi-square(2) | 0.1449 |

Source: Data processed by the author (2026)

The probability value obtained is 0.1449 based on the above table. It can be determined that there is no autocorrelation since the probability value is higher than 0.05.

***d. Heteroscedasticity Test***

**Table 4. Heteroscedasticity Test Results**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 4.8628 | 1.6138 | 3.0131 | 0.0036 |
| CSR | -0.2761 | 0.4120 | -0.6702 | 0.5049 |
| IC | 1.3192 | 0.4955 | 2.6620 | 0.0097 |
| ROA | 1.1707 | 0.9131 | 1.2821 | 0.2041 |
| SIZE | -0.1462 | 0.0474 | -3.0842 | 0.0029 |

Source: Data processed by the author (2026)

The heteroscedasticity test above used the Glejser test. Based on the figure above, there are two variables with significance values below 0.05: the independent commissioner variable at 0.0097 and the firm size variable at 0.0029. These results indicate that the regression model still exhibits heteroscedasticity. Therefore, the researcher addressed the heteroscedasticity by using the White Robust Standard Error or the Huber-White Heteroscedasticity Consistent Standard Error. This method is used to correct the standard error values in the regression model so that the resulting parameter estimates are robust against heteroscedasticity (Ghozali & Ratmono, 2017).

## 4. Research Findings and Discussion

### *4.1 Descriptive Statistical Analysis*

**Table 5. Descriptive Statistical Test Results**

| | N | *Minimum* | *Maximum* | *Mean* | *Std. Deviation* |
|---|---|---|---|---|---|
| CSR | 74 | 0.41 | 1.00 | 0.6931 | 0.1502 |
| IC | 74 | 0.25 | 0.83 | 0.4597 | 0.1279 |
| ROA | 74 | 0.00 | 0.30 | 0.0752 | 0.0694 |
| *SIZE* | 74 | 30.41 | 35.43 | 32.6645 | 1.4680 |
| *Tobin's Q* | 74 | 0.63 | 8.98 | 1.6430 | 1.2637 |
| Valid N (listwise) | 74 | | | | |

Source: Data processed by author (2026)

Based on the descriptive statistical analysis in the table above, the researcher can draw the following conclusions:

a. The Corporate Social Responsibility (CSR) disclosure variable, measured using CSRDI, shows a minimum value of 0.41 recorded by Charoen Pokphand Indonesia (CPIN) in 2022. The maximum value of 1.00 was recorded by Vale Indonesia Tbk (INCO) in 2023. Meanwhile, the average (mean) CSR disclosure value is 0.6931, and the standard deviation for the CSR variable is 0.1502.
b. The independent commissioner variable, measured using the proportion of independent commissioners to the total board of commissioners, has a minimum value of 0.25 at Vale Indonesia Tbk (INCO) in 2023. The maximum value of 0.83 was held by Unilever Indonesia Tbk (UNVR) in 2021. The average (mean) independent commissioner ratio is 0.45, with a standard deviation of 0.1279.
c. The profitability variable, measured using Return on Assets (ROA), has a minimum value of 0.0009 at Bank Jago Tbk (ARTO) in 2022. The maximum value of 0.30 was

held by Unilever Indonesia Tbk (UNVR) in 2021. The average (mean) ROA is 0.0752 with a standard deviation of 0.0695.

d. The firm size variable, measured using the natural logarithm of total assets, has a minimum value of 30.41 at Unilever Indonesia Tbk (UNVR) in 2024. The maximum value of 35.43 is owned by Bank Mandiri Tbk (BMRI) in 2024. Meanwhile, the average (mean) firm size is 32.6645, with a standard deviation of 1.4680.
e. The firm value variable, measured using Tobin's Q, has a minimum value of 0.63 at Semen Indonesia Tbk (SMGR) in 2024. The maximum value of 8.97 is owned by Unilever Indonesia Tbk (UNVR) in 2021. Meanwhile, the average (mean) Tobin's Q is 1.6430 with a standard deviation of 1.2637.

### *4.2 Multiple Linear Regression Analysis*

#### *4.2.1 Adjusted R Square Coefficient Test*

**Table 6. Adjusted R Square Test Result**

| | |
|---|---|
| R-squared | 0.5873 |
| Adjusted R-squared | 0.5634 |

Source: Data processed by author (2026)

The table of determination coefficient test results reveals that the Adjusted R-Square value is 0.5634, suggesting that 56% of a company's value is determined by the independent variables analyzed in this study, which include CSR disclosure (CSRDI), independent commissioners, profitability (ROA), and firm size (SIZE). The leftover 44% is shaped by external variables beyond the scope of the model utilized in this analysis.

#### *4.2.2 F-Test*

**Table 7. F-Test Result**

| | |
|---|---|
| F-statistic | 24.5514 |
| Prob(F-statistic) | 0.0000 |

Source: Data processed by author (2026)

The table presented above illustrates the outcomes of the concurrent examination. The computed F-value of 24.5514 surpasses the critical F-value of 2.5046, and the significance level of 0.0000, based on the probability (Prob F-Statistic), is below 0.05. Consequently, it can be inferred that the independent variables of CSR disclosure, independent commissioners, profitability (ROA), and firm size (SIZE) collectively and concurrently affect the dependent variable, firm value (TOBIN'S Q)

### *4.3 Hypothesis testing (T-Test)*

**Table 8. T-Test Result**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 19.9439 | 3.3569 | 5.9410 | 0.0000 |
| CSR | -2.5224 | 0.6746 | -3.7387 | 0.0004 |
| IC | 5.3121 | 1.4846 | 3.5779 | 0.0006 |
| ROA | 3.0814 | 2.4495 | 1.2579 | 0.2126 |
| SIZE | -0.5885 | 0.1039 | -5.6603 | 0.0000 |

Source: Data processed by the author (2026)

Based on the results of the T-test in the table above, the data obtained are as follows:

a. The findings from the hypothesis test or t-test presented in the table indicate that the

significance level of CSR disclosure, as assessed by CSRDI in relation to firm value measured by Tobin's Q, is 0.0004, which is below the threshold of 0.05 (0.0004 < 0.05), and the computed t-value of -3.7387 is inferior to the critical t-value of 1.9994. The findings suggest that the CSR disclosure variable significantly influences the firm value variable.

These results indicate that higher levels of CSR disclosure by a company tend to be associated with a decline in firm value. This may occur because investors prioritize a company's financial performance over its social activities; CSR initiatives are perceived as increasing costs, thereby reducing profits. Consequently, extensive CSR engagement leads to a decrease in the value of companies included in the IDX30 index.

b. The findings from the hypothesis testing, specifically the t-test, presented in the table reveal that the significance value for independent commissioners, determined by their proportion, is 0.0006, which is below 0.05 (0.0006 < 0.05), and the computed t-value of 3.5779 exceeds the critical t-value of 1.9944. The findings suggest that the independent commissioners variable substantially influences the firm value variable.

   These results indicate that a higher proportion of independent commissioners within a company tends to lead to an increase in firm value. The presence of independent commissioners enhances the effectiveness of oversight regarding corporate performance, ensuring that business activities align with the company's objectives and the interests of shareholders. Effective oversight can boost investor confidence in the company, thereby resulting in increased firm value. The results of this study can be explained by agency theory.

c. The findings from the hypothesis testing or t-test presented in the table indicate that the significance value of profitability, as assessed by ROA, was 0.2126, exceeding 0.05 (0.2126 > 0.05), while the computed t-value of 1.2579 is inferior to the critical t-value of 1.9944. These findings suggest that the profitability variable does not significantly influence the firm value variable.

   These results indicate that the level of a company's profitability does not affect its value. This situation may arise because investors, when evaluating a company, consider not only its profit-generating capacity but also other factors such as market conditions, business prospects, and economic stability. Furthermore, profits generated by a company do not necessarily boost investor interest unless accompanied by sound management and promising business prospects. Consequently, the level of profitability has not exerted a significant influence on the value of companies included in the IDX30 Index.

d. The findings from the hypothesis testing or t-test illustrated in the table reveal that the firm size variable, represented by SIZE, exhibits a significance value of 0.0000, which is lower than 0.05 (0.0000 < 0.05) when juxtaposed with firm value determined by Tobin's Q, and the derived t-value of -5.6603 is less than the critical t-value of 1.9944. The results demonstrate that the size of the firm has a notable impact on its value.

   These results indicate that firm size has a negative impact on firm value; specifically, as the size of the firm increases, its value tends to decline. This phenomenon may arise because companies with substantial total assets face higher levels of management complexity and greater risks associated with asset utilization. Investors perceive that companies included in the IDX30 index incur higher operational costs and are prone to potential inefficiencies in asset management.

## 5. Conclusion

The following conclusions can be made in light of the data analysis and conversations that have been conducted:

a. CSR disclosure has a detrimental impact on the firm value of companies that are included in the IDX30 index. The study's findings indicate that a company's tendency for firm value decreases as its level of CSR disclosure increases.
b. The impact of independent commissioners on the firm value of enterprises included in the IDX30 index. The study's findings suggest that a company's worth tends to rise in proportion to the number of independent commissioners.
c. The firm value of businesses included in the IDX30 index is unaffected by profitability. The study's findings show that a company's worth is independent of its capacity to turn a profit.
d. The firm value of enterprises listed on the IDX30 index is negatively impacted by firm size. The study's findings show that a company's worth tends to decrease with its size.

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# MCCLELLAND'S MOTIVATIONAL NEEDS AMONG GENERATION Z IN VOLUNTARY STUDENT ORGANIZATIONS

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***Abstract***
*Generation Z is increasingly recognized for valuing meaningful experiences, personal growth, and social engagement rather than solely pursuing extrinsic rewards. Despite the growing importance of student organizations as voluntary learning environments, limited research has identified the dominant motivational needs of Generation Z students within nonprofit student organizations. This study aims to identify the dominant motivational needs of Generation Z students participating voluntarily in student organizations based on McClelland's Theory of Needs. A quantitative descriptive approach was employed using purposive sampling. Data were collected from 255 active Generation Z students involved in voluntary student organizations through a structured questionnaire measuring three motivational dimensions: need for achievement, need for affiliation, and need for power. The instrument demonstrated satisfactory validity and reliability, with a Cronbach's alpha coefficient of 0.893. Descriptive statistical analysis revealed that all motivational dimensions were rated highly. The need for achievement emerged as the most dominant motivational need, followed by need for affiliation, whereas need for power received comparatively lower, although still high, scores. The findings indicate that Generation Z students primarily perceive student organizations as platforms for competency development, experiential learning, and social collaboration rather than as avenues for obtaining formal recognition or leadership status. This study extends the application of McClelland's Theory of Needs to voluntary nonprofit student organizations and provides practical implications for designing student organization management strategies that better align with the motivational characteristics of Generation Z.*
***Keywords:*** *Generation Z, McClelland's Theory of Needs, student organizations, motivation, voluntary participation*

## 1. Introduction

Generasi Z Generation Z has grown up amid the rapid advancement of digital technology, providing them with extensive access to information, a strong capacity to adapt to technological changes, and patterns of social interaction that differ markedly from those of previous generations. These characteristics make Generation Z more receptive to new experiences, highly oriented toward self-development, and inclined to engage in activities that offer opportunities for learning, relationship building, and creating positive impacts within their communities. Unlike previous generations, whose activity choices were largely influenced by economic considerations, Generation Z also values opportunities to gain meaningful experiences, enhance competencies, and develop a strong sense of personal identity. This shift in orientation underscores the importance of understanding the motivational dynamics of Generation Z, particularly within the context of voluntary participation.

As Generation Z enters its productive years, it is projected to become the dominant segment of Indonesia's workforce. Utami and Siswanto (2021) estimated that Generation Z would account for approximately 77% of the Indonesian labour force by 2025. Nevertheless, the majority of this generation remains engaged in formal education, with approximately 87% currently enrolled as students in universities or polytechnic institutions (Andreas, 2024). This demographic profile indicates that today's university students are predominantly members of Generation Z who are in a critical phase of character development, competency enhancement, and preparation for future careers. Consequently, higher education institutions serve not only as providers of formal education but also as environments that facilitate the development of both academic and non-academic competencies required for professional success.

One of the most important platforms supporting this developmental process is student organizations. These organizations provide students with experiential learning opportunities through leadership roles, committee participation, community service, and various social initiatives. Such involvement enables students to develop communication skills, teamwork, leadership, decision-making abilities, problem-solving skills, and a strong sense of responsibility in carrying out organizational tasks. Beyond fostering non-technical competencies (soft skills), participation in student organizations also contributes to the development of technical competencies relevant to the labour market by exposing students to real-world situations that require critical thinking, collaboration, and adaptability to change (Purwanto & Darmawan, 2020). Therefore, student organizations play a strategic role in preparing students to meet the demands of an increasingly dynamic and competitive workplace.

Despite the growing availability of alternative self-development opportunities, such as internships, professional certification programs, competitions, digital communities, and entrepreneurship, many Generation Z students continue to participate actively in student organizations. This phenomenon is particularly noteworthy because student organizations operate as nonprofit entities that rely on voluntary member participation without providing financial compensation, unlike business organizations. Nevertheless, many students willingly devote their time, energy, and even personal interests to support organizational activities. This suggests that students' involvement in student organizations is driven not solely by economic considerations but also by psychological factors that encourage them to participate, contribute, and maintain their commitment to organizational activities.

One of the most widely recognized frameworks for explaining individual motivation within organizational settings is McClelland's Theory of Needs. This theory proposes that individual behaviour is primarily influenced by three fundamental psychological needs: need for achievement, need for affiliation, and need for power. These needs are acquired through learning experiences and social interactions rather than being innate characteristics, resulting in varying levels of dominance across individuals. Differences in the prominence of these motivational needs influence why individuals choose to join organizations, establish social relationships, assume leadership roles, and sustain their involvement in organizational activities. Accordingly, McClelland's Theory of Needs provides a relevant theoretical framework for understanding the motivation of Generation Z students participating in student organizations.

Previous studies have consistently demonstrated the continued relevance of McClelland's Theory of Needs across diverse contexts. Wirayudha et al. (2026) reported that Generation Z students tend to integrate achievement and affiliation needs within collaborative activities. Similarly, Munthe and Gunawan (2024) found that the need for achievement contributes significantly to students' engagement in academic activities. Other studies conducted by Siok et al. (2023), Vetiana et al. (2025), and Rother et al. (2024) further confirmed that the three motivational dimensions proposed by McClelland effectively explain various forms of individual behaviour in both educational and organizational contexts. Collectively, these findings indicate that individual motivation results from the interaction among the needs for achievement, affiliation, and power rather than being driven by a single psychological need.

Despite these contributions, most previous studies have focused on formal learning environments, leadership, educational institutions in general, or organizations characterized by formal employment relationships and explicit reward systems. Research specifically examining the dominant motivational needs of Generation Z students who voluntarily participate in nonprofit student organizations remains relatively limited. This represents an important gap because student organizations differ fundamentally from business organizations, as members participate voluntarily without contractual obligations or financial incentives. These distinctive characteristics suggest that students' motivational patterns within student organizations may differ substantially from those observed in other organizational settings. Consequently, an empirical gap remains regarding the dominant motivational needs of Generation Z students participating in nonprofit student

organizations, particularly within the context of Indonesian higher education.

Addressing this gap, the present study seeks to identify the dominant motivational needs of Generation Z students who voluntarily participate in student organizations based on McClelland's Theory of Needs. Unlike previous studies that primarily examined the applicability of McClelland's theory in formal educational settings or business organizations, this study positions nonprofit student organizations, which rely entirely on voluntary member participation, as its primary research context. Accordingly, this study is expected to provide empirical evidence that extends the application of McClelland's Theory of Needs to voluntary organizations within higher education. Furthermore, the findings are expected to provide practical insights for student organizations in designing leadership development strategies, enhancing member engagement, and establishing organizational management practices that better reflect the motivational characteristics of Generation Z.

Based on these considerations, this study aims to analyze the dominant motivational needs of Generation Z students who voluntarily participate in student organizations through the perspective of McClelland's Theory of Needs.

## 2. Literature Review

Generation Z comprises individuals who were born and raised during the rapid expansion of digital technology, the internet, and social media, resulting in characteristics that distinguish them from previous generations. Continuous exposure to technology from an early age has fostered a high capacity for adaptation to technological change, a preference for rapid communication, and a strong tendency to integrate technology into various aspects of daily life, including learning and organizational activities. In addition, Generation Z is widely recognized for its strong orientation toward self-development, flexibility, collaboration, and the pursuit of meaningful experiences. These characteristics indicate that Generation Z is motivated not only by academic and economic achievement but also by opportunities to gain valuable experiences, expand social networks, and contribute positively to society (Seemiller & Grace, 2019).

Previous studies have shown that these characteristics influence how Generation Z selects and sustains its involvement in organizations. Compared with earlier generations, Generation Z is more likely to engage with organizations that provide learning opportunities, encourage participation in decision-making, foster collaborative working environments, and embrace open and inclusive organizational cultures. Rather than perceiving organizations merely as vehicles for achieving predetermined objectives, Generation Z views them as platforms for competency development, professional identity formation, and meaningful personal experiences. Consequently, the motivation of Generation Z extends beyond extrinsic rewards to include opportunities for personal growth, social interaction, and meaningful contributions to the broader community (Ozkan & Solmaz, 2015).

Within the context of higher education, student organizations represent an important form of non-formal learning that plays a strategic role in students' personal and professional development. Participation in student organizations enables students to strengthen leadership, interpersonal communication, teamwork, decision-making, and organizational problem-solving skills. Unlike business organizations, student organizations operate as nonprofit entities that rely primarily on voluntary member participation. Consequently, students' involvement is driven more by intrinsic motivation than by financial incentives. Student organizations therefore provide an environment in which students can satisfy their needs for learning, personal growth, and leadership experience before entering the professional workforce (Gunawan & Munthe, 2024).

Although previous studies have extensively examined the characteristics of Generation Z and the role of student organizations, the findings consistently indicate that Generation Z's motivation is a multidimensional phenomenon influenced by various psychological needs. Accordingly, a comprehensive theoretical framework is required to explain how these psychological needs shape

students' decisions to participate in and remain committed to student organizations. One of the most widely accepted frameworks for explaining this motivational process is McClelland's Theory of Needs.

McClelland's Theory of Needs proposes that individual behaviour is primarily influenced by three fundamental psychological needs: need for achievement, need for affiliation, and need for power. Unlike motivational theories that regard needs as innate characteristics, McClelland argues that these three needs are acquired through learning, social experiences, and interactions with the surrounding environment. Consequently, the relative dominance of each need varies across individuals, leading to differences in behaviour, decision-making, and organizational involvement (Siok, Sim, Rahmat, 2023).

Within the context of Generation Z, these three motivational needs provide a useful framework for explaining why students choose to participate in student organizations. Students with a dominant need for achievement are generally motivated to seek challenges, improve their competencies, and acquire experiences that enhance their future career prospects. In contrast, those with a stronger need for affiliation tend to value opportunities to establish meaningful interpersonal relationships, collaborate with others, and become part of a supportive community. Meanwhile, students characterized by a high need for power are more likely to be motivated by opportunities to lead, influence others, and contribute to organizational decision-making processes.

The need for achievement refers to an individual's desire to attain high standards of performance, accomplish challenging tasks, and receive feedback regarding performance outcomes. Individuals with a strong need for achievement generally prefer tasks that allow them to demonstrate their capabilities, assume responsibility for their performance, and continuously improve the quality of their work.

These characteristics are consistent with those of Generation Z, which is strongly oriented toward continuous learning, competency development, and measurable achievement. Previous studies suggest that Generation Z students are particularly attracted to organizations that provide authentic learning experiences, opportunities to develop leadership competencies, and preparation for future careers. Consequently, student organizations serve as an appropriate platform for satisfying achievement needs through leadership roles, committee assignments, and the implementation of challenging organizational programs.

The need for affiliation reflects an individual's desire to establish positive interpersonal relationships, gain social acceptance, and belong to a particular group. Individuals with a high need for affiliation generally prioritize cooperation, harmonious communication, and mutually supportive social relationships.

For Generation Z, social relationships play a fundamental role in shaping both learning experiences and organizational involvement. Members of this generation tend to prefer organizational environments that encourage collaboration, facilitate the exchange of ideas, and foster a strong sense of belonging. Consequently, student organizations provide an effective setting for fulfilling affiliation needs through interpersonal interaction, teamwork, and the expansion of social networks. The fulfilment of these needs contributes to stronger organizational commitment and sustained member participation.

The need for power should not be interpreted solely as the desire to control others but rather as the motivation to influence the environment, lead organizational change, and make meaningful contributions to organizational success. Individuals with a strong need for power are generally motivated to assume responsibility, lead teams, and coordinate organizational activities.

Within student organizations, these needs are expressed through opportunities to serve as organizational presidents, program coordinators, or leaders of student initiatives. Such experiences

not only strengthen leadership competencies but also enhance self-confidence, decision-making abilities, and preparedness to face organizational and professional challenges. Therefore, student organizations provide an important environment in which students can satisfy their need for power through authentic leadership experiences.

Based on the synthesis of previous studies, it can be concluded that the motivation of Generation Z students participating in student organizations cannot be adequately explained by a single psychological need. The need for achievement motivates students to enhance their competencies and pursue high levels of performance, the need for affiliation strengthens social connectedness and organizational commitment, while the need for power encourages leadership, organizational influence, and meaningful contributions to organizational success. These three motivational needs complement one another and collectively shape the unique motivational structure of each individual. Consequently, identifying the dominant motivational need is essential for understanding the characteristics of Generation Z students who voluntarily participate in student organizations. This study not only extends the application of McClelland's Theory of Needs to nonprofit student organizations but also provides a conceptual foundation for developing leadership strategies and organizational management practices that better align with the distinctive characteristics of Generation Z (Rother et al, 2024).

## 3. Research Methods

This study employed a quantitative approach using a descriptive research design to identify the dominant motivational needs of Generation Z students who voluntarily participate in student organizations based on McClelland's Theory of Needs. A descriptive design was selected because the primary objective of the study was to describe the prevailing patterns of students' motivational needs rather than to examine causal relationships among variables.

The study was conducted at Maranatha Christian University, Bandung, Indonesia. Primary data were collected through an online questionnaire administered via Google Forms in September 2024. The target population comprised Generation Z students who were actively serving as members of student organizations. A non-probability sampling technique with a purposive sampling approach was employed to select respondents based on the following criteria: (1) active university students belonging to Generation Z, (2) currently serving as members or officers of student organizations, (3) voluntarily participating in organizational activities, and (4) possessing prior experience in student organizational activities.

The minimum sample size was determined based on the recommendation of Hair et al. (2014), who suggested that an adequate sample should range from five to ten times the number of research indicators. Applying the recommended ratio of 10:1 to the six measurement indicators resulted in a minimum required sample of 60 respondents. A total of 255 valid responses were ultimately collected, all of which met the established inclusion criteria and were deemed suitable for statistical analysis, thereby substantially exceeding the minimum sample size requirement.

The research instrument was developed based on McClelland's Theory of Needs, encompassing three motivational dimensions: need for achievement, need for affiliation, and need for power. These dimensions were operationalized into six measurement items assessed using a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree).

Prior to data analysis, the instrument was evaluated for validity using the Pearson Product-Moment Correlation and for reliability using Cronbach's Alpha to ensure that each measurement item accurately and consistently represented the intended construct. Subsequently, the data were analyzed using descriptive statistics with IBM SPSS Statistics Version 26. The analysis focused on identifying the motivational dimension with the highest mean score in order to determine the dominant motivational need among Generation Z students who voluntarily participate in student organizations.

## 4. Research Findings and Discussion

A total of 255 valid responses were collected and deemed suitable for further analysis. Based on the demographic profile of the respondents, the majority were female (185 respondents, 72.55%). In terms of age, most respondents were 20 years old (96 respondents, 37.65%). Regarding academic performance, the majority reported a cumulative grade point average (GPA) of above 3.00 (243 respondents, 95.29%). Furthermore, most respondents originated from Bandung (144 respondents, 56.47%), had been involved in student organizations for less than one year (173 respondents, 67.84%), and were affiliated with the Student Executive Board (BEM) (40 respondents, 15.69%). Overall, these demographic characteristics indicate that the respondents adequately represent Generation Z students actively participating in student organizations.

Prior to the main analysis, the research instrument was evaluated for validity and reliability. The validity test revealed that all six motivational indicators were statistically significant ($p \leq 0.05$), indicating that each item effectively measured the intended motivational construct. Consequently, all measurement items were considered valid and retained for subsequent analysis. In addition, the reliability test produced a Cronbach's Alpha coefficient of 0.893, exceeding the recommended threshold of 0.70, thereby demonstrating a high level of internal consistency and confirming that the instrument was reliable for measuring students' motivational needs.

The descriptive statistical analysis revealed that all motivational indicators obtained mean scores above 5.00 on the seven-point Likert scale, indicating a generally high level of motivation among Generation Z students participating in student organizations. None of the indicators fell within the low category, suggesting that student organizations successfully fulfill students' psychological needs as conceptualized by McClelland's Theory of Needs.

The highest mean score was recorded for Indicator X1, which measures the opportunity to develop skills and competencies (Mean = 5.82). This finding suggests that Generation Z students perceive student organizations primarily as platforms for self-development rather than merely as places for social interaction or administrative involvement. Student organizations are viewed as experiential learning environments that enable students to strengthen leadership competencies, communication skills, teamwork, and problem-solving abilities. This finding is consistent with the characteristics of Generation Z, who generally place greater value on continuous learning, competency development, and personal growth than on material rewards or external recognition.

The second-highest mean score was obtained for Indicator X4, which reflects the existence of supportive interpersonal relationships among organizational members (Mean = 5.67). This result indicates that respondents perceive the social climate within student organizations positively. Harmonious interpersonal relationships appear to be an important factor encouraging students to remain actively involved in organizational activities. These findings further support the proposition that the need for affiliation represents one of the primary motivational drivers among Generation Z students, as they highly value collaboration, mutual support, and a sense of belonging within their organizational environment.

The third-highest mean score was obtained for Indicator X3, which measures cooperation among organizational members (Mean = 5.57). This finding indicates that collaborative relationships among members have been effectively established within student organizations. It further suggests that student organizations function not only as platforms for individual competency development but also as important environments for fostering social networking, enabling students to establish meaningful interpersonal relationships that contribute to both their personal and professional development.

Within the need for power dimension, Indicator X6, which measures opportunities to participate in organizational decision-making, achieved a mean score of 5.52, while Indicator X5, representing opportunities to occupy leadership positions, obtained a mean score of 5.47. These findings indicate that respondents perceived student organizations as providing opportunities to

participate in decision-making processes and assume leadership responsibilities. Although these two indicators received slightly lower scores than those associated with the need for achievement and need for affiliation, both remained within the high category. This suggests that Generation Z students appreciate leadership opportunities; however, leadership positions are viewed as opportunities for learning and personal growth rather than as primary motivations for organizational involvement.

The lowest mean score was recorded for Indicator X2, which measures organizational recognition and appreciation (Mean = 5.29). Nevertheless, this score still falls within the high category. This finding indicates that formal recognition is not the primary factor motivating students to remain actively involved in student organizations. Instead, Generation Z students appear to place greater value on opportunities for learning, meaningful social relationships, and organizational experiences than on symbolic forms of recognition or external rewards.

Overall, the respondents' motivational priorities can be ranked as follows:

1. Opportunities for skill and competency development (Mean = 5.82)
2. Supportive interpersonal relationships among members (Mean = 5.67)
3. Collaboration and teamwork (Mean = 5.57)
4. Participation in determining organizational goals (Mean = 5.52)
5. Opportunities to assume leadership positions (Mean = 5.47)
6. Organizational recognition and appreciation (Mean = 5.29)

These findings demonstrate that the motivation of Generation Z students is primarily driven by self-development and social connectedness rather than by status, authority, or formal recognition. Student organizations are therefore perceived as environments that facilitate competency development, collaborative learning, and interpersonal interaction rather than as platforms for pursuing prestige or hierarchical positions.

The findings further reveal that Generation Z students perceive student organizations as important vehicles for competency development. This is reflected in the highest mean score obtained for opportunities to develop skills and abilities. Such findings are consistent with the defining characteristics of Generation Z, who place considerable emphasis on lifelong learning, continuous competency development, and preparedness for future careers.

From the perspective of McClelland's Theory of Needs, the need for achievement emerged as the most dominant motivational dimension. Students are motivated not primarily by organizational recognition but rather by opportunities to improve their competencies through active participation in organizational activities. Consequently, student organizations are perceived as environments for self-actualization and long-term investment in personal and professional development.

At the same time, the relatively high scores obtained for cooperation and interpersonal relationships indicate that the need for affiliation also plays a substantial role in shaping students' motivation. Student organizations provide supportive social environments in which students can establish networks, receive peer support, and develop a strong sense of belonging. These findings are consistent with the characteristics of Generation Z, who generally prefer collaborative, inclusive, and participatory organizational environments.

Although the need for power received comparatively lower mean scores than the other two motivational dimensions, it nevertheless remained within the high category. This finding suggests that students do not participate in student organizations primarily to obtain authority or formal leadership positions. Instead, leadership opportunities are viewed as valuable learning experiences through which students can strengthen their leadership competencies, decision-making abilities, and organizational skills.

The findings of this study have important practical implications for the management of student

organizations. Rather than relying primarily on formal recognition systems, student organizations should prioritize competency development initiatives, mentoring programs, leadership training, and collaborative learning opportunities. Such strategies are likely to be more effective in sustaining the engagement of Generation Z students, whose motivation is predominantly driven by opportunities for personal growth, meaningful social interaction, and experiential learning rather than by extrinsic rewards.

## 5. Conclusion

This study aimed to identify the dominant motivational needs of Generation Z students who voluntarily participate in student organizations based on McClelland's Theory of Needs. The findings indicate that, overall, Generation Z students demonstrate a high level of motivation toward participation in student organizations, as reflected by mean scores exceeding 5.00 across all motivational indicators on the seven-point Likert scale. These results suggest that student organizations effectively fulfill the psychological needs of their members and continue to serve as relevant platforms for student development in the digital era.

The findings further reveal that the need for achievement is the most dominant motivational dimension. Generation Z students perceive student organizations as environments that enable them to develop competencies, enhance practical skills, gain authentic experiences, and prepare themselves for future careers. In addition, the need for affiliation also emerged as a significant motivational factor, reflected in students' strong appreciation for teamwork, harmonious interpersonal relationships, and a sense of belonging within the organization. Although the need for power was likewise rated highly, it was not identified as the primary motivational driver. Instead, leadership opportunities were perceived as valuable learning experiences and avenues for personal growth rather than as means of acquiring authority or social status.

From a theoretical perspective, this study reinforces the relevance of McClelland's Theory of Needs in explaining the motivational characteristics of Generation Z students within the context of voluntary nonprofit student organizations. Furthermore, the study extends the application of McClelland's framework beyond its traditional use in business organizations and formal workplace settings by demonstrating its applicability to nonprofit organizations operating in higher education. The findings provide empirical evidence that Generation Z students' participation in student organizations is driven primarily by opportunities for personal development, continuous learning, and meaningful social relationships rather than by formal recognition or hierarchical status.

The findings offer several practical implications for the management of student organizations. Rather than emphasizing formal recognition and symbolic rewards, organizational leaders should prioritize competency development through leadership training, mentoring programs, collaborative learning, and active member involvement in organizational decision-making. Student organizations should also provide broader opportunities for members to gain practical experience through organizational projects and leadership responsibilities. Moreover, fostering an organizational culture characterized by collaboration, support, and inclusiveness should become a strategic priority, as these factors have proven to be essential in sustaining the long-term engagement of Generation Z students.

## 6. Limitations and Future Research

This study has several limitations that should be acknowledged. First, the use of a descriptive research design limits the ability to explain causal relationships between motivational needs and organizational behaviour among students. Second, the respondents consisted exclusively of students actively involved in student organizations; therefore, the findings cannot be generalized to other forms of voluntary organizations or to students who do not participate in organizational activities.

Future research is encouraged to adopt explanatory research designs that examine the influence of each dimension of McClelland's Theory of Needs on other organizational variables,

such as organizational commitment, student engagement, leadership effectiveness, organizational citizenship behaviour, and organizational performance. Comparative studies across different types of student organizations, membership duration, higher education institutions, geographical regions, and demographic characteristics are also recommended to provide a more comprehensive understanding of the motivational dynamics of Generation Z in various voluntary organizational settings. Furthermore, employing mixed-methods or qualitative approaches would offer deeper insights into the underlying reasons why Generation Z students choose to sustain their participation and commitment within student organizations.

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# THE EFFECT OF BRAND AMBASSADOR AND BRAND IMAGE ON THE PURCHASE DECISION OF LE MINERALE MEDIATED BY PURCHASE INTENTION

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***Abstract***
*This study aims to: 1) determine the effect of brand ambassador on the purchase decision of Le Minerale; 2) determine the effect of brand image on the purchase decision of Le Minerale; 3) determine the effect of brand ambassador on purchase decision as mediated by purchase intention toward Le Minerale; and 4) determine the effect of brand image on purchase decision as mediated by purchase intention toward Le Minerale. A quantitative approach with a explanatory research design. Data were collected through an online questionnaire distributed to 116 respondents belonging to Generation Z in the Special Region of Yogyakarta who were familiar with Le Minerale and followed the development of the Indonesian national football team. Data were analyzed using Structural Equation Modeling (SEM) with the SmartPLS 4.0 application. The results indicate that: 1) brand ambassador has no effect on the purchase decision of Le Minerale; 2) brand image has no effect on the purchase decision of Le Minerale; 3) purchase intention fully mediates the effect of brand ambassador on the purchase decision of Le Minerale; and 4) purchase intention fully mediates the effect of brand image on the purchase decision of Le Minerale.*
***Keywords:*** *Brand Ambassador, Brand Image, Generation Z, Purchase Decision, Purchase Intention.*

## 1. Introduction

In the current era, most people have become increasingly aware of the importance of consuming mineral water. Given the large number of mineral water products available in Indonesia, consumers must weigh the relative advantages of the products they choose. The National Packaged Beverage Producers Association (Asparminas) has reported that the packaged drinking water (AMDK) industry in Indonesia is projected to grow by up to 10% in 2025, driven by rising post-pandemic health awareness and concern over tap water quality. This trend is reflected in bottled-segment AMDK sales, which reached IDR 13.3 trillion based on industry data for the 2021–2022 period (Aulia, 2025).

Competition among brands has intensified through the use of brand ambassadors and the strengthening of brand image to influence consumer purchase intention and purchase decisions. Without a thorough understanding of the mediating role of purchase intention within this model, companies risk losing market share amid increasingly intense competition in the AMDK industry. This study is therefore necessary at present, in order to provide strategic, data-driven recommendations that can support the sustainability of the national industry before market trends shift further.

Le Minerale was selected as the object of this study because of its position as a local brand that has captured a significant share of the market, particularly among young consumers from Generation Z. Generation Z is currently both a pioneer and a symbol of the healthy-lifestyle movement, making product preference a crucial consideration for this generation. Amid the continuing dominance of Aqua, Le Minerale has continued to record sales growth, aided by its distinctive positioning, "Yang Ada Manis-Manisnya" ("With a Hint of Sweetness"), which emphasizes the natural taste of its mineral water and its commitment to sustainability through recycled packaging.

Le Minerale differentiates itself through strategic collaborations with players from the

Indonesian national football team as brand ambassadors, such as Nathan Tjoe-A-On and Rizky Ridho, generating viral campaigns such as "Real Ada Manis-Manisnya" and special-edition packaging that make the brand more relatable to young, nationalist (Generation Z) consumers in Indonesia. These strategic initiatives have produced positive outcomes, positioning Le Minerale as the leading product choice among Generation Z. The brand received a Gold award at the 2025 Marketeers Choice Award in the AMDK sector, an award based on an online survey conducted between April and June 2025 involving 1,183 university students from 44 universities. Le Minerale led with 31% of the votes, followed by Aqua (24%), Nestlé Pure Life (21%), Cleo (16%), and Pristine (8%) (Marketeers, 2025).

Companies must communicate their products effectively and to the right target audience so that their products remain top of mind for consumers. To this end, companies need to build a strong brand, as a strong brand enables accurate positioning of the product in consumers' minds (Fatmaningrum & Fadhilah, 2020). According to Kotler and Armstrong (2012, as cited in Fatmaningrum & Fadhilah, 2020), brand image refers to the feelings and thoughts that arise once consumers have seen or heard about a brand. A favorable consumer perception of a product tends to encourage purchase, and a product viewed positively by consumers becomes the foundation for a positive brand image; brand image can therefore be understood as consumers' evaluation of a product. Based on Top Brand Index data, Le Minerale's share within the packaged drinking water (AMDK) category rose between 2020 and 2021 (initial data first appeared in 2020 at 6.10%, serving as the post-launch baseline following the brand's 2017 introduction, with fluctuation thereafter); however, in 2021 it experienced a marked decline of 1.5 percentage points, falling to 4.60%. Between 2021 and 2022 it rose by 7.9 percentage points to 12.50%. Between 2022 and 2023 it rose again by 2 percentage points to 14.50%. Between 2023 and 2024 it continued to increase by 4.3 percentage points to 18.80%, with a 2025 projection of 23.20% driven by the brand's sustained strategy.

The Top Brand Index is measured using three parameters: first, top-of-mind awareness, based on the brand first mentioned by a respondent when a product category is named; second, last used, based on the brand most recently consumed by a respondent within one repurchase cycle; and third, future intention, based on the brand a respondent intends to consume in the future (Top Brand Award, 2024).

Brand ambassadors particularly players from the Indonesian national football team, help strengthen Le Minerale's brand image through associations with nationalism and pride, which in turn increase consumer purchase intention as a mediator prior to the final purchase decision. A positive brand image, built on perceptions of natural mineral quality and sustainability, is interrelated with brand ambassadors in generating positive emotion, such that purchase intention functions as a bridge strengthening this relationship by moving consumers from initial interest toward an actual purchase. The research questions formulated for this study are as follows:

1. Does brand ambassador affect the purchase decision of Le Minerale?
2. Does brand image affect the purchase decision of Le Minerale?
3. Does brand ambassador affect the purchase decision of Le Minerale as mediated by purchase intention?
4. Does brand image affect the purchase decision of Le Minerale as mediated by purchase intention?

The main objective of this study is to empirically analyze the effect of brand ambassador and brand image on the purchase decision of Le Minerale as mediated by purchase intention, using a quantitative method, namely Structural Equation Modeling (SEM). This study seeks to address a gap in the literature by adapting this model to the context of Indonesia's packaged drinking water (AMDK) industry, specifically for the Le Minerale brand, which leverages elements of nationalism through brand ambassadors drawn from the Indonesian national football team an aspect that has not previously been explored in depth.

Previous studies have examined the relationship between brand ambassador and brand image on purchase intention, and the subsequent effect on purchase decision. Purwati and Cahyanti, (2022), studying the Scarlett product, found that brand ambassador had no significant effect on purchase intention but had a positive effect on purchase decision, whereas brand image had a positive effect on purchase intention but no direct significant effect on purchase decision. In contrast, Salsabiela et al., (2022) found that brand ambassador had a positive and significant effect on purchase intention, that brand awareness positively affected both purchase intention and purchase decision, and that purchase intention positively affected purchase decision. However, the direct effect of brand ambassador on purchase decision was found to be insignificant, indicating a weak relationship. Purchase intention was also found to fully mediate the effect of brand ambassador on purchase decision, and to partially mediate the effect of brand awareness on purchase decision.

Previous studies did not account for the element of nationalism embodied in brand ambassadors such as national football players, nor for the specific phenomenon of a local brand such as Le Minerale experiencing a sales surge from viral, post-pandemic campaigns. The novelty of the present study therefore lies in its integration of the emotional factor of nationalism into the brand ambassador construct. Nationalism, expressed through collaboration with national football athletes who went viral on social media generating thousands of interactions through the "Real Ada Manis-Manisnya" campaign offers a unique perspective on young consumer behavior amid competition between local and international brands.

## 2. Literature Review

### *2.1 Consumer Behavior*

Marketing is the process of communicating a good or service needed or wanted by consumers so as to create a mutually beneficial relationship Kotler et al., (2022). This process concerns the relationship between a company and its customers, building a harmonious relationship through the value delivered to them. Consumer behavior, within marketing, focuses on how individuals, groups, and organizations select, use, or discontinue the use of goods and services in order to satisfy their needs and wants. Marketing can thus be understood as the pursuit of new customers by offering superior value, while retaining and growing existing customers by satisfying their needs (Kotler et al., 2022).

### *2.2 Brand Ambassador*

According to Lea Greenwood 2003, Salsabiela et al., (2022) , a brand ambassador is one of the efforts undertaken by business actors to promote a product through the use of a cultural icon or identity, functioning as a communication channel between the company and the public to introduce and expand sales. According to Savitri 2012 Salsabiela et al., (2022), brand ambassador is measured through the following indicators:

1. How well-known the brand ambassador is among the target audience (reputation)
2. The attractiveness of the brand ambassador
3. Consumer trust in the brand ambassador's expertise
4. The brand ambassador's ability to influence consumers (power)

### *2.3 Brand Image*

According to Kotler et al., (2022), brand image refers to the perceptions and beliefs held by consumers, reflected in the associations stored in consumers' memory. Brand image is shaped by a range of associations linked to the brand, including thoughts, feelings, perceptions, images, experiences, beliefs, and attitudes. Every company seeks to build a brand image with associations that are as strong, favorable, and unique as possible, since this reflects how consumers perceive and evaluate the brand relative to its market competitors.

### *2.4 Purchase Intention*

According to Kotler et al., (2022), within the consumer decision-making process, purchase intention is formed once consumers have developed a preference among the brands within their consideration set. This intention may be expressed through sub-decisions such as brand choice, retailer choice, quantity, timing of purchase, and payment method. However, purchase intention is not an absolute predictor of actual purchasing behavior, as intervening factors may alter this intention before it translates into an actual purchase decision.

### *2.5 Purchase Decision*

Purchase decision refers to the consumer's action of forming a set of brand references, narrowing them to a single choice, and purchasing the product that is most needed or desired (Kotler et al., 2022). According to Purwati and Cahyanti, (2022), purchase decision can be measured through several dimensions: product choice, brand choice, retailer choice, purchase timing, and purchase quantity. Consistent with this definition, the payment-method dimension is excluded from the present study, as it is transactional and operational in nature and is not part of the core process of forming brand preference and choice.

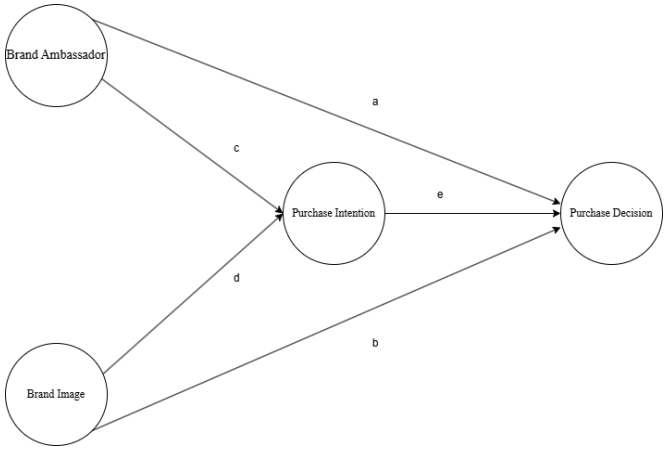



Figure 1. Research Model

H1(a): Brand ambassador affects purchase decision.
H2(b): Brand image affects purchase decision.
H3(c-e): Brand ambassador affects purchase decision through purchase intention.
H4(d-e): Brand image affects purchase decision through purchase intention.

## 3. Research Methods

This study employs a quantitative research design using a survey approach. The research procedure was carried out in three stages: a literature review, the formulation of methodology and measurement, and validation of the findings. Primary data, sourced from respondents' answers to a distributed questionnaire, were collected, processed, and interpreted. Because the exact size of the population was unknown, the sample size was determined using the Cochran formula with a 10% sampling error, yielding a minimum required sample of 96 respondents. A total of 116 respondents were obtained, satisfying the minimum sample size required by the Cochran formula. Each respondent met the following criteria: residing in Yogyakarta, belonging to Generation Z, following the development of the Indonesian national football team, and being familiar with Le Minerale.

**Table 1. Operational Definitions and Indicators**

| Variable | Operational Definition | Indicators |
|---|---|---|
| Brand ambassador | Brand ambassador refers to the activity of promoting a product using the cultural icon and identity of players from the Indonesian national football team, functioning as a communication channel between the | 1. Reputation among the target audience<br>2. Attractiveness<br>3. Consumer trust<br>4. Ability to influence consumers |

| Variable | Operational Definition | Indicators |
|---|---|---|
| | company and consumers to introduce and expand sales. | (Salsabiela et al., 2022) |
| Brand image | Brand image is the consumer's perception of the Le Minerale brand, stored in memory based on the attributes, experiences, and benefits associated with the product. | 1. Strength<br>2. Uniqueness<br>3. Favorability (Purwati & Cahyanti, 2022) |
| Purchase intention | Purchase intention is the consumer's interest in purchasing Le Minerale, shaped by perception, motivation, and evaluation. | 1. Exploratory interest<br>2. Referential interest<br>3. Preferential interest<br>4. Transactional interest (Salsabiela et al., 2022) |
| Purchase decision | Purchase decision is the consumer's action of forming a set of brand references narrowed into a choice, and purchasing a Le Minerale product. | 1. Product choice<br>2. Brand choice<br>3. Retailer choice<br>4. Purchase timing<br>5. Purchase quantity (Purwati & Cahyanti, 2022) |

*Source: primary data processed, 2025*

The questionnaire was designed to measure brand ambassador and brand image in relation to purchase decision, with purchase intention as a mediating variable. The first section screened respondent characteristics, including domicile, generation, familiarity with the development of the Indonesian national football team, and familiarity with Le Minerale. The second section contained statements representing each variable, measured using a five-point Likert scale.

The sampling method used was non-probability sampling, chosen because the exact size of the study population was unknown. The specific technique employed was purposive sampling, selected because the study sample needed to satisfy particular criteria, meaning that not every member of the population had an equal chance of being selected. The data analysis technique used in this study was Partial Least Squares Path Modeling (PLS-SEM), an analytical technique used to examine the relationships among latent constructs by testing whether an effect exists between them (Hair et al., 2019). The analysis was carried out using PLS-SEM, fulfilling the criteria for validity and reliability as evidence of a sound measurement model (Hair et al., 2019). Construct validity requires a factor loading value greater than 0.5. Convergent validity requires an Average Variance Extracted (AVE) value greater than 0.5, with factor loadings ideally exceeding 0.7. Discriminant validity is assessed by comparing the square root of each construct's AVE against its correlations with other variables. Reliability is assessed through composite reliability values, which should ideally exceed 0.7. Following evaluation of the measurement model, the structural model was evaluated using the coefficient of determination ($R^2$), the relative effect size ($f^2$), and the path coefficients. Hypothesis testing was conducted by examining the p-value, which represents the probability of error in assuming a given path coefficient. Mediation hypotheses were tested by comparing the direct and indirect effects (Hair et al., 2019).

### *3.1 Measurement Model Testing (Outer Model)*

Measurement model (outer model) testing in this study comprised tests of validity and reliability. Convergent validity and discriminant validity were the two validity tests employed. Convergent validity is considered satisfied when the outer loading value exceeds 0.7 and the Average Variance Extracted (AVE) value exceeds 0.5 (Hair et al., 2019).

**Table 2. Loading Factor Values**

| No. | Statement | Loading Factor | Status |
|---|---|---|---|
| 1 | BA1 | 0.833 | Valid |
| 2 | BA2 | 0.815 | Valid |
| 3 | BA3 | 0.804 | Valid |

| No. | Statement | Loading Factor | Status |
|---|---|---|---|
| 4 | BA4 | 0.807 | Valid |
| 5 | BI1 | 0.818 | Valid |
| 6 | BI2 | 0.803 | Valid |
| 7 | BI3 | 0.819 | Valid |
| 8 | BI4 | 0.828 | Valid |
| 9 | BI5 | 0.844 | Valid |
| 10 | BI6 | 0.849 | Valid |
| 11 | PI1 | 0.734 | Valid |
| 12 | PI2 | 0.834 | Valid |
| 13 | PI3 | 0.777 | Valid |
| 14 | PI4 | 0.855 | Valid |
| 15 | PD1 | 0.838 | Valid |
| 16 | PD2 | 0.783 | Valid |
| 17 | PD3 | 0.788 | Valid |
| 18 | PD4 | 0.788 | Valid |
| 19 | PD5 | 0.847 | Valid |

*Source: primary data processed (2026)*

Referring to Table 2, every indicator for each variable is considered valid, as the loading factor for each statement item exceeds 0.7. This indicates that all statement items adequately represent their respective latent constructs, so no item needs to be eliminated.

**Table 3. Average Variance Extracted (AVE) Values**

| No. | Variable | AVE | Status |
|---|---|---|---|
| 1 | Brand Ambassador | 0.663 | Valid |
| 2 | Brand Image | 0.684 | Valid |
| 3 | Purchase Intention | 0.655 | Valid |
| 4 | Purchase Decision | 0.643 | Valid |

*Source: primary data processed (2026)*

Referring to Table 3, the Average Variance Extracted (AVE) value for every variable is considered valid, as each exceeds 0.5. This indicates that more than 50% of the variance in the indicators of each variable can be explained by its respective latent construct.

**Table 4. HTMT Values**

| | BA | BI | PD | PI |
|---|---|---|---|---|
| BA | | | | |
| BI | 0.637 | | | |
| PD | 0.634 | 0.637 | | |
| PI | 0.832 | 0.759 | 0.872 | |

*Source: primary data processed (2026)*

Referring to Table 4, all HTMT values fall below the predetermined threshold of 0.90, so all values are considered valid, indicating that the correlation between heterotrait indicators differs from that of monotrait constructs.

**Table 5. Fornell-Larcker Criterion Values**

| | BA | BI | PD | PI |
|---|---|---|---|---|
| BA | 0.814 | | | |
| BI | 0.598 | 0.827 | | |
| PD | 0.544 | 0.571 | 0.809 | |
| PI | 0.685 | 0.665 | 0.745 | 0.802 |

*Source: primary data processed (2026)*

Referring to Table 5, the square root of AVE for every construct exceeds its correlation with the other latent variables, so all values are considered valid. This indicates that each construct explains its own indicators more strongly than it correlates with the other constructs.

**Table 6. Cross-Loading Values**

| Indicator | BA (X1) | BI (X2) | PD (Y) | PI (Z) |
|---|---|---|---|---|
| X1.1 | 0.833 | 0.473 | 0.396 | 0.523 |
| X1.2 | 0.815 | 0.442 | 0.516 | 0.559 |
| X1.3 | 0.804 | 0.491 | 0.430 | 0.576 |
| X1.4 | 0.807 | 0.543 | 0.420 | 0.569 |
| X2.1 | 0.466 | 0.818 | 0.506 | 0.528 |
| X2.2 | 0.454 | 0.803 | 0.400 | 0.454 |
| X2.3 | 0.474 | 0.819 | 0.457 | 0.528 |
| X2.4 | 0.479 | 0.828 | 0.477 | 0.590 |
| X2.5 | 0.524 | 0.844 | 0.512 | 0.623 |
| X2.6 | 0.562 | 0.849 | 0.469 | 0.551 |
| Y1.1 | 0.463 | 0.434 | 0.734 | 0.608 |
| Y1.2 | 0.434 | 0.469 | 0.834 | 0.583 |
| Y1.3 | 0.365 | 0.398 | 0.777 | 0.531 |
| Y1.4 | 0.460 | 0.459 | 0.855 | 0.612 |
| Y1.5 | 0.465 | 0.535 | 0.838 | 0.663 |
| Z1.1 | 0.526 | 0.469 | 0.480 | 0.783 |
| Z1.2 | 0.606 | 0.482 | 0.550 | 0.788 |
| Z1.3 | 0.523 | 0.515 | 0.631 | 0.788 |
| Z1.4 | 0.546 | 0.645 | 0.701 | 0.847 |

*Source: primary data processed*

Referring to Table 6, each indicator's loading on its own construct exceeds its cross-loading on other constructs, indicating that each indicator item aligns more closely with its intended variable than with the others.

**Table 7. Cronbach's Alpha and Composite Reliability Values**

| No. | Variable | Cronbach's Alpha | Composite Reliability | Status |
|---|---|---|---|---|
| 1 | BA | 0.831 | 0.832 | Reliable |
| 2 | BI | 0.908 | 0.928 | Reliable |
| 3 | PD | 0.867 | 0.904 | Reliable |
| 4 | PI | 0.815 | 0.878 | Reliable |

*Source: primary data processed (2026)*

Referring to Table 7, each of the four variables has a Cronbach's Alpha and Composite

Reliability value exceeding 0.7, indicating that the relationships among the statement items (indicators) are consistent.

### *3.2 Structural Model Testing (Inner Model)*

Evaluation of the inner model is conducted by examining the R-Square ($R^2$) value, also known as the coefficient of determination, where changes in R-Square are used to determine the proportion of variance in the dependent variable that can be predicted or explained by the independent variable (Rahadi, 2023). The R-Square ($R^2$) results used to assess the effect between the independent and dependent variables are presented below:

**Table 8. R-Square ($R^2$) Values**

| No. | Variable | $R^2$ |
|---|---|---|
| 1 | Purchase Intention | 0.570 |
| 2 | Purchase Decision | 0.565 |

*Source: primary data processed (2026)*

Referring to Table 8, the $R^2$ value for purchase intention, as influenced by brand ambassador and brand image, is 0.570, or 57%, while the remaining 43% is explained by variables outside this research model. In addition, purchase decision is influenced by brand ambassador and brand image at 0.565, or 56.5%, while the remaining 43.5% is explained by variables outside this research model.

## 4. Research Findings and Discussion

### *4.1 Sample Screening Characteristics*

The screening criteria for this study were Generation Z respondents residing in Yogyakarta who were familiar with Le Minerale and followed the development of the Indonesian national football team. A total of 116 respondents participated, with characteristics presented in the following table:

**Table 9. Respondent Characteristics**

| Criterion | Category | n | Percentage (%) |
|---|---|---|---|
| Domicile | Yogyakarta | 116 | 100% |
| Generation | Generation Z | 116 | 100% |
| Follows Indonesian national football team | Yes | 116 | 100% |
| Familiar with Le Minerale | Yes | 116 | 100% |

*Source: primary data processed (2026)*

Referring to Table 9, of the 116 respondents sampled, 100% resided in Yogyakarta, 100% belonged to Generation Z, 100% followed the development of the Indonesian national football team, and 100% were familiar with Le Minerale.

### *4.2 Hypothesis Testing*

Inner model testing was carried out through the interpretation of the $R^2$ value. R-Square ($R^2$) can be used as a measure of the degree of variation between independent and dependent variables (Fridayani & Kusuma, 2023). The results of the direct- and indirect-effect path analyses are presented in the following tables:

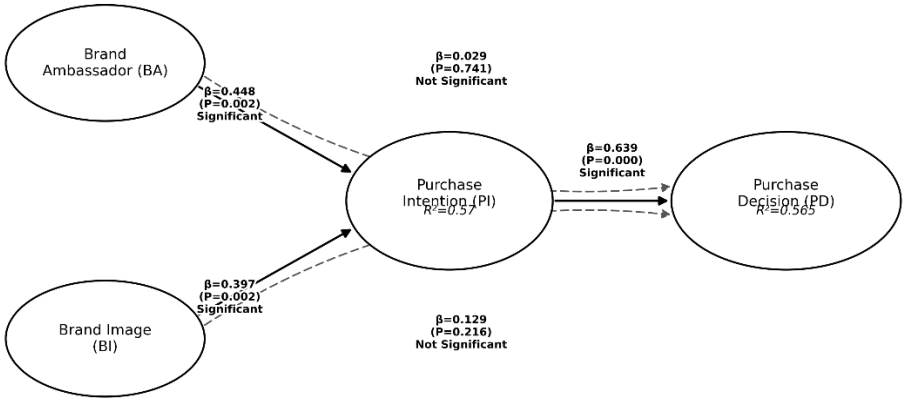



**Figure 2. Testing the Indirect Effect With SmartPLS 4.0**

**Table 10. Direct Effects**

| No. | Hypothesis | Path Coefficient | P-value | Result |
|---|---|---|---|---|
| 1 | BA → PD | 0.029 | 0.741 | Not significant |
| 2 | BA → PI | 0,448 | 0,002 | Significant |
| 3 | BI → PD | 0.129 | 0.216 | Not significant |
| 4 | BI → PI | 0,397 | 0,002 | Significant |
| 5 | PI → PD | 0,639 | 0,000 | Significant |

*Source: primary data processed (2026)*

**Table 11. Indirect (Mediated) Effects**

| No. | Hypothesis | Path Coefficient | P-value | Result |
|---|---|---|---|---|
| 1 | BA → PI → PD | 0.286 | 0.003 | Significant |
| 2 | BI → PI → PD | 0.254 | 0.001 | Significant |

*Source: primary data processed (2026)*

Mediation hypothesis testing was used to examine the extent to which variable Y is influenced by variable X through a mediator. According to Fridayani and Kusuma, (2023), this requires a systematic sequence of analytical decision-making steps: complementary (partial) mediation occurs when both the indirect and direct effects are significant and in the same direction; competitive mediation (suppressor effect) occurs when both are significant but in opposite directions; indirect-only mediation (full mediation) occurs when the indirect effect is significant while the direct effect is not; direct-only mediation (no mediation) occurs when the indirect effect is not significant while the direct effect is; and no effect (no mediation) occurs when neither the indirect nor the direct effect is significant.

### *4.2.1 Brand Ambassador Has No Effect on the Purchase Decision of Le Minerale*

A brand ambassador functions as a communication channel between a company and the public, introducing and expanding product sales. The results of this study show that brand ambassador has no effect on purchase decision: the attractiveness, or lack thereof, of the brand ambassador does not directly shape consumer confidence in the decision to purchase Le Minerale. This finding is consistent with Yunita and Risdwiyanto, (2024), who likewise found that brand ambassador has no effect on purchase decision. It contrasts, however, with Purwati and Cahyanti, (2022) and Hariyanto and Wijaya, (2022), both of whom found that brand ambassador significantly influences purchase decision. This result suggests that the attractiveness of a brand ambassador used in product promotion does not, on its own, convince consumers to decide to purchase Le Minerale.

#### *4.2.2 Brand Image Has No Effect on the Purchase Decision of Le Minerale*

Brand image is formed through a range of associations thoughts, feelings, perceptions, images, experiences, beliefs, and attitudes connected to the Le Minerale brand. The results of this study show that brand image has no effect on purchase decision: whether the brand image is favorable or unfavorable does not directly shape consumer confidence in the decision to purchase Le Minerale. This finding is consistent with Purwati and Cahyanti, (2022), who found that brand image has no significant effect on purchase decision. It contrasts, however, with Ustadriatul Mukarromah et al., (2022), who found that brand image has a positive and significant effect on purchase decision, and Fatmaningrum and Fadhilah, (2020), who likewise found that brand image affects purchase decision. It can therefore be concluded that, in this study, the quality of Le Minerale's brand image does not directly shape consumer confidence in the purchase decision.

#### *4.2.3 Purchase Intention Fully Mediates the Effect of Brand Ambassador on the Purchase Decision of Le Minerale*

The results of this study show that purchase intention fully mediates the effect of brand ambassador on purchase decision. Although brand ambassador does not directly affect purchase decision, purchase intention serves as an important mediating factor that channels the effect of brand ambassador toward purchase decision (full mediation). In this study, the attractiveness of the brand ambassador particularly players from the Indonesian national football team builds consumer confidence in the purchase decision only through purchase intention. This finding contrasts with Purwati and Cahyanti, (2022), who found that purchase intention does not mediate the effect of brand ambassador on purchase decision, but is consistent with Salsabiela et al., (2022), who found that purchase intention does mediate this relationship. This finding indicates that a brand ambassador who suits Le Minerale well can increase purchase intention, thereby making consumers more confident in deciding to purchase the product.

#### *4.2.4 Purchase Intention Fully Mediates the Effect of Brand Image on the Purchase Decision of Le Minerale*

The results of this study show that purchase intention fully mediates the effect of brand image on the purchase decision of Le Minerale. Although brand image does not directly affect purchase decision, purchase intention serves as an important mediating factor that channels the effect of brand image toward purchase decision (full mediation). In this study, whether the brand image is favorable or unfavorable builds consumer confidence in the purchase decision only through purchase intention. This finding is consistent with Purwati and Cahyanti, (2022), who found that purchase intention mediates the effect of brand image on purchase decision. This finding indicates that a favorable brand image of Le Minerale can increase purchase intention, thereby making consumers more confident in deciding to purchase the product.

## 5. Conclusion

Based on the results of the analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM), this study shows that brand ambassador and brand image do not have a direct effect on the purchase decision of Le Minerale, as evidenced by path coefficients of 0.029 (p-value = 0.741) and 0.129 (p-value = 0.216), respectively, both of which exceed the 0.05 significance threshold. However, when tested through purchase intention as a mediating variable, both variables were found to have a significant effect on purchase decision, with indirect effects of 0.286 (p-value = 0.003) for brand ambassador and 0.254 (p-value = 0.001) for brand image, confirming that purchase intention acts as a full mediator in both relationships. These findings indicate that the attractiveness of the brand ambassador and the quality of Le Minerale's brand image become effective in driving consumer purchase decisions only once they have first generated purchase intention, making purchase intention the key link bridging Le Minerale's marketing strategy with consumers' actual purchase decisions.

This study has certain limitations that should be addressed in future research. The questionnaire was distributed online via Google Forms through Instagram and WhatsApp, meaning respondents were not directly assisted while completing it; this may have limited responses to a particular age range and raises the possibility that some responses were not completed with full seriousness. In addition, based on the $R^2$ results, other variables beyond those examined here may also influence purchase decision; future researchers are therefore encouraged to incorporate additional variables beyond those studied in this research in order to obtain more varied findings.

Managerial implications:

1.) Aligning the brand ambassador with product values. PT Tirta Fresindo Jaya needs to strengthen the alignment between its brand ambassadors and the product's values through more authentic content, testimonials that reflect genuine experience, and campaigns that connect product benefits with the brand ambassadors' lifestyles, in order to increase consumer purchase intention toward Le Minerale.
2.) Direct interaction with consumers. PT Tirta Fresindo Jaya should regularly organize both online and offline challenge programs to intensify consumer interaction, and should carefully select sponsorship opportunities—for example, sponsoring running events, music concerts, or culinary festivals—to ensure the brand is present at moments when consumers need hydration, thereby increasing purchase intention toward Le Minerale.
3.) Communicating the product to consumers. PT Tirta Fresindo Jaya needs to make its marketing efforts more educational, sharpen its brand storytelling to improve product communication, and keep pace with marketing trends so that consumers are encouraged to actively seek information about Le Minerale, thereby increasing purchase intention toward the product.
4.) Considering additional variables. In developing marketing strategy and corporate policy, management may consider further research that incorporates additional variables influencing purchase intention and purchase decision, thereby broadening insight into consumer behavior.

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# TEACHERS AS SERVANT LEADER

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***Abstract***
*This research employed a qualitative case study design with a naturalistic and interpretive approach. Interviews were conducted with teachers, students, principal representatives, and foundation representatives at several junior high schools affiliated with a private foundation in Tangerang. The results indicate that teachers implement servant leadership characteristics, such as listening, empathy, healing, and a commitment to student growth, in daily educational interactions. There is a positive alignment between teachers' service efforts and students' perceptions, although the challenge of meeting the expectations of all students and parents still requires teachers to be adaptable. The implications of this study indicate that the success of servant leadership in schools is determined by the leadership's exemplary behavior and ongoing policy synergy.*
***Keywords****: Servant Leadership, Teacher, Student Mentoring, Character Education*

## 1. Introduction

Education plays an essential role in preparing qualified, adaptive human resources capable of responding to the disruptions of the times. As a socio-emotional process, educational success is inseparable from the quality of interpersonal relationships in the classroom, particularly between teachers and students (Arumsari, 2017; Nugraha, 2018). The quality of education is greatly influenced by the role of teachers as key actors in the learning process in schools (Hasra, Asyarah, & Azainil, 2024). In the 21st-century educational paradigm, the role of teachers has transformed; they are no longer merely transmitters of knowledge, but have evolved into facilitators, organizers, motivators, and leaders who orchestrate the development of students' full potential (Wibowo & Farnisa, 2018). This paradigm shift demands a more humanistic, collaborative, and service-oriented model of instructional leadership.

One leadership approach relevant to these demands is servant leadership. This approach focuses not on hierarchical authority, but rather on a fundamental drive to help others grow and reach their full potential (Northouse, 2016; 2021). Servant leadership focuses on cultivating, motivating, and empowering partners or students to achieve shared goals (Waruwu et al., 2021). In the educational context, teachers who adopt servant leadership tend to be more caring, empathetic, and mentor-oriented, which directly impacts student achievement, motivation, and loyalty (Nikmah, 2024; Noland & Richards, 2015). Furthermore, integrating servant leadership into teaching practices allows educators to focus more on the substance of classroom learning, minimizing instructional ineffectiveness (Drury, 2005).

Previous literature reviews on servant leadership in education still leave a crucial research gap. First, the majority of contemporary studies still focus on the principal as the primary subject of leadership (Makirimani & Naicker, 2024; Khoarane, 2023; Afjur et al., 2023; Shula, 2023). Second, studies exploring the practice of servant leadership by teachers as informal classroom leaders (teacher-as-leader) are still very limited, especially those that integrate the tripartite perspective of teachers, students, and school management. Recent studies (Dami, 2024; Athanasios, 2024; Zhang, 2023) still focus on conceptual concepts regarding student-centered learning or merely examine quantitative correlations between variables, but fail to capture the complexity and dynamics of daily teaching practices empirically and comprehensively.

Based on this research gap, this study aims to explore in-depth the implementation of servant leadership by teachers and its impact on students' learning experiences, using a case study in a school. Specifically, this research aims to: (1) describe how servant leadership characteristics are implemented by teachers and perceived by students in classroom interactions; and (2) analyzing the role of principals and supervisors in aligning these leadership practices with the institution's core

values.

Qualitative research methods are going to be adopted for this study which apart from providing some valuable theoretical findings on teacher-learner relationship in secondary school, will give educational institutions some practical tips in developing human resource development policies which will emphasize the value of service. From the perspective of educators, the result of this paper will help them be more proactive in their role as servant leaders.

## 2. Literature Review

### *2.1 The Dynamics of the Teacher's Role in Contemporary Learning*

Teachers as professionals are expected to educate, teach, guide, and evaluate students. Mulyasa (2013) points out in his writings, the role of a teacher is much more than a lecturer, but more of an agent of learning through an environment which challenges, motivates, and promotes the creativity of the learners. Teacher is not just a medium of knowledge delivery but a catalyst that transform student's values, attitude, and character. Anggraeni & Effane (2022) emphasize this. Teacher's dignity, as a cultural and etymological phenomenon, is shown through dedication, exemplary conduct, and pedagogical interactions, where the student's spiritual development and character growth is equally, if not more, value as the learning of knowledge (Wahyuni, 2014).

With the evolution of education that marks the 21st century, teacher's role has also become more complicated to define. It can also say according to Djamarah (2010), this is no longer confined to just being a guide of knowledge transfer but to act as facilitator, motivator and counsellor. This major change in teacher's role calls for teachers to no longer be an infallible knowledge bank but rather one who creates an atmosphere of openness and collaboration where students can develop ideas, raise questions and find the answer by themselves.

### *2.2 Leadership in Education and Servant Leadership*

Leadership as a process wherein, an individual or a person with leadership qualities is capable of affecting change, mobilizes, guides, and inspires others to achieve or accomplish certain goals or purposes. This process involves leaders influencing, guiding, and coordinating the efforts of others individually or collectively. Leadership can either be directive or collaborative but is ultimately about effecting change through people (Northouse, 2021). In modern educational management, one of the leadership styles is value-based leadership which focuses on ethics, collaboration, and human relationships. (Chang et al., 2021). The main function of educational leaders, especially in a school, is not limited to school administrator only but also to all the teachers who are instructional leaders because they are the first point of contact for the students (Bush, 2020).

Education is one context where a servant leadership style is very appropriate type of leadership because servant-leaders focus on the follower's needs, development, and service. Drury (2005) stated so. Greenleaf who coined the term servant leadership in 1970. The ten attributes of a servant-leader are: 1) listening, 2) empathy, 3) healing, 4) awareness 5) persuasion, 0 6) conceptualization, 7) foresight, 8) stewardship, 9) commitment to the growth of others, and 10) building community (Spears, 2002). A servant leader therefore does not look to be served, but is serving those for whom he leads, and in doing so, he is a genuine, humble servant.

### *2.3 How Servant Leadership is Changing Schools*

In the school environment, the adoption of the philosophy and spirit of servant leadership have brought about both positive personal level and organizational development. Kainde & Mandagi (2023) have empirically confirmed this. It also coincides closely with the principle of student-centered education where the foundation of interaction is integrity empathy and humility.Keith(2023; Ramiini et al (2024).

Several studies confirm the significance of this leadership:

- Towards Students. Teachers who prioritize empathy and listening are able to create positive interpersonal relationships (Pujiastutianingsih, 2023). This is directly correlated with increased intrinsic motivation, student engagement, and academic achievement (Kilag et al., 2023). Furthermore, this approach supports students' socio-emotional development and the formation of pro-social character traits (Van Dierendonck, 2011).
- Towards Teachers and School Climate. Servant leadership practices not only empower students but also improve teacher well-being, morale, and job satisfaction (Zhang et al., 2023; Makirimani & Naicker, 2024). A work environment based on genuine service fosters increased professionalism and performance (Thai'Atun et al., 2024), while also fostering an inclusive, collaborative, and trusting school culture.

### *2.4 Teachers as Servants*

An instructor has to be the primary source of motivation and direction for students. Teaching is more than just a job; it's an essential service. Suprihatiningrum (2013) says that every teacher is a leader at the classroom level. Teacher leaders are not only the ones who give academics lessons their task also entails shaping the character and personality of students through learning (Suryana, 2017).

Through adopting servant leadership, the teacher does not use her or his power to control, but to support, follow and empower the students. The practical examples of this philosophy include a teacher who listens attentively to her students and pays attention to their personal needs. Also, a teacher who makes her classroom free from fear (Janet et al. 2014; Northouse, 2021). Based on this approach, the authors of the article examine internalization of servant leadership traits by the teachers and how it could be the cause of a major positive impact on the learning behaviour and development of the students at school. In fact, this kind of thinking is what forms the main argument of the research paper being discussed here.

## 3. Research Methods

The researchers conducted a case study that was naturally occurring and from which meaning was made through qualitative research. In selecting an interpretive strategy for a qualiative case study design (Creswell & Poth, 2018; Yin, 2018), the researchers were able to identify themselves very closely with the phenomenon under investigation, thus facilitating them in understanding the phenomenon in its full depth and with a naturalistic perspective. The decision to adopt an interpretive-case study design (Creswell & Poth, 2018; Yin, 2018) was informed by the research goal to look at and deeply understand a present phenomenon occurring in a limited setting. It is the implementation of service values in a number of junior high schools through a private foundation in Tangerang. This method was also one of the ways that helped the researchers to capture without distortion the daily life of the schools and through that, to have an understanding of the various practices of servant leadership by teachers and the interpretations made by students.

To gain a holistic perspective in this study, the participants were carefully identified. Informants were selected through a combination of purposive sampling and randomized selection techniques, consisting of:

- Teachers (6): Selected using purposive sampling from six junior high schools. The selection criteria were based on the highest score on the Customer Satisfaction Indicator (IKP)—an internal evaluation instrument on a scale of 1-4 that assesses teachers' personal, pedagogical, and social competencies. Teachers with the highest IKP were assumed to be the "best models" of student service practices.
- Students (6): Randomly selected from the ninth-grade student population at the same six junior high schools. The ninth-grade students were chosen because they had the longest duration of interaction (three years) with the teachers, and therefore were assumed to have comprehensive and representative experience in assessing the quality of academic and emotional service at the school.

- Principal (1): Purposively selected based on the longest tenure, with the aim of gaining in-depth historical and managerial insight into the school's organizational culture.
- School Supervisor (1): Purposively selected from the junior high and senior high school levels to provide perspective on the alignment between foundation policies and the implementation of servant leadership in the field.

As the key instrument (human instrument), the researcher collected primary data through in-depth interviews. Interviews were conducted online, facilitated by the Zoom application, recorded with the participants' consent, and transcribed verbatim.

The interview guide was designed by operationalizing the ten characteristics of servant leadership (Spears, 2002) into indicators of daily behavior. The interview instrument was tailored specifically to each participant group:

1) Teacher Guide: Explores teachers' experiences of listening, empathizing, empowering students, and managing service-based classrooms.
2) Student Guide: Explores students' subjective perceptions and experiences of teacher support, care, and fairness.
3) Management Guide (Principal & Supervisor): Describes the role of structural leadership in fostering, facilitating, and aligning the institution's core values with teachers' teaching practices.

The collected data were analyzed using the interactive data analysis model by Miles, Huberman, and Saldaña (2014).

## 4. Research Findings and Discussion

### *4.1 Actualizing Servant Leadership Values in Pedagogical Practice*

The findings indicate that teachers not only fulfill an instructional role, but also position themselves as servants who prioritize the holistic development of students. Ten characteristics of servant leadership (Spears, 2002) were observed to manifest in three domains of teachers' daily practice:

1) Interpersonal Approach and Conflict Resolution
   Teachers demonstrated the characteristics of listening, empathy, healing, and awareness through personal approaches outside of class hours. When dealing with introverted students—such as those from orphanages—teachers took proactive initiatives to approach, listen, and reflect on their own past experiences to build a bridge of empathy. This was confirmed by participant G6, who stated the importance of ensuring students' emotional well-being before offering academic support. Furthermore, in addressing behavioral issues, teachers prioritized awareness and collaboration (with guidance counselors and parents) through a persuasive, rather than punitive, approach.

2) Inclusive Instructional Strategies
   In the learning process, the characteristics of persuasion, conceptualization, and community building were implemented through collaborative classroom design. Teachers avoid favoritism by using random methods (such as the spinwheel) in forming groups, ensuring that each student has an equal opportunity. As facilitators, teachers do not dictate, but rather encourage students to explore the material in their own words. Participant G3 emphasized, "When I know what they need, I provide everything in one assignment... so everyone can explore."

3) Future Orientation and Commitment to Growth
   The characteristics of foresight, stewardship, and commitment to the growth of people are evident in teachers' dedication beyond formal work hours. Teachers actively map students' potential, recommend competitions, and mentor them. Through project-based assignments (such as analyzing successful figures), teachers

implicitly instill a future orientation (foresight) to help students plan their transition to high school/vocational school.

### *4.2 Student Reception of Teachers' Servant Leadership Style*

The effectiveness of servant leadership depends heavily on how followers (in this case, students) perceive their leaders. Data from ninth-grade student participants indicates a very positive reception. Students feel the school environment is psychologically safe, which makes them feel free to share academic and personal issues.

Students perceive justice in educational environments. Participant S4 stated that random group work assignments are a way of stopping some students from being left out and making them feel isolated. Besides this, it shows that the teachers really want students to get ahead that the extra time and attention given to the students who are struggling outside classroom hours help them overcome the gaps in the material. In effect, the collection of various services directly affects students' learning motivation and character building, for they feel valued as subjects, rather than being mere instruments for instruction only.

### *4.3 Managerial Support and Internalization of Organizational Values*

Teachers' servant leadership behavior is not a self-driven effort. Rather, it happens in the background with the help of an efficient organizational support system. For instance, when the leaders and supervisors get actively involved, they are able to create practices aligned with institutional values of service, honesty, discipline, caring and excellence.

The head teacher plays such a model and, rather than only instructing other teachers, they perform activities of care themselves for example taking care after a student who is sick during a school function. Moreover, when the principal leaves teachers completely free hands and full confidence in the ability of teachers to deal with student issues with compassion, trust is created.

At the structural level, the school supervisor acts as a quality catalyst through reflective evaluation instruments. Supervision is not conducted as a judgmental exercise, but rather as a space for reflective dialogue. Supervisors integrate teacher self-assessment results with the Customer Satisfaction Indicators (IKP) completed by students. PGWS participants emphasized that the teaching profession is about "selling services," which requires humility to continuously adapt to the needs of "consumers" (students). Furthermore, regular habituation programs (such as live-in and recollection) are utilized by management not only for students but also as a means for teachers to continuously hone their social sensitivity and service spirit.

### *4.4 General Discussion*

Based on the above findings, this study confirms that servant leadership in education is not simply a principal's management style, but rather an essential pedagogical approach for teachers in the classroom. This practice shifts from an authoritative, teacher-centered paradigm to a dialogical relationship that fosters serve students.

Furthermore, these findings extend the existing literature by demonstrating that the sustainability of teacher servant leadership is highly dependent on the "chain of service" within the organization. Principals and supervisors who serve teachers will produce teachers with the emotional and professional capacity to optimally serve their students. Aligning the institution's core values, leadership role modeling, and evaluation mechanisms centered on student satisfaction has proven to be an effective formula for institutionalizing a culture of servant leadership in the school environment.

### *4.5 Implications*

Theoretically, this research contributes to enriching the literature on educational management and leadership by filling a research gap that has dominated studies of servant leadership at the structural leadership level (principals). This study broadens the discourse by

positioning teachers as informal leaders in the classroom (teacher-as-leader), where servant leadership is viewed not solely as a management style, but as a core pedagogical approach that humanizes students. Furthermore, the findings related to the "chain of service" provide a new perspective that servant leadership in educational institutions is an interdependent, ecosystemic construct extending from the foundation/supervisory level down to the students, not simply an individual leadership competency.

Practically, these findings provide strategic implications for school management and educational foundations to design teacher continuing professional development (CPD) programs that focus not only on pedagogical-cognitive competencies but also on fostering affective and socio-emotional intelligence based on service values. School policymakers are encouraged to maintain and expand student-centered evaluation instruments—such as the Customer Satisfaction Indicator (CSI)—and adopt a non-judgmental, dialogic supervision model to safeguard teachers' psychological well-being. For educators in general, this research can serve as a critical reflection tool for consciously building classrooms that are equitable, inclusive, and free from favoritism.

## 5. Conclusion

This study concludes that the ten characteristics of servant leadership are manifested through an empathetic interpersonal approach, inclusive and collaborative classroom instructional strategies, and future-oriented mentoring for students. This approach positively impacts student engagement, who feel psychologically safe, valued, and motivated to learn. Furthermore, this study demonstrates that the success of servant leadership in the classroom is highly dependent on the presence of a "chain of service" within the school ecosystem. Teachers' service practices are strongly supported by managerial support through role modeling by the principal and reflective supervision and evaluation mechanisms from the school supervisor.

This study has limitations due to its focus on a qualitative case study within a single institutional environment with an established organizational culture. Therefore, further research is recommended to conduct longitudinal studies to measure the long-term impact of teacher servant leadership on substantive academic achievement and the development of students' prosocial character, all the way to higher education. In addition, further researchers can develop quantitative or mixed-methods research designs by creating servant leadership metric measurement instruments specifically for the context of teacher-student relations, and testing them on public school populations and institutions with more heterogeneous demographic and cultural backgrounds.

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# DETERMINANTS OF STOCK RETURN IN THE INDEX OF ESGSKEHATI: THE ROLE OF CSR DISCLOSURE, LIQUIDITY, PROFITABILITY, AND FIRM SIZE

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***Abstract***
*The ESGSKEHATI index comprises stocks that demonstrate above-average ESG performance within their respective sectors and possess good liquidity. This study aims to examine the determinants of stock return in the ESGSKEHATI index listed on the Indonesia Stock Exchange. The factors examined in this research are Corporate Social Responsibility (CSR), liquidity, profitability, and firm size. This study provides information regarding the factors that can increase stock returns, which may serve as one of the considerations for investors in making investment decisions. This research employed a quantitative research method. The study used secondary data obtained from the official website of the Indonesia Stock Exchange covering the period from 2022 to 2024. The sample used in this study consisted of 24 companies. The data analysis technique applied was multiple linear regression analysis using SPSS 22.0 software. The results of this study indicate that profitability and firm size have an effect on stock returns. Furthermore, CSR disclosure and liquidity do not affect stock returns*
***Keywords****: Corporate Social Responsibility disclosure, liquidity, profitability, firm size, stock return.*

## 1. Introduction

In the current era, investment has become a popular activity across various groups for allocating their financial resources. The primary objective of investing is to obtain future financial returns. One of the most favored investment instruments is stocks. A stock represents a share of ownership in a company. Stocks are characterized by a high-risk, high-return profile, meaning they are capable of delivering substantial returns but are accompanied by a significantly high risk (Nurlaily et al., 2023).

According to Putra et al. (2024), stock return is the rate of return that investors will receive on their investments. The financial returns or profits obtained by investors can come in the form of yield and capital gains. Yield is the regular income earned from an investment, typically distributed as dividends. Meanwhile, a capital gain is the return derived from an investment due to an increase in the stock price.

In Indonesia, the Indonesia Stock Exchange, in collaboration with the Indonesian Biodiversity Foundation (KEHATI), launched a new index named the ESG Sector Leaders IDX KEHATI (ESGSKEHATI) on December 20, 2021. The ESGSKEHATI index comprises stocks that demonstrate above-average ESG performance within their respective sectors and possess good liquidity. The ESGSKEHATI index consists of 55 companies that undergo evaluation every six months.

Stock returns of companies listed on the ESGSKEHATI index do not always exhibit consistent increases. During the 2022–2024 period, the ESGSKEHATI index experienced fluctuating dynamics. According to data from the Indonesia Stock Exchange, ESG-based indices showed growth; the ESGSKEHATI index strengthened by approximately 2.38% over the last three years, whereas other conventional stocks, such as the LQ45, suffered a sharp correction. However, on an annual basis, several ESG indices faced negative pressure; for instance, the SRI-KEHATI index declined by around 10% in 2024, even though the Jakarta Composite Index (JCI) still

recorded positive growth.

These conditions indicate that stock returns of companies listed on the ESGSKEHATI index have not yet shown stability and consistency, and they remain influenced by various fundamental and non-fundamental factors. Fundamental factors are directly related to the financial performance of the company itself, such as liquidity ratios, profitability ratios, solvency ratios, and firm size. On the other hand, non-fundamental factors are not directly associated with the company's financial performance, such as CSR disclosure, corporate innovation, and management reputation (A'ini & Suwandi, 2023).

Furthermore, previous studies on the effects of CSR disclosure, liquidity, profitability, and firm size on stock returns have yielded inconsistent results. Additionally, given the limited research focusing on companies listed on the ESG Sector Leaders IDX KEHATI Index as research subjects, the author decided to conduct further investigation.

## 2. Literature Review

### *2.1 Signalling Theory*

According to Brigham and Houston (2019), as cited in Baharudin & Sulistyowati (2022), signaling theory is defined as the actions taken by a company's management to provide signals to shareholders regarding the company's prospects for enhancing its value in the future.

### *2.2 Efficient Market Hypothesis*

According to Eugene Fama (1970), the efficient market hypothesis states that stock prices in the capital market reflect all available information and adjust to new information.

### *2.3 Corporate Social Responsibility*

Corporate Social Responsibility is a corporate responsibility toward stakeholders located around the area where the company conducts its business activities.

### *2.4 Liquidity*

Liquidity is a ratio used to measure a company's ability to meet its maturing short-term obligations.

### *2.5 Profitability*

In this study, the profitability ratio is measured using ROA. Return on Assets (ROA) is a financial ratio that reflects a company's capability to generate profits from its total assets.

### *2.6 Firm Size*

Firm size is a metric used to assess the scale of a company. In this study, firm size is measured using the natural logarithm of total assets.

### *2.7 Stock Return*

Stock return is the income earned by investors from their investment activities. According to Tandelilin (2017:113), as cited in Tapokabkab & Rosyati (2023), stock return is one of the factors that motivate investors to invest. Stock return is measured by using relative return.

### *2.8 Theoretical Framework*

This study examines the influence of independent variables on dependent variables. The dependent variable is stock return. The independent variables are: corporate social responsibility disclosure, liquidity, evaluated by the Current Ratio (CR), profitability by the Return On Assets (ROA), and firm size, evaluated by the natural logarithm of total assets.

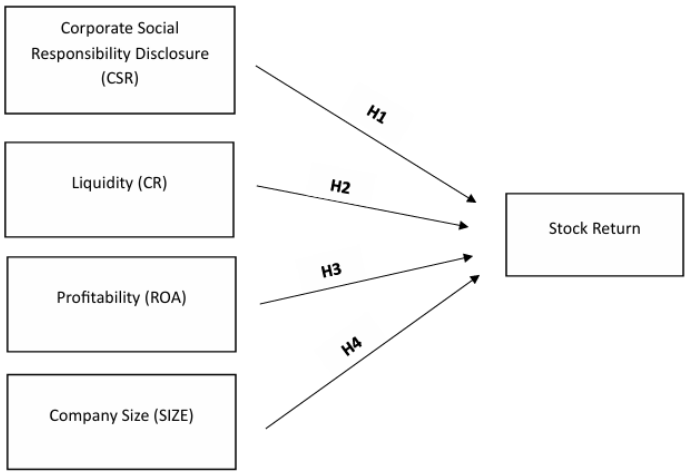



Figure 1. Theoretical Framework

Based on the conceptual framework and supported by theoretical foundations and prior studies, the research hypotheses are then tested empirically, as presented below:

H1: Corporate Social Responsibility disclosure affects the stock returns of companies listed on the ESGSKEHATI index.
H2: Liquidity affects the stock returns of companies listed on the ESGSKEHATI index.
H3: Profitability affects the stock returns of companies listed on the ESGSKEHATI index.
H4: Firm size affects the stock returns of companies listed on the ESGSKEHATI index.

## 3. Research Methods

### *3.1 Research Approach*

The method applied in this study is a quantitative method using secondary data. The secondary data sources were obtained from the annual reports of companies listed on the ESGSKEHATI index on the Indonesia Stock Exchange (IDX) for the 2022–2024 period, retrieved from the official Indonesia Stock Exchange website at www.idx.co.id.

#### *3.1.1 Population*

Population is defined as a generalization area consisting of objects or subjects that possess specific qualities and characteristics determined by the researcher to be studied and from which conclusions are drawn. In this study, the population is companies listed on the ESGSKEHATI index and registered on the Indonesia Stock Exchange (IDX) during the 2022–2024 period.

#### *3.1.2 Sample*

A sample is a subset of a population that represents both the size and characteristics of that population. The sampling technique employed in this study is purposive sampling, which is a method of selecting samples based on specific criteria or considerations. The sample comprises companies included in the ESGSKEHATI index for a period of 3 consecutive years and possessing complete data for analysis in this study.

### *3.2 Data Analysis Techniques*

This study employs multiple linear regression as the analytical tool. Before conducting the multiple linear regression analysis, we have classic assumption tests, including a normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test.

### *3.2.1 Classical Assumption Testing*

The classical assumption test can be used in this research to verify the feasibility of the regression model used. The classical assumption test aims to ensure that the regression model meets basic statistical assumptions, ensuring the reliability of the analysis results. The classical assumption tests conducted in this research include normality tests, multicollinearity tests, heteroscedasticity tests, and autocorrelation tests (Ghozali, 2018).

***(a) Normality Test***

**Table 1. One-Sample Kolmogorov-Smirnov Test**

| | | Unstandardized Residual |
|---|---|---|
| N | | 72 |
| Normal Parameters[a,b] | Mean | 0,0000000 |
| | Std. Deviation | 0,15969303 |
| Most Extreme Differences | Absolute | 0,090 |
| | Positive | 0,090 |
| | Negative | -0,083 |
| Test Statistic | | 0,090 |
| Asymp. Sig. (2-tailed) | | 0,200[c,d] |

Source: Data Processed by Author (2026)

Based on the results of the normality test in Table 1, the value obtained from the Kolmogorov-Smirnov normality test is 0,200. According to these results, the residual data can be stated to be normally distributed because the Asymp. Sig. value of 0,200 is > 0,05 (0,200 > 0,05).

***(b) Multicollinearity Test***

**Table 2. Multicollinearity Test**

| Model | | Collinearity Statistics | |
|---|---|---|---|
| | | Tolerance | VIF |
| 1 | Corporate Social Responsibility disclosure (CSR) | 0,990 | 1,011 |
| | Liquidity (CR) | 0,978 | 1,022 |
| | Profitability (ROA) | 0,974 | 1,027 |
| | Firm Size (SIZE) | 0,987 | 1,013 |

Source: Data Processed by Author (2026)

Based on the results of the multicollinearity test in Table 2, it can be seen that the tolerance values for the CSR, CR, ROA, and SIZE variables are 0,990, 0,978, 0,974, and 0,987, respectively, with VIF values of 1,011, 1,022, 1,027, and 1,013. From the obtained tolerance and VIF values, it can be stated that they meet the criteria of a tolerance value greater than 0,10 and a VIF value less than 10. Based on these results, it can be concluded that there is no symptom of multicollinearity among the independent variables in this study.

***(c)*** *Heteroscedasticity Test*

**Table 3. Heteroscedasticity Test Result**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 0,487 | 0,245 | | 1,991 | 0,051 |
| | Corporate Social Responsibility disclosure (CSR) | 0,079 | 0,071 | 0,129 | 1,100 | 0,275 |
| | Liquidity (CR) | -0,008 | 0,008 | -0,115 | -0,977 | 0,332 |
| | Profitability (ROA) | 0,232 | 0,201 | 0,136 | 1,155 | 0,252 |
| | Firm Size (SIZE) | -0,014 | 0,008 | -0,209 | -1,782 | 0,079 |

Dependent Variable: ABRESID
Source: Data Processed by Author (2026)

Based on the results of the Glejser test in Table 3, it can be seen that the significance values for the CSR, CR, ROA, and SIZE variables are 0,275, 0,332, 0,252, and 0,079, respectively. Based on these results, it can be concluded that the significance values are > 0,05, indicating that there is no symptom of heteroscedasticity in this study.

***(d)*** *Autocorrelation Test*

**Table 4. Autocorrelation Test Results**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|---|---|---|---|---|---|
| 1 | 0,445[a] | 0,198 | 0,150 | 0,16439 | 2,031 |

Source: Data Processed by Author (2026)

Based on the Durbin-Watson results in Table 4, it can be seen that the DW value is 2,031. With N = 72 (24 companies multiplied by a 3-year research period) and k = 4 (the number of variables used), the $dU$ value obtained from the DW table is 1,7366. According to these results, it shows that: $DW > dU$ and $DW < (4 - dU)$, thus 2,031 > 1,7366 and 2,031 < 2,2634. Based on these test results, it can be concluded that there is no symptom of autocorrelation in this research data.

## 4. Research Findings and Discussion

### *4.1 Descriptive statistical analysis*

**Table 5. Descriptive Statistics**

| Research Variables | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Corporate Social Responsibility disclosure (CSR) | 72 | 0,3504 | 1,0000 | 0,6840 | 0,16850 |
| Liquidity (CR) | 72 | 0,3366 | 5,6548 | 2,1120 | 1,47132 |
| Profitability (ROA) | 72 | -0,0057 | 0,2929 | 0,0843 | 0,06024 |
| Firm Size (SIZE) | 72 | 22.9918 | 34,6812 | 31,2439 | 1,58934 |
| Stock Return (Y) | 72 | 0,4300 | 1,3800 | 0,9982 | 0,17831 |
| Valid N (listwise) | 72 | | | | |

Source: Data Processed by Author (2026)

Based on the results in Table 5, the following conclusions can be drawn:

a) The minimum CSR disclosure index value is 0,3504, obtained from PT Alam Sutera Realty Tbk in 2023, while the maximum value is 1,0000, achieved by PT Ciputra Development Tbk in 2022. The average CSR disclosure value across the samples is 0,6840, with a standard deviation of 0,1685.
b) The liquidity variable index (current ratio) has a minimum value of 0.3366 from PT Jasa Marga Tbk in 2023 and a maximum value of 5,6548 from PT Vale Indonesia Tbk in 2022. The average liquidity value is 2,1120, with a standard deviatiaton of 1,4713.
c) The profitability index value (return on assets) shows a minimum value of -0,0057, found in PT Elang Mahkota Teknologi Tbk in 2023, and a maximum value of 0,2929 by PT Unilever Indonesia Tbk in 2022. Meanwhile, the average profitability value is 0,0843, and the standard deviation is 0,0602.
d) The firm size index has a minimum value of 22,9918 at PT Siloam International Hospitals Tbk in 2022 and a maximum value of 34,6812 at PT Indofood CBP Sukses Makmur Tbk. The average value is 31,2439, with a standard deviation of 1,5893.
e) The minimum value for the stock return variable stands at 0,4300 at PT Siloam International Hospitals in 2022, and the maximum value is 1,3800 at PT AKR Corporindo Tbk in 2022. The average value obtained is 0,9982, while the standard deviation is 0,1783.

### *4.2 Multiple Linear Regression Analysis*

#### *4.2.1 Adjusted R-Square Coefficient Test*

**Table 6. Adjusted R-Square Coefficient Test Result**

| Model | R | R Square | Adjusted R Square |
|---|---|---|---|
| 1 | 0,445[a] | 0,198 | 0,150 |

Source: Data Processed by Author (2026)

Based on the test results in Table 6, the obtained adjusted $R^2$ square value is 0,150, or 15%. This result indicates that the independent variables used in this study (CSR disclosure, liquidity, profitability, and firm size) only account for 15% of the variance in stock returns, while the remaining 85% is influenced by other variables not included in this study.

#### *4.2.2 F-Test*

**Table 7. F-Test Testing**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 0,447 | 4 | 0,112 | 4,134 | 0,005[b] |
| | Residual | 1,811 | 67 | 0,027 | | |
| | Total | 2,257 | 71 | | | |

Source: Data Processed by Author (2026)

Based on the F-test results in Table 7, it can be seen that the significance value is 0.005, which is < 0.05 with a calculated F-value ($F_{calculated}$) of 4.134. Before comparing the calculated F-value with the F-table value, the F-table value was determined using dfN1 = 4 (k-1) and dfN2 = 67 ($n - k$), yielding an F-table value ($F_{table}$) of 2,509. The calculated F-value of 4,134 is > the F-table value of 2.509 4,134 > 2,509). Based on these results, it can be concluded that the research model is feasible for the study. At the very least, the independent variables have an effect on the dependent variable, or in other words, at least one of the independent variables exerts an influence on the dependent variable. Therefore, the analysis can proceed.

### *4.3 Hypothesis testing (t-Test)*

**Table 9. t-Test Results**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | -0,126 | 0,399 | | -0,315 | 0,753 |
| | Corporate Social Responsibility disclosure (CSR) | 0,182 | 0,116 | 0,172 | 1,567 | 0,122 |
| | Liquidity (CR) | -0,019 | 0,013 | -0,153 | -1,383 | 0,171 |
| | Profitability (ROA) | 0,994 | 0,328 | 0,336 | 3,029 | 0,003 |
| | Firm Size (SIZE) | 0,031 | 0,012 | 0,272 | 2,473 | 0,016 |

Dependent Variable: RS
Source: Data Processed by Author (2026)

Based on the t-test results in Table 9, the following outcomes are obtained:

a) The hypothesis test results indicate that the significance value ($p$-value) of t for the CSR disclosure variable is 0,122, which is > 0,05 (0,122 > 0,05). Additionally, the calculated t-value is 1,567 and the t-table value is 1,6680 (1,567 < 1,6680). Therefore, it can be stated that the CSR disclosure variable does not have an effect on stock returns, leading to the conclusion that **H1** is rejected. This implies that CSR disclosure is not a factor considered by investors when making investment decisions. This situation likely arises because the majority of investors prioritize a company's financial factors over non-financial ones.

b) The hypothesis test results show that the significance value of t for the liquidity variable is 0,171, which is > 0,05 (0,171 > 0,05). Furthermore, the calculated t-value is -1,383, and the t-table value is -1,6680 (-1,383 > -1,6680). This outcome indicates that the liquidity variable does not have an effect on stock returns; thus, it can be concluded that **H2** is rejected.

   These results indicate that the level of liquidity—whether high or low—is not a factor influencing investor behavior. Liquidity is likely a greater consideration for the company's creditors than for investors; consequently, it does not affect stock prices or stock returns.

c) The hypothesis test results reveal that the significance value of t for the profitability variable is 0,003, which is < 0,05 (0,003 < 0,05). The calculated t-value is 3,029, and the t-table value is 1,6680 (3,029 > 1,6680); this indicates that the profitability variable has a positive effect on stock returns, so it can be concluded that **H3** is accepted.

   The results of this study can be explained by signaling theory, which posits that information disclosed by a company to the public serves as a signal for investors to assess the company's future condition. These findings indicate that the higher a company's profitability, the greater its potential to provide gains to investors in the form of stock returns.

   High profitability serves as a positive signal indicating the company's strong ability to generate profit. This signal attracts investors to invest in highly profitable companies, thereby driving up both share prices and stock returns.

d) The hypothesis test results demonstrate that the significance value of t for the firm size variable is 0,016, which is < 0,05 (0,016 < 0,0). The calculated t-value is 2,473, and the t-table value is 1,6680 (2,473 > 1,6680). This outcome shows that the firm size variable has a positive effect on stock returns, thereby concluding that **H4** is accepted.

The results are also consistent with signaling theory, which posits that internal company information provides signals to investors regarding the firm's future condition and potential. These results indicate that firm size is a factor considered by investors. Larger companies are perceived to possess more stable conditions and strong operational capabilities. Such conditions heighten investor interest, thereby driving up share prices and stock returns.

## 5. Conclusion

Based on the results of data analysis and discussions that have been carried out, the following conclusions can be drawn:

a) Corporate Social Responsibility disclosure does not influence stock returns of companies listed on the ESGSKEHATI index. This indicates that CSR disclosure is not yet a factor considered by investors when making investment decisions.
b) Liquidity does not influence stock returns of companies listed on the ESGSKEHATI index. This implies that a company's ability to meet its short-term obligations has not yet been able to attract investor interest or act as a driver to increase stock returns.
c) Profitability affects stock returns of companies listed on the ESGSKEHATI index. This indicates that the higher a company's ability to generate profits, the higher the stock returns investors will receive. Consequently, investors are attracted to invest, which subsequently increases stock returns.
d) Firm size affects the stock returns of companies listed on the ESGSKEHATI index. This suggests that larger companies tend to be capable of generating greater profits, thereby enabling them to provide higher stock returns. As a result, investors will be interested in investing, which will enhance the company's stock returns.

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# COMPARISON OF MARKET REACTIONS TO AUTO-REJECTION OF IPO STOCK ON THE INDONESIAN STOCK EXCHANGE DURING 2022 – 2024

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***Abstract***
*This study aims to analyze differences in market reactions, measured by Average Abnormal Return (AAR) and Averange Trading Volume Activity (ATVA), among Intial Public Offering (IPO) stock that experienced Auto Rejection on the Indonesia Stock Exchange during the 2022-2024 period. This study employs an event study methodology comparing market reactions on the event day with the period after the event. The sample consists of 90 comnpanies selected using purposive sampling. The data analysis was conducted using the nonparametic Wilcoxon Signed Rank Test. The result of data analysis and hypothesis testing reveal a significant differences in Averange Abnormal Return (AAR) and Averange Trading Volume Activity (ATVA) between the Auto Rejection and peiod after the event. Market reactions show a declining trend after the occurrence of Auto Rejection. This finding is evidenced by the majority of sampled companies experiencing decreases in abnormal returns and tarading volume during the post event period comnpared to the Auto Rejection day. The results support the semi strong form of the Efficient Market Hypothesis, indicating that the market responds rapidly to price limit information* by adjusting stock returns and trading activity.
***Keywords****: Initial Public Offering (IPO), Auto Rejection Abnormal Return, Trading Volume, Efficient Market Hypothesis*

## Introduction

Indonesia's economic growth and capital market development can be seen form the growing number of investors and companies conducting Initial Public Offering (IPOs). An IPO provides companies with an opportunity to enter the capital market by offering their shares to the public for the first time, allowing them to raise funds for business expansion and strengthen their capital structure (Natsir, 2024). However, IPO stocks are generally high volatility, with prices moving rapidly and often diverging from fundamental values (Dewan & Dharni, 2019). (Guilmi, 2014) explains that stock prices frequently experience substantial fluctuations, deviate from fundamentals, and display volatility clustering, where periods of high volatility are followed by similar periods. These conditions suggest that IPO stock prices are affected not only by company fundamentals but also by investor behavior when responding to market uncertainty (Sibarani, 2024).

In periods of high information uncertainty, investors tend to have difficulty evaluating stocks' fundamental value and are more likely to follow market sentiment. High volatility in IPO stocks is closely related to information asymmetry, which refers to an imbalance in information where some investors possess better information than others. As companies that have recently entered the capital market, IPO stocks generally have limited trading history and publicly available information, making it difficult for investors to evaluate company fundamentals (Talebong & Pagalung, 2024). This condition encourages investors to use market behavior as a reference in making investment decisions and following market movements (Yahya et al., 2024). Consequently, investment decisions become increasingly influenced by collective investor behavior, which may accelerate stock price movements in the market (Qi, 2023).

Collective investor behavior is often influenced by psychological factors and market sentiment, causing investors to make irrational decisions. This response causes the capital market to move in line with market dynamics, including behavioral finance and herding. Herding behavior refers to investors' tendency to follow the majority's actions when making transactions rather than making decisions based on fundamental information (Sibarani, 2024). In periods of high volatility, stock prices are under pressure, causing them to move in a particular direction. For IPO stocks with high information uncertainty, herd behavior can causing stock prices to approach the predetermined price limits more rapidly.

The tendency of stock prices to move toward price limits can be explained by the Magnet Effect Hypothesis proposed by Subrahmanyam (1994). This theory suggests that stock prices act as a "magnet," attracting price movements toward the limit boundary, so rapid trading pressure can drive prices to reach the predetermined price limits. In the Indonesian capital market, the price limit mechanism is implemented through

Auto Rejection Atas (ARA) and Auto Rejection Bawah (ARB), which represent the maximum upward and downward limits on stock prices within a single trading day. When stock prices reach the ARA or ARB limits, the trading system automatically rejects the order. Therefore, the Auto Rejection mechanism serves not only as a trading control instrument but also as a means to address investor behavior that may trigger excessive stock price volatility.

As an acts to limit extreme price movements within a single trading session, the Indonesia Stock Exchange implements the Auto Rejection Atas (ARA) and Auto Rejection Bawah (ARB) mechanisms by setting daily price movement limits (*price limits*). This mechanism is designed to prevent excessive price changes within a short period and provide investors with opportunities to respond to information entering the market. This policy has resulted in changes to market mechanisms, with the previously asymmetric ARB limit being adjusted to a symmetric price limit mechanism on September 4, 2023. Nevertheless, the effectiveness of the price limit mechanism remains debated in financial literature. On the one hand, the mechanism is considered capable of maintaining orderly trading conditions. However, several studies indicate that price limits may influence investor behavior when stock prices approach trading limits.

Several studies show that increased investor attention positively affects to stock market volatility. (Murdani & Wibowo, 2025; Yang et al., 2023) reveal that high market volatility often increases investor uncertainty, thereby triggering larger stock price fluctuations. (Hewamana et al., 2022) show that stock price volatility is influenced not only by macroeconomic factors and company fundamentals but also by investors' psychological factors. Meanwhile, empirical evidence regarding this phenomenon in IPO stocks on the Indonesia Stock Exchange remains very limited, particularly after the change in the Auto Rejection policy from asymmetric to symmetric in 2023.

A study conducted in the Shenzhen Stock Exchange, China, by (Qi, 2023) examined the increase in price limits from 10% to 20% as a natural experiment. The results showed that there was a positive and significant effect on the Magnet Effect Hypothesis. In contrast, a study conducted in the South Korean capital market by (Eom et al., 2022) found that price limits could provide a cooling-off effect that helps reduce market pressure. Previous studies have shown that investor behavior may contribute to faster stock price movements as prices move closer to the price limits (Kaya & Çatak, 2025). These differences in findings suggest that the effectiveness of price limits and the presence of the Magnet Effect Hypothesis are still the subject of global debate in global literature. Therefore, further research is needed to understand how price limits relate to stock price volatility and investor behavior in capital market.

Based on these conditions, this study aims to examine market reactions toward ARA/ARB price limits among IPO stocks listed on the Indonesia Stock Exchange during the 2022–2024 period.

## Literature Review

### *1. Market Efficiency*

Information Asymmetry proposed by George Akerlof (1970) explains a condition of information imbalance where some investors possess better information compared to other investors. For Initial Public Offering (IPO) stocks, limited trading history makes it difficult for investors to obtain a complete information of the company's value. Nabila et al. (2024) explain that higher information asymmetry increases risks for investors. This condition makes it difficult for investors to evaluate and assess a company's fundamentals and therefore investors are more likely to follow on market sentiments when making investment decisions (Talebong & Pagalung, 2024). This situation can contribute to market inefficiency because stock prices do not fully reflect the company's fundamental value. As a result, buying and selling pressures can be increased and causing stock prices to move rapidly and become less reflective with fundamental information, thereby reducing market efficiency (Papadimitriou, 2023). The concept of Efficient Market Hypothesis introduced by Fama (1970) emphasizes that market efficiency is determined by the extent to which information is reflected in security prices. Nainggolan (2025) explains that market efficiency testing can be conducted by observing abnormal returns following the release of public information. These findings indicate that market efficiency strongly depends on investors' ability to obtain, process, and respond to available information.

### *2. Signaling Theory*

Signaling Theory, introduced by Spence (1973), explains that parties with greater information provide signals to investors to reduce information asymmetry. (Blajer-Gołębiewska, 2021) states that clear and credible information serves as a signal that influences investor responses toward a company. The better the quality of information disclosed, the higher investors' confidence in the company, leading to more

positive responses in their investment decisions. Every piece of information published to the market provides signals that investors use to evaluate market conditions before making investment decisions (Lukman et al., 2022).

### *3. Mixture of Distribution Hypothesis*

The Mixture of Distribution Hypothesis proposed by Clark (1973). This theory states that stock price changes and trading volume activity are influenced by the arrival of new information to the market. When new information is received by investors, they respond by buying and selling, causing price changes that are reflected in stock returns and increasing volatility and trading volume. (Anwar & Asandimitra, 2018) show that information affects stock trading activity. This finding is consistent with (Al-Qudah & Houcine, 2022), who found that information has a significant effect on market returns and volatility. In addition, (Yusran & Lesmana, 2022) found significant differences in stock prices and return volatility before and after changes in the Auto Rejection policy, while trading volume also showed a significant effect. These findings indicate that information affects investor responses, as reflected in changes in stock returns, volatility, and trading volume.

### *4. Auto Rejection*

Auto Rejection is a mechanism implemented by the Indonesia Stock Exchange to limit stock price movements within a single trading day. The Indonesian capital market applies the Auto Rejection Atas (ARA) and Auto Rejection Bawah (ARB) mechanisms by setting daily price movement limits (*price limits*). This mechanism is designed to prevent excessive fluctuations in stock prices and to determine the maximum limits of price within a single trading day. Once stock prices reaches the ARA or ARB limits, the trading system automatically rejects the orders that exceed the predetermined price limits. Kim and Rhee (1997) explain that price limits serve as a volatility control mechanism, and allowing investors to evaluate available information before making investment decisions.

The results of previous studies (Heradhyaksa, 2022; Utami & Mawardi, 2021) indicate that price limit policies have a positive effect on return volatility and stock price formation processes. Price limits are considered market stabilization instruments that regulate the price-formation process (Heradhyaksa, 2022). (Saputri et al., 2023) found that price limits accelerate stock price movements and influence investor behavior, while (Zhang et al., 2022) demonstrated that widening price limits increase in market liquidity and volatility.

### *5. Hypothesis Development*

Research on the impact of changes in the Auto Rejection policy on IPO stocks during the 2022–2024 period remains limited. Additionally, prior studies have reported inconsistent findings regarding the effects of price limits on abnormal returns, volatility, and trading volume. Drawing on previous research on market reactions to Auto Rejection, as well as the current conceptual framework, this study tests the following hypotheses.

The research conducted by (Nainggolan, 2025) explains that investor responses to information are reflected in changes in abnormal returns. Abnormal returns indicate market inefficiency, where security prices should reflect available information and expected returns. If the market is inefficient, securities may generate returns greater than their normal expected returns, which are referred to as abnormal returns. Therefore, testing market efficiency is essentially a test of abnormal returns.

H1 *: There is a difference in abnormal return between IPO stocks experiencing Auto Rejection*

H2 : *There is a difference in Trading Volume Activity (TVA) between IPO stocks experiencing Auto Rejection*

## Research Methods

This study is a comparative study using a quantitative approach and an event-study method. This study aims to analyze differences in market reactions, measured by Abnormal Return (AR) and Trading Volume Activity (TVA), among Initial Public Offering (IPO) stocks that experienced Auto Rejection on the Indonesia Stock Exchange during the 2022–2024 period.

The sample was selected using purposive sampling to more effective, so overall there are 90 IPO companies that met the research criteria. Market reactions were observed over an eight-day event window, spanning the Auto Rejection event (t0) and seven trading days after the event (t1 to t7). The

Abnormal Return and Trading Volume Activity values on the Auto Rejection day were compared with their averages after the Auto Rejection to assess whether market reactions differed following the event. The research data were analyzed using descriptive statistics, normality tests, and the Wilcoxon Signed-Rank Test to examine differences in Abnormal Return and Trading Volume Activity between the period before Auto Rejection and the period after Auto Rejection.

The population in this study comprises all companies that conducted Initial Public Offerings (IPOs) on the Indonesia Stock Exchange during the 2022–2024 period, totaling 171 companies. Sample determination was conducted using the purposive sampling method with the following criteria:

1) Companies conducting IPOs on the Indonesia Stock Exchange during the 2022–2024 period.
2) Companies that have complete stock price data, trading volume data, listed shares data, and Composite Stock Price Index (IHSG) data during the observation period.
3) Companies experiencing Auto Rejection Atas (ARA) or Auto Rejection Bawah (ARB) on the first trading day after stock listing.

Based on the selection process using these criteria, 90 companies were selected as research samples, comprising 29 companies experiencing ARA and 61 companies experiencing ARB. These companies met the criteria and were selected as research samples.

The data used in this study are secondary data obtained from the official website of the Indonesia Stock Exchange (IDX) and other supporting sources providing stock price data, stock trading volume, outstanding shares, and IHSG data during the research period.

The following are the data analysis methods used:

1) Collecting closing stock prices, IHSG closing prices, daily trading volume, and the number of outstanding shares.
2) The data processing was conducted by calculating the actual return and expected return to obtain the Average Abnormal Return. The formulas used in this study are based on the event study concept developed by Brown and Warner (1985) and Jogiyanto (2017).

The actual return was calculated using the following formula (Jogiyanto, 2017):

$$R = \frac{(P_{it} - P_{it-1})}{P_{it-1}} (1)$$

Expected return was calculated using the Market Adjusted Model method (Brown & Warner, 1985) with the following formula:

$$E(R_{it}) = R_{mt} (2)$$

The market return was calculated using the following formula:

$$R_{mt} = \frac{IHSG_{\ t} - IHSG_{\ t-1}}{IHSG_{\ t-1}} (3)$$

Abnormal Return was calculated using the following formula (Brown & Warner, 1985):

$$AR_{it} = R_{it} - E(R_{it}) (4)$$

Average Abnormal Return was calculated using the following formula (MacKinlay, 1997):

$$AARt = \frac{\sum_{i=1}^{N} AR_{it}}{N} (5)$$

Trading Volume Activity was calculated by comparing daily trading volume with the number of outstanding shares. Subsequently, Average Trading Volume Activity (ATVA) was calculated to measure average stock trading activity over the research period. The formulas used follow the event-study concept proposed by Beaver (1968) and Jogiyanto (2017).

Trading Volume Activity was calculated using the following formula (Beaver, 1968):

$$TVAit = \frac{Stock\ Trading\ Volume_{\ it}}{Number\ of\ Outstanding\ Shares_{\ it}} (6)$$

Average Trading Volume Activity was calculated using the following formula (Jogiyanto, 2017):

$$ATVAit = \frac{\sum_{i=1}^{N} TVA_{it}}{N} \quad (7)$$

**Research Findings and Discussion**

This study aims to analyzes differences in market reactions, measured by abnormal returns and Trading Volume Activity (TVA), among Initial Public Offering (IPO) stocks that experienced Auto Rejection on the Indonesia Stock Exchange during 2022–2024. Employing a quantitative event study method and purposive sampling, the research sample comprises 90 IPO companies meeting the specified criteria. Table 1 presents the distribution of the research population and sample.

**Table 1. Research Sample**

| Period | IPO Population | Sample |
|---|---|---|
| Pre Pandemic Period (1 Januari 2022–4 Juni 2023) | 93 | 33 |
| Normalization Period (5 Juni 2023–3 September 2023) | 23 | 4 |
| Symmetic Period (4 September 2023 – 31 Desember 2024) | 55 | 53 |
| Total | 171 | 90 |
| Sample Size | 90 Companies | |

*Source: Processed data by the researcher (2026)*

**Table 2. Descriptive Statistic Test**

| Variabel | AAR_t0 | AAR_After | TVA_t0 | ATVA_After |
|---|---|---|---|---|
| N Valid | 90 | 90 | 90 | 90 |
| Mean /Rata-rata | .1226116669 | .0154163161 | .6010466217 | .2282331361 |
| Stdr.Eror | .0298343296 | .0070499321 | .1105857309 | .0249804519 |
| Median | .1888636789 | .0032953945 | .2555920343 | .1655879755 |
| Std. Deviation | .2830333019 | .0668815288 | 1.049108359 | .2369853747 |
| Range | 2.059721146 | .3938734653 | 8.820007034 | 1.320592758 |
| Minimum | -.932361662 | -.118839664 | .0005899658 | .0067619086 |
| Maximum | 1.127359484 | .2750338017 | 8.820597000 | 1.327354667 |

*Source: Processed data by the researcher (2026)*

Based on the descriptive statistics, the average abnormal return on the day stocks experienced Auto Rejection (t0) was 0.1226, whereas the average abnormal return during the period after Auto Rejection was only 0.0154. This difference indicates that the strongest market response toward IPO stocks occurred on the day when Auto Rejection took place. In the following days, the abnormal return decreased, indicating that excess returns were no longer as high as on the event day.

A similar pattern was also found in Trading Volume Activity (TVA). The average TVA value during Auto Rejection value was 0.6010 and then decreased to 0.2282 during the following period. This also indicates that trading activity was concentrated on the day when Auto Rejection occured. After market conditions began to adjust, the intensity of trading activity also declined.

Descriptively, these results provide an initial indication that differences in abnormal return and Trading Volume Activity between the Auto Rejection event and the post period after event. Overall,

both variables show a similar pattern: market reactions were stronger during Auto Rejection than in the days that followed. However, the statistical significance of these differences needs to be examined through hypothesis testing using the Wilcoxon Signed-Rank Test.

**Table 3. Abnormal Return Observations**

| Observations | Time | Average Abnomal Return |
|---|---|---|
| Auto Rejection Day | t0 | 0,1226116669 |
| | t1 | 0,0501463327 |
| | t2 | 0,02858263373 |
| | t3 | 0,007150855228 |
| | t4 | -0,0005883466493 |
| | t5 | 0,002180342261 |
| | t6 | 0,001535506363 |
| | t7 | 0,01890688931 |

*Source: Processed data by the researcher (2026)*

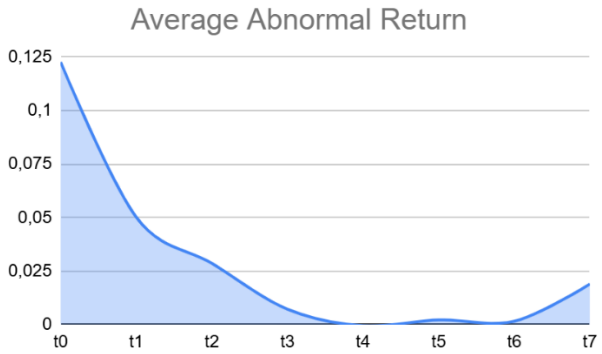



**Figure 1. Average Abnormal Return**

*Source: Processed data by the researcher (2026)*

Based on Table 3 and Figure 1, the average abnormal return reached its highest level in Auto Rejection occurred (t0) and then decreased in the following days after. This pattern indicates that the market reaction was strongest when the Auto Rejection occurred. After market participants absorbed and responded the available information, abnormal returns gradually decreased, indicating that stock prices moved toward a more stable as investors adapted the information. Furthermore, this pattern indicates that the Auto Rejection mechanism may affects investor behavior. The increase in abnormal return on the event day shows that investors tend to respond quickly to significant price movements.

This phenomenon is consistent with the Efficient Market Hypothesis proposed by Fama (1970), which states that investors quickly respond rapidly to available information. When new information is gradually absorbed into stock prices, the level of uncertainty investors face tends to fall and abnormal return begin to shrink. This suggests that events capable of moving prices to have a weaker effect in periods that follow.

These findings are also consistent with (Nainggolan, 2025), who states that abnormal returns are an indicator of market response to new information. Furthermore, the results also support (Yusran & Lesmana, 2022), explain that differences in stock returns following changes in the Auto Rejection policy.

Therefore, this study demonstrates that the Auto Rejection mechanism is not only related to limiting stock price movements but also affecting how investors quickly respond to information in the short term, as reflected through changes in abnormal return during the observation period.

**Table 4. Trading Volume Activity Observations**

| Observations | Time | Average Trading Volume Activity |
|---|---|---|
| Auto Rejection Day | t0 | 0,6010466217 |
| | t1 | 0,399863875 |
| | t2 | 0,2629590761 |
| | t3 | 0,2362620649 |
| | t4 | 0,1861219347 |
| | t5 | 0,1914980026 |
| | t6 | 0,1451576149 |
| | t7 | 0,1757693843 |

*Source: Processed data by the researcher (2026)*

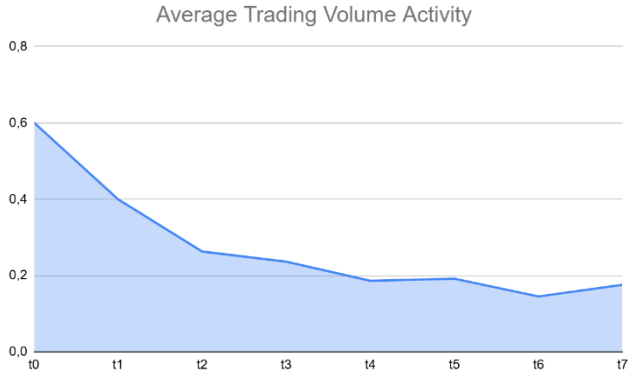



**Figure 2. Average Trading Volume Activity**
*Source: Processed data by the researcher (2026)*

Based on Table 4 and Figure 2, the average movement of Trading Volume Activity shows a pattern similar to abnormal return. Trading activity reached its highest level when Auto Rejection occurred, then gradually decreased in the following days after the event. This pattern indicates that investor trading activity was highest when stocks reached the Auto Rejection limit. After the Auto Rejection event passed, transaction frequency began to decrease, resulting in a decline in trading volume. The decline in trading activity over the following days indicates that transaction intensity declined as market uncertainty eased and market conditions returned to stability. This finding indicates that investors tend to respond to ongoing market movements and demonstrates the potential presence of herding behavior in IPO stocks.

These findings consistent with the Mixture of Distribution Hypothesis, which explain that the arrival of new information in the market can increased trading activity as investors respond through buying and selling activity. In this study context, Auto Rejection essentially acts as a signal to the market, and leads to trading more on the daya after the event. The findings are also consistent with (Al-Qudah & Houcine, 2022), explain that market information affects stock trading activity. Also (Qi, 2023) found that changes in the price limit mechanism can influence investor responses, as reflected in changes in trading activity.

Therefore, this study demonstrates that the Auto Rejection mechanism not only as a limitation on stock price movements but also affects investor transaction behavior, which is reflected through changes in Trading Volume Activity during the observation period.

**Table 5. Normality Test**

| | *Kolmogorov - Smirnov* | | | *Shapiro - Wilk* | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| AR_t0 | .183 | 90 | <.001 | .872 | 90 | <.001 |
| ARR_After | .140 | 90 | <.001 | .934 | 90 | <.001 |
| TVA_t0 | .284 | 90 | <.001 | .497 | 90 | <.001 |
| ATVA_After | .218 | 90 | <.001 | .692 | 90 | <.001 |

*Source: Processed data by the researcher (2026)*

Based on Table 5, the results of the normality test using the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that all research variables have significance values below 0.05. Therefore, the abnormal return and Trading Volume Activity data do not meet the assumption of normality. This condition suggests that market reactions are different across IPO companies. In other words, some companies experience substantial changes, while others show relatively smaller changes. These differences in characteristics among IPO companies cause the data distribution to become non-normal.

Because the data did not meet the normality assumption, the further hypothesis testing was conducted using the Wilcoxon Signed-Rank Test, a non-parametric test appropriate for the characteristics of the research data.

**Table 6. Wilcoxon Signed Rank Test**

| | | N | Mean Rank | Sum of Rank |
|---|---|---|---|---|
| AAR_After – AR_t0 | Negative Ranks | 63[a] | 49.43 | 3114.00 |
| | Positive Ranks | 27[b] | 36.33 | 981.00 |
| | Ties | 0[c] | | |
| | Total | 90 | | |
| ATVA_After – TVA_t0 | Negative Ranks | 54[d] | 56.57 | 3055.00 |
| | Positive Ranks | 36[e] | 28.89 | 1040.00 |
| | Ties | 0[f] | | |
| | Total | 90 | | |

*Source: Processed data by the researcher (2026)*

Based on Table 6, for the abnormal return variable, there are 63 companies experienced a decrease in abnormal return after Auto Rejection, while 27 companies experienced an increase. Since the data negative ranks dominate, this means most IPO stocks generated lower abnormal returns after the event than on the Auto Rejection day. This condition indicates that the strong market reaction observed during Auto Rejection weakened as the market absorbed to the available information.

For the Trading Volume Activity variable, there are 54 companies experienced a decrease in trading activity after Auto Rejection, while 36 companies experienced an increase. These results also indicate that most of companies experienced a decline in trading volume after Auto Rejection, although some stocks continued to experience higher transaction activity. This finding suggets that investors were more active in trading when Auto Rejection occurred, while trading intensity gradually decreased as market conditions became more stable.

Overall, the results show a negative ranks in both variables indicates that abnormal return and Trading Volume Activity generally declined after Auto Rejection. These findings provide an initial indication that the strongest market response occurred on the event day and gradually weakened in the following period.

**Table 7. Statistic Test**

| Variabel | Z | Asymp.Sig. (2- tailed) | Keputusan |
|---|---|---|---|
| AAR_After – AR_t0 | -4.291[b] | <.001 | HI accepted |
| ATVA_After – TVA_t0 | -4.054[b] | <.001 | H2 accepted |

*Source: Processed data by the researcher (2026)*

Based on Table 7, the results of the Wilcoxon Signed-Rank Test for the abnormal return variable show a Z-value of -4.291 and a significance level of <0.001. Since p-value is below than the 0.05 significance level. Therefore, the research hypothesis stating that there is a difference in abnormal return among IPO stocks experiencing Auto Rejection is accepted. The test results indicate that there is a significant difference between abnormal return on Auto Rejection day and the days after the event. The results also show that most of the companies experienced a declined in abnormal return after Auto Rejection. The decline in abnormal returns indicates that investors adjusted their decisions based on available market information, leading to a decrease in abnormal returns during the event period.

These findings support the Efficient Market Hypothesis proposed by Fama (1970), explain that stock prices quickly adjust to available public information, meaning that abnormal returns generated by information cannot be sustained over the long term. Therefore, the decline in abnormal return after Auto Rejection indicates that the market had absorbed and adjusted to the information generated by the event. Furthermore, this phenomenon is consistent with Signaling Theory, which changes in abnormal returns reflect investors' interpretation of the information they receive. The decline in AAR after Auto Rejection suggests investors perceived the event as anticipated information, and leading some investors to take actions such as profit-taking.

The findings are also consistent with (Nainggolan, 2025), explain that abnormal returns represent market responses to new information. In addition, these findings also support (Yusran & Lesmana, 2022), explain that changes in stock returns following changes in the Auto Rejection policy. Overall, the decline in AAR following Auto Rejection suggests that the Auto Rejection mechanism contains information that can influence investor decisions. However, this response is short-term because the market gradually adjusts until the information is fully reflected in stock prices.

The Trading Volume Activity variable shows a Z-value of -4.054 with a significance level of <0.001. Since the p-value is below than the 0.05 significance level, there is a significant difference in Trading Volume Activity between the day when Auto Rejection occurred and the period after the event. Therefore, the research hypothesis stating that there is a difference in Trading Volume Activity among IPO stocks experiencing Auto Rejection is accepted. The test results indicate that most companies experienced a decline in trading activity after Auto Rejection.

This finding demonstrates that trading activity was concentrated on the event day when stock prices reached the Auto Rejection limit. After the event, investors gradually reduced their trading activity as market uncertainty eased and the information had been incorporated into stock prices. The decline in Trading Volume Activity after Auto Rejection indicates that investor responses were strongest at the time of the event. The high level of trading activity on the event day reflects increased investor attention toward IPO stocks experiencing significant price movements. However, after the market received and processed the information, trading activity gradually declined.

These findings support the Mixture of Distribution Hypothesis proposed by Clark (1973), explain that trading volume activity is influenced by the arrival of information in the market. When new information enters the market, investors respond through buying and selling activity, leading to increased in trading volume. When investors have processed the information, trading activity tends to decrease. The findings are consistent with (Al-Qudah & Houcine, 2022), explain that information affects market activity and trading behavior. Furthermore, these findings also support (Yusran & Lesmana, 2022), who found that differences in trading volume before and after changes to the Auto Rejection policy. Therefore, the results indicate that the Auto Rejection mechanism provides information signals that influence investor transaction decisions.

**Conclusion**

This study aims to analyze differences in market reactions, measured by abnormal returns and trading volume activity, among IPO stocks that experience Auto Rejection on the Indonesia Stock Exchange during the 2022–2024 period. Based on descriptive analysis and Wilcoxon Signed Rank Test, this study concludes that there are significant differences in abnormal return and Trading Volume Activity between the Auto Rejection day and the post event day. Both variables show a similar pattern: market reactions are strongest when Auto Rejection occurs and gradually decline over the following trading days.

The significant difference shows that Auto Rejection generated a significant market reaction among investors. When stocks reached the Auto Rejection limits, investors quickly respond and reflected in higher abnormal returns and trading volume on the event day. This condition suggest that Auto Rejection attracted investor attention and influenced short-term market behavior. The decline in abnormal return and Trading Volume Activity after Auto Rejection indicates that the market gradually absorbed and processed the information related to the event. As the information was reflected in stock prices, investor uncertainty tended to decrease and leading to weaker market reactions in the following days.

Theoretically, these findings support the Efficient Market Hypothesis and the Mixture of Distribution Hypothesis, both of which explain that new information can influence stock prices and investor trading activity. Practically, this study suggests that Auto Rejection events provide important information for evaluating short-term stock movements. Investors are suggests to consider not only on price movements but also company fundamentals and available market information when making investment decisions.

For future researchers, this study suggests using a longer observation period, considering different market conditions, and examining other factors that may influence investor reactions toward Auto Rejection events, such as investor sentiment, liquidity, and stock volatility.

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# GROWTH AND COMPANY CHARACTERISTICS ON DIVIDEND PAYOUT RATIO IN FAMILY COMPANY LISTED ON IDX

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***Abstract***
*This study aims to examine the effect of Net Profit Margin (NPM), Sales Growth, Debt to Equity Ratio (DER), Company Value, and Growth on the Dividend Payout Ratio (DPR) in family companies listed on the Indonesia Stock Exchange for the period of 2021 to 2024. Family companies have unique financial logic where dividend decisions are driven by both economic goals and family interests. Using a quantitative approach, secondary data were gathered from 35 purposively selected family companies, generating 140 panel data observations. Data were analyzed using panel data regression via EViews 14. After model selection tests, the Random Effect Model was chosen and further corrected using the Cochrane-Orcutt iterative method to resolve autocorrelation issues. The results reveal that NPM and Company Value have a positive, significant effect on the DPR, whereas Growth exerts a negative, significant influence. Meanwhile, Sales Growth and DER showed no significant impact. Simultaneously, all variables significantly affect the DPR with an Adjusted R-squared of 21.83%, implying that other unexamined non-financial factors heavily influence dividend decisions and policies in Indonesian family firms.*
***Keywords:*** *Dividend Payout Ratio, Company Value, Growth, Family Company, Net Profit Margin.*

## 1. Introduction

Family companies play a substantial role in the global economy, particularly in Indonesia. Their concentrated ownership and control structures shape a wide range of corporate decisions, including dividend policy. In practice, family companies typically weigh not only profitability but also business sustainability and the preservation of family control, and dividend policy reflects how firms distribute earnings to shareholders. According to the Family Business Summit 2024, family companies contribute around 53.28% of Indonesia's Gross Domestic Product and absorb about 96.16% of the national workforce. Most companies listed on the Indonesia Stock Exchange (IDX) are family-managed, making the financial behavior of family companies—particularly dividend decisions—an important research topic.

Dividend policy in family companies is often shaped not only by pure financial considerations but also by family agendas such as personal consumption needs, wealth succession, and the desire to preserve control. National economic growth data show a recovering trend, with Indonesia's GDP growing 3.69% in 2021, 5.31% in 2022, 5.05% in 2023, and 5.03% in 2024, with the fourth quarter of 2024 growing 5.02% year-on-year. This macroeconomic recovery has translated into higher corporate profitability among listed firms, which in turn affects dividend payout decisions. On the Indonesian capital market, dividend distribution is closely watched by investors. IDX recorded that in 2024, 342 listed companies distributed dividends worth a combined IDR 364.2 trillion, signaling firms' efforts to maintain investor trust through consistent dividend policy. Family companies, however, often face a distinctive tension: whether to distribute profits to family shareholders or retain earnings for business development.

A range of financial indicators are known to affect the Dividend Payout Ratio (DPR), including Net Profit Margin (NPM), Sales Growth, and Debt to Equity Ratio (DER). Higher profitability generally expands a firm's capacity to pay dividends, while high Sales Growth may lead firms to retain earnings to fund operational expansion. Similarly, higher DER indicates heavier reliance on debt, which can constrain dividend capacity as firms prioritize debt obligations. Company characteristics such as Company Value (measured through the Price Earnings Ratio) and

Growth (measured through total asset growth) may also shape dividend policy. Firms with a longer track record and higher market value tend to have more stable earnings and cash flow, enabling more regular dividends, while firms undergoing rapid asset expansion tend to retain earnings to finance growth.

Based on this background, the research questions are: (1) Does Net Profit Margin affect the Dividend Payout Ratio? (2) Does Sales Growth affect the Dividend Payout Ratio? (3) Does Debt to Equity Ratio affect the Dividend Payout Ratio? (4) Does Company Value affect the Dividend Payout Ratio? (5) Does Growth affect the Dividend Payout Ratio? Accordingly, this study aims to analyze the effect of each of these five variables on the Dividend Payout Ratio of family companies listed on the IDX. Theoretically, the study is expected to contribute to financial management literature on family company dividend decisions. Practically, it offers guidance for investors making investment decisions in family companies and for management in setting dividend policy consistent with the firm's growth stage and characteristics. This research is bounded to family companies listed on the IDX during 2021–2024, using five independent variables (NPM, Sales Growth, DER, Company Value, Growth) against one dependent variable (DPR), based on secondary data from company financial statements; macroeconomic conditions, government policy, and other external factors are outside its scope.

## 2. Literature Review

### *2.1 Clientele Effect Theory*

Elton & Gruber (1970) provided direct evidence that shareholders in lower tax brackets tend to prefer high dividend-yield stocks, while investors holding low-yield stocks pursue capital gains due to higher marginal tax burdens. This finding was reinforced by Pettit (1977), who showed that investors gravitate toward dividend-paying securities that match their income level and the gap between capital-gains and dividend tax rates. Hasnawati (2017) argued that Clientele Effect Theory is highly relevant for explaining the "dividend puzzle," given demographic and economic differences among investors, noting that older individual investors typically rely on dividend income and therefore prefer higher payout policies, whereas higher-income investors prefer lower payout ratios to minimize tax exposure. In the Indonesian automotive sector, Sari & Lestiani (2018) similarly found that profitability and firm size negatively affect DPR under a clientele and signaling framework, while leverage and liquidity show no significant effect.

### *2.2 Agency Theory*

Agency theory explains the relationship between principals (shareholders) and agents (management), which can generate conflicts of interest due to differing goals and information asymmetry. Jensen & Meckling (1976) argued that agency costs arise from the separation of ownership and control. Al-hiyari et al. (2024) noted that dividend payments serve as a mechanism to reduce free cash flow available to managers, thereby minimizing opportunistic behavior harmful to minority shareholders. Family companies, agency theory takes on added complexity. Azekkar et al. (2025) explained that family firms face two layers of agency conflict: between management and shareholders, and between controlling family shareholders and minority shareholders. This second layer pushes family firms to use dividend policy as a signal of commitment to all shareholders and as a way of preserving market trust—consistent with Madyan et al. (2019), who found that high family ownership indicates significant agency costs between majority and minority shareholders, encouraging larger dividend distributions as a form of accountability.

### *2.3 Signaling Theory*

Signaling theory holds that under conditions of information asymmetry between management and investors, dividend policy signals a firm's financial condition and future prospects. Firms that pay dividends consistently are seen as signaling strong, sustainable cash-generating capacity. Alghazali et al. (2024) confirmed that dividend policy changes are positively associated with corresponding stock price adjustments, supporting the signaling

hypothesis. This theory connects to the present study through Company Value (PER) and NPM as channels of the signal a firm sends to the market: higher NPM and PER strengthen the positive signal that a firm is able and committed to sustained dividend distribution. In family companies, signaling theory is especially relevant because family firms with long-standing reputations tend to preserve consistent dividend payments as a signal of trustworthiness to external shareholders (Azekkar et al., 2025). Signaling theory also explains why positive Sales Growth may encourage higher DPR, since consistent revenue growth signals good prospects, giving management more confidence to distribute earnings.

### *2.4 Pecking Order Theory*

Pecking order theory, proposed by Myers and Majluf, explains that firms follow a hierarchical preference in financing sources: internal funds (retained earnings) first, then debt, and finally new equity. This theory directly affects dividend policy, since a larger share of earnings used to finance growth leaves a smaller share available for dividends. Culata & Gunarsih (2012) explained that firms with large retained-earnings reserves tend to prioritize reinvestment over dividend distribution, a direct manifestation of pecking order theory. In this study, pecking order theory helps explain the relationship between Growth, Sales Growth, DER, and DPR: firms with high asset growth tend to pay lower dividends because they need internal funds for expansion, and firms with high DER have already relied heavily on debt, which can reduce dividend capacity as cash flow is directed toward debt servicing. Marina et al. (2020) found a negative effect of DER on DPR, consistent with this prediction. In family companies, pecking order theory is also relevant because family firms tend to avoid diluting ownership through new share issuance, relying instead on retained earnings and debt to finance expansion.

### *2.5 Net Profit Margin*

Net Profit Margin reflects the percentage of net income generated from sales. A higher NPM signals favorable information to shareholders about a firm's capacity to attract capital (Sha, 2017), and reflects efficient performance since costs are well controlled (Zuwita & Henny, 2019), which in turn strengthens investor and shareholder confidence to continue investing (Azhar, 2022).

### *2.6 Sales Growth*

Sales Growth measures the year-over-year increase in a company's sales, observable through the income statement. Yuliani (2021) noted that Sales Growth reflects how successful a firm's past investment strategy has been and serves as a guide for projecting future growth. Tamsil & Esra (2020) explained that high Sales Growth requires substantial funding to support operations and expansion, leading firms to retain a larger share of earnings rather than distribute them as dividends—meaning Sales Growth may influence DPR through the firm's internal funding needs.

### *2.7 Debt to Equity Ratio*

DER is a solvency ratio comparing total debt to total equity. Meliana et al. (2020) described DER as a measure of how a firm manages its debt as a funding source; a higher DER means heavier reliance on debt relative to equity, increasing the obligation to service principal and interest, which can reduce net income and dividend capacity. Susilawati et al. (2022) added that high leverage increases financial risk if debt is poorly managed.

### *2.8 Dividend Payout Ratio*

DPR is the ratio showing the percentage of net profit distributed to shareholders as dividends. Noted that a higher DPR means shareholders receive a larger share of profit, while Ariyani et al. (2019) emphasized that DPR reflects the percentage of profit paid as cash dividends, influencing shareholders' investment decisions. Septiani et al. (2020) stressed the importance of balancing distributed and retained earnings, since excessive distribution can constrain future growth capacity. Franc-Dąbrowska et al. (2020) further showed that dividend

decisions are shaped by profitability, growth, liquidity, and firm size—considerations that become more complex in family firms given their long-term orientation and continuity goals.

### *2.9 Family Company*

A family company is a business owned, managed, and controlled by family members, distinguishing it from other firms by its focus not only on profit but on business continuity and legacy for future generations. Michiels & Molly (2017) noted that family companies have a distinctive financial logic shaped by family interests rather than purely economic goals. Amram et al. (2023) added that family businesses are passed down across generations as a means of preserving family wealth and continuity, with cultural values, loyalty, trust, and succession planning distinguishing them from non-family firms. Consequently, family companies tend to use profits to support business development, maintain stability, and preserve family control—meaning DPR in family companies is shaped not only by financial conditions but also by the goals of preserving family control, continuity, and long-term orientation.

### *2.10 Company Value*

Company Value reflects investor confidence in a firm's performance and prospects. Dwiastuti & Dillak (2019) argued that firm value is a tool shaping how investors perceive a company, while Hauteas & Muslichah (2019) added that it captures the economic value linked to share price and shareholder returns. Although Tobin's Q and Price to Book Value are more commonly used, this study uses the Price Earnings Ratio (PER) as the proxy for Company Value, given its ability to capture investors' expectations of future firm prospects Sudana on 2015, as cited in Sujono et al. (2024).

### *2.11 Growth*

Growth reflects a firm's ability to sustain and expand its business over time, through increases in assets, profit, or operational expansion. Yap & Stevanius (2017) explained that growth is reflected in rising market value, sales, and assets, which support efficient capital use and reinvestment. Didier et al. (2020) noted that growing firms typically channel funds into strengthening productive capacity—assets, labor, and capital—implying that high-growth firms require more internal funding and must be more cautious in balancing dividends against retained earnings. Although Sales Growth and Growth (measured via total asset growth) both reflect firm expansion, they capture different dimensions: Sales Growth reflects short-term operational performance, while Growth captures longer-term capacity expansion; both are retained in this study to represent distinct aspects of firm growth relevant to DPR.

### *2.12 Research Hypotheses*

Previous studies indicate that financial and company characteristics may influence the Dividend Payout Ratio (DPR). Net Profit Margin (NPM), for instance, was found to positively affect dividend distribution as a signal of efficient performance (Zuwita & Henny, 2019) and to strengthen shareholder confidence (Azhar, 2022). Thus, the first hypothesis is: H1: Net Profit Margin affects the Dividend Payout Ratio. Next, consistent Sales Growth has been shown to increase cash flows and positively drive the DPR (Franc-Dąbrowska et al., 2020), while serving as an indicator of successful operational strategies (Yuliani, 2021). Therefore: H2: Sales Growth affects the Dividend Payout Ratio. The Debt to Equity Ratio (DER) has generally been found to negatively affect the DPR (Marina et al., 2020; Meliana et al., 2020), although family companies might maintain dividend stability despite high debt to preserve investor trust (Setianto & Sari, 2017). Hence, the third hypothesis is: H3: Debt to Equity Ratio affects the Dividend Payout Ratio. Company Value, often measured by market valuation or stock prices, has been consistently reported to positively and significantly affect the DPR (Alghazali et al., 2024; Azekkar et al., 2025; Septiani et al., 2020) as a signal of commitment to shareholders. Thus, the fourth hypothesis is: H4: Company Value affects the Dividend Payout Ratio. Finally, research on company growth shows a negative effect on the DPR, as rapidly growing companies tend to retain their earnings to fund business expansion rather than distribute them (Rusliati & Meiliyawati, 2020). Therefore, the fifth hypothesis is: H5: Growth affects the Dividend Payout

Ratio.

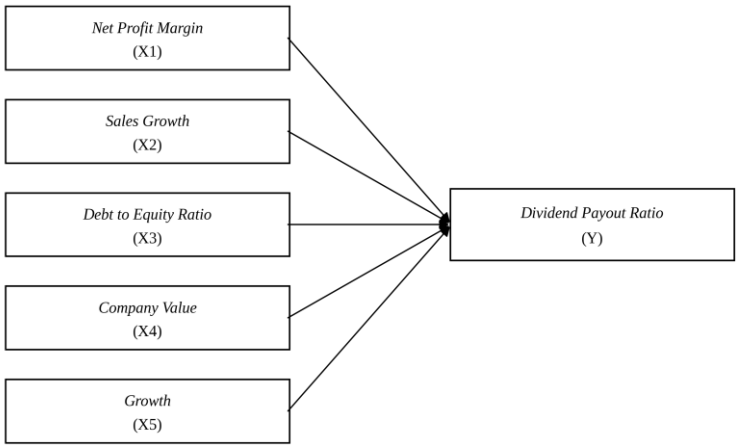



*Figure 1. Research Framework*

## 3. Research Methods

### *3.1 Research Design*

This study employed a quantitative method with a causal hypothesis testing approach to examine the effect of independent variables on the dependent variable. Specifically, the objective is to analyze the effect of Net Profit Margin, Sales Growth, Debt to Equity Ratio, Company Value, and Growth on the Dividend Payout Ratio in family companies.

### *3.2 Data Type and Sample*

This study uses secondary data obtained from company financial statements available on the IDX's official website and each company's official website. The sample consists of 35 family companies listed on the IDX during 2021–2024, yielding 140 panel observations combining time-series and cross-sectional data. A family company in this study is defined as a business owned and managed primarily by a founding family or specific family members, either through majority share ownership or family participation in management. The 35 sampled companies span sectors including energy, consumer goods, banking, property, media, and infrastructure.

Samples were selected using purposive sampling, a technique that selects samples based on specific criteria aligned with the research objective (Sugiyono, 2013). A company was classified as a family company if it met the following criteria: (1) consistently reported financial statements on the IDX throughout 2021–2024; (2) had family ownership of at least 15 percent of total outstanding shares, following Ramadani et al. (2019), who define a firm as family-controlled when 15–25 percent of ownership and control is held by a family with active family involvement; (3) had at least one family member involved in company management or decision-making; and (4) exhibited family control either directly or indirectly through a parent company, subsidiary, or other family business group structure.

### *3.3 Data Analysis Method*

This study employed a quantitative method with a causal hypothesis testing approach to examine the effect of independent variables on the dependent variable. Specifically, the objective is to analyze the effect of Net Profit Margin, Sales Growth, Debt to Equity Ratio, Company Value, and Growth on the Dividend Payout Ratio in family companies. Descriptive statistics (mean, median, maximum, minimum, and standard deviation) were used to characterize the variables. The best-fitting estimation model was selected through the Chow test, Hausman test, and Lagrange Multiplier test, distinguishing between the Common Effect

Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM).

The Chow test determines whether CEM or FEM is more appropriate (H0: CEM if $p > 0.05$; H1: FEM if $p < 0.05$). If FEM is indicated, the Hausman test then compares FEM against REM (H0: REM if $p > 0.05$; H1: FEM if $p < 0.05$). If CEM is indicated by the Chow test but REM by the Hausman test, the Lagrange Multiplier test determines the final choice between CEM and REM (H0: CEM if $p > 0.05$; H1: REM if $p < 0.05$).

### *3.4 Classical Assumption Tests*

Normality was tested using the Jarque-Bera test (residuals are normally distributed if $p > 0.05$). Multicollinearity was assessed via the Variance Inflation Factor (VIF), with $VIF < 10$ indicating no multicollinearity. Heteroscedasticity was tested using the Harvey Test (no heteroscedasticity if $p > 0.05$). Autocorrelation was tested using the Durbin-Watson (DW) statistic; with $n = 140$ and $k = 5$, the critical values are $dL = 1.6507$ and $dU = 1.7984$, giving an autocorrelation-free zone of $1.7984 < DW < 2.2016$. Where autocorrelation was detected, the iterative Cochrane-Orcutt procedure was applied, transforming the regression model through quasi-differencing to address first-order autocorrelation, AR(1): $\varepsilon_t = \rho\varepsilon_{(t-1)} + u_t$ (Wooldridge, 2019).

### *3.5 Hypothesis Testing*

The multiple linear regression model used in this study is:

$$DPR = \alpha + \beta 1NPM + \beta 2SALES + \beta 3DER + \beta 4PER + \beta 5GROWTH + e$$

Where DPR is Dividend Payout Ratio, α is the constant, β1–β5 are regression coefficients, and e is the error term. The t-test (partial test) evaluates the significance of each independent variable individually (H0 rejected if $p < 0.05$, indicating a significant effect). The F-test evaluates the overall significance of the model (H0 rejected if $p < 0.05$, indicating all independent variables jointly affect the dependent variable). The Adjusted R-squared measures the proportion of variation in DPR explained by the independent variables.

## 4. Research Findings and Discussion

### *4.1 Sample Data Description*

**Table 2. Sampling Criteria**

| Sampling Criteria | Numbers of Companies |
|---|---|
| Companies that consistently reported financial statements on the IDX during 2021–2024 | 697 |
| Companies with family ownership of at least 15% of total shares during 2021–2024 | 203 |
| Companies with at least one family member involved in management or decision-making | 35 |
| Companies with direct or indirect family control (via parent company, subsidiary, or family business group structure) | 35 |
| Family companies meeting all criteria | 35 |
| Observation period (years) | 4 |
| Total panel observations | 140 |

The sample was determined through a purposive sampling procedure based on the family-company criteria described in Section 3.2. Table 1 presents the step-by-step sample selection process. Starting from all companies that consistently reported financial statements on the IDX throughout 2021–2024, the sample was progressively narrowed based on family-ownership and family-involvement criteria, resulting in a final sample of 35 family companies and 140 firm-year observations used in this study.

### *4.2 Descriptive Statistics*

**Table 3. Descriptive Statistics**

| | NPM_X1 | SG_X2 | DER_X3 | PER_X4 | *GROWTH*_X5 | DPR_Y |
|---|---|---|---|---|---|---|
| *Mean* | 0.174670 | 0.121303 | 0.423660 | 0.839009 | 0.041919 | 0.363373 |
| *Median* | 0.112850 | 0.089650 | 0.369950 | 0.860500 | 0.064300 | 0.303000 |
| *Maximum* | 0.868600 | 1.219500 | 1.287500 | 2.052200 | 0.778800 | 1.228700 |
| *Minimum* | -0.062700 | -0.740500 | 0.000100 | 0.002700 | -3.450800 | -0.667600 |
| Std. Dev | 0.190871 | 0.236890 | 0.291413 | 0.354099 | 0.394283 | 0.327012 |
| N | 140 | 140 | 140 | 140 | 140 | 140 |

*Source: Author's data processing (2026)*

The descriptive statistics show considerable variation across all variables, particularly Growth (X5), whose standard deviation (0.3943) exceeds its mean (0.0419), reflecting substantial dispersion in asset growth across the sampled family firms. The negative minimum value of DPR (-0.6676) indicates instances where sample firms distributed dividends even while reporting negative earnings per share.

### *4.3 Panel Data Model Selection*

The Chow test yielded a cross-section F-statistic of 4.079 with a probability of 0.0000 ($p < 0.05$), indicating that the Fixed Effect Model outperforms the Common Effect Model. The subsequent Hausman test produced a chi-square statistic of 3.647 with a probability of 0.6013 ($p > 0.05$), indicating that the Random Effect Model is preferred over the Fixed Effect Model. The Lagrange Multiplier test confirmed this, with a Breusch-Pagan cross-section probability of 0.0000 ($p < 0.05$), favoring the Random Effect Model over the Common Effect Model. Taken together, these three tests identify the Random Effect Model as the most appropriate estimator for this study.

### *4.4 Classical Assumption Tests*

The Jarque-Bera normality test produced a statistic of 1.3769 with a probability of 0.5024 ($p > 0.05$), indicating normally distributed residuals. The multicollinearity test showed Centered VIF values of 1.070 (NPM), 1.115 (Sales Growth), 1.020 (DER), 1.110 (PER), and 1.058 (Growth)—all well below the threshold of 10, indicating no multicollinearity. The Harvey heteroscedasticity test produced an F-statistic probability of 0.4008 and an Obs*R-squared probability of 0.3924 (both $p > 0.05$), indicating no heteroscedasticity. The initial Durbin-Watson statistic for the Random Effect Model was 1.6461, falling below dU (1.7984) and indicating positive autocorrelation. The Cochrane-Orcutt procedure was applied with an estimated autoregressive coefficient of $\rho = 0.4260$, transforming all variables via quasi-differencing. Following transformation, the Durbin-Watson statistic improved to 1.9430, falling within the no-autocorrelation zone ($1.7984 < DW < 2.2016$), confirming that all classical assumptions were satisfied and the model was suitable for hypothesis testing.

### *4.5 Hypothesis Testing*

#### *4.5.1 Regression Result*

**Table 4. Multiple Linear Regression Result**

| *Variable* | *Coefficient* | *Std. Error* | *t-Statistic* | *Prob.* |
|---|---|---|---|---|
| C | 0.056820 | 0.055548 | 1.022906 | 0.3082 |
| NPM_X1 | 0.354726 | 0.152033 | 2.333219 | 0.0211 |
| SG_X2 | -0.119132 | 0.093531 | -1.273720 | 0.2050 |
| DER_X3 | -0.119621 | 0.089243 | -1.340385 | 0.1824 |
| PER_X4 | 0.323350 | 0.078209 | 4.134464 | 0.0001 |
| *GROWTH*_X5 | -0.201739 | 0.052939 | -3.810805 | 0.0002 |

*Source: Author's data processing (2026)*

The resulting regression equation is:

$$DPR = 0.056820 + 0.354726NPM - 0.119132SALES - 0.119621DER + 0.323350PER - 0.201739GROWTH$$

The Adjusted R-squared was 0.2183, indicating that the model explains 21.83% of the variation in DPR, with the remaining 78.17% explained by factors outside the model.

### *4.5.2 Hypothesis Discussion*

#### *4.5.2.1 Net Profit Margin to Dividend Payout Ratio*

NPM shows a significant positive effect on DPR (coefficient 0.3547, p = 0.0211), so H1 is supported. This indicates that family companies with higher profitability distribute a larger share of earnings as dividends—consistent with agency theory (Jensen & Meckling, 1976), where dividends reduce free cash flow available to managers and mitigate agency conflict between controlling family shareholders and minority shareholders. Under clientele effect theory, consistent high profitability also helps family firms retain dividend-seeking investors, such as older individual investors relying on dividend income (Hasnawati, 2017). From a signaling perspective, high NPM sends a positive signal about a firm's financial strength, motivating larger dividend distributions to build external shareholder trust—consistent with Naibaho & Widyastari (2023).

#### *4.5.2.2 Sales Growth to Dividend Payout Ratio*

Sales Growth shows a negative but statistically insignificant effect on DPR (coefficient -0.1191, p = 0.2050), so H2 is not supported. Although the direction is consistent with theoretical expectations, its insignificance can be explained through several lenses. First, family firms tend to be long-term oriented and maintain dividend policy stability despite short-term sales fluctuations (Michiels & Molly, 2017). Second, under clientele effect theory, investors in family firms have typically calibrated their expectations to the firm's historical dividend pattern, so short-term sales volatility does not readily shift investor preference (Sari & Lestiani, 2018). Third, larger Indonesian family firms often have diversified funding access, meaning sales growth need not be financed by cutting dividends—consistent with Ariyani et al. (2019).

#### *4.5.2.3 Debt to Equity Ratio to Dividend Payout Ratio*

DER shows a negative but statistically insignificant effect on DPR (coefficient -0.1196, p = 0.1824), so H3 is not supported. The sample's relatively moderate average DER (0.4237) suggests that sample firms did not carry excessive debt burdens sufficient to meaningfully constrain dividend capacity. This is further supported by clientele effect theory: since sample leverage variation remained moderate, it was likely insufficient to disrupt investor expectations built around family firms' relatively stable dividend patterns. This finding diverges from several prior studies conducted on general (non-family) firms (Marina et al., 2020; Meliana et al., 2020; Tamsil & Esra, 2020), which found significant DER effects—a difference plausibly explained by family firms' long-term orientation toward preserving reputation and shareholder trust regardless of leverage level (Setianto & Sari, 2017).

#### *4.5.2.4 Company Value to Dividend Payout Ratio*

Company Value (PER) shows a significant positive effect on DPR (coefficient 0.3234, p = 0.0001), so H4 is supported. Family firms with higher market valuation distribute proportionally more of their earnings as dividends—consistent with signaling theory, where firms with strong market value have greater incentive to maintain consistent dividends as a signal of financial health, and with

agency theory, where higher-valued family firms face greater pressure from minority shareholders to distribute profits (Azekkar et al., 2025). This finding aligns with Septiani et al. (2020) and Alghazali et al. (2024). Under clientele effect theory, high-PER firms attract both growth-oriented and dividend-seeking investors simultaneously, giving management an incentive to maintain consistent dividend payments to satisfy both investor groups.

#### *4.5.2.5 Growth to Dividend Payout Ratio*

Growth shows a significant negative effect on DPR (coefficient -0.2017, p = 0.0002), so H5 is supported. Family firms undergoing rapid asset expansion distribute a smaller share of earnings as dividends, consistent with pecking order theory (Myers & Majluf), under which firms in an expansion phase prioritize internal funds over dividend distribution before seeking external financing. This is consistent with Rusliati & Meiliyawati (2020), Marina et al. (2020), and Culata & Gunarsih (2012). Under clientele effect theory, high-growth family firms naturally attract capital-gain-oriented investors rather than dividend-seeking investors, since these investors understand that retained earnings are being reinvested to support future share price appreciation (Pettit, 1977); the lower DPR therefore does not conflict with these investors' preferences but rather aligns with them.

## 5. Conclusion

This study examined the effect of Net Profit Margin, Sales Growth, Debt to Equity Ratio, Company Value, and Growth on the Dividend Payout Ratio of family companies listed on the Indonesia Stock Exchange during 2021–2024, using panel data regression under the Random Effect Model corrected for autocorrelation via the Cochrane-Orcutt method. Net Profit Margin and Company Value each show a significant positive effect on DPR: more profitable family firms and firms with higher market valuation distribute a larger share of earnings as dividends, reflecting both a stronger capacity to pay and a stronger incentive to signal financial health and preserve shareholder trust. Growth shows a significant negative effect: family firms undergoing rapid asset expansion retain a larger share of earnings to fund that expansion, consistent with pecking order theory. Sales Growth and Debt to Equity Ratio show no significant effect on DPR, suggesting that family firms maintain dividend policy stability independent of short-term sales fluctuations and that the sample's relatively moderate leverage did not meaningfully constrain dividend capacity.

The F-test confirms that the five independent variables jointly and significantly affect DPR, though the Adjusted R-squared of 21.83% indicates that a substantial share of variation in family firm dividend policy is explained by factors outside this model—consistent with Azekkar et al. (2025), who found through a systematic review of 63 Scopus-indexed articles that family firm dividend policy is shaped not only by financial variables but also by non-financial factors such as board independence, CEO duality, board gender diversity, family succession planning, and the preservation of socio-emotional wealth.

For family firm management, these findings underscore that profitability (NPM) is a primary determinant of dividend capacity; management should therefore consistently pursue operational efficiency to sustain profitability and preserve trust among both family and minority shareholders. Dividend decisions should also account for the firm's growth phase, adjusting payout levels to internal funding needs during periods of rapid asset expansion. For policymakers such as the Financial Services Authority (OJK) and the Indonesia Stock Exchange, these findings can inform regulation supporting greater dividend policy transparency among family firms, given their substantial contribution to the national economy, alongside investor education initiatives addressing the distinctive characteristics of family firm dividend behavior.

This study is limited by its use of only five independent variables, excluding other potentially relevant factors such as liquidity, interest rates, and institutional ownership; its restriction to 35 family firms over a four-year period (2021–2024), which may not fully represent the broader

population of Indonesian family firms or capture long-term dividend dynamics; its lack of control for industry-sector differences and firm life-cycle stage; its omission of insider ownership and business risk variables relevant to second-layer agency conflicts in family firms; and its use of a static panel model that does not account for lagged dividend effects.

Future research is encouraged to incorporate additional variables such as liquidity, managerial ownership, or free cash flow; extend the observation period to ten years or more; compare dividend policy between family and non-family firms on the IDX; incorporate insider ownership and business risk variables; apply dynamic panel approaches such as GMM with lagged dividend terms; include industry-dummy and firm-size control variables; and consider firm life-cycle stage as a control or moderating variable. Investors are advised to consider NPM and PER as indicators of dividend potential and to exercise caution when investing in rapidly growing family firms, which tend to distribute smaller dividends.

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# ALGORITHMIC CONTROL VS. HUMAN DIGNITY: EVALUATING DECENT WORK STANDARDS AMONG DIGITAL PLATFORM WORKERS IN YOGYAKARTA

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***Abstract***
*The rapid expansion of the digital economy in Southeast Asia is often celebrated for offering income flexibility. However, under the facade of autonomy, platform workers increasingly face absolute digital surveillance. In regions like Yogyakarta, where the formal job market is highly competitive and regional minimum wage (UMR) remains relatively low, the reliance on the gig economy has intensified. This study evaluates to what extent platform work aligns with the international labor benchmarks, tracing the trajectory from the ILO WESO (2021) diagnostic report to the newly established normative standards of ILO Convention No. 193 (2026). Employing a qualitative case study approach with heterogeneity sampling, this research conducts in-depth semi-structured interviews with 11 active platform workers in Yogyakarta, categorized into three distinct clusters: male passenger transport drivers, female drivers facing gender-specific vulnerabilities, and time-bound food and goods couriers. Data saturation was achieved, and the data is analyzed using Miles and Huberman's thematic analysis. The preliminary findings reveal a phenomenon of "pseudo-flexibility," where workers' endurance under strict algorithmic control is not an autonomous preference but a manifestation of structural coercion due to the lack of formal, inclusive livelihood alternatives. This paper argues that without robust state-led regulatory interventions and internal algorithmic reforms by digital platforms, the digital economy in developing Asian urban centers will continue to compromise human dignity under the guise of technological transformation.*
***Keywords***: *Algorithmic Control, Decent Work, Gig Economy, Human Dignity, Pseudo-Flexibility.*

## Introduction

The proliferation of the gig economy across the Global South has fundamentally restructured the contemporary labor market, shifting the paradigm from traditional formal employment to digitally mediated short-term contracts. In Southeast Asia, particularly in Indonesia, this digital transformation has been widely celebrated as a democratizing force, promising unprecedented autonomy, financial inclusion, and temporal flexibility. Digital platforms offering ride-hailing, food delivery, and logistics services have rapidly expanded, absorbing a significant portion of the productive demographic that remains marginalized by the highly competitive formal sector. In the Special Region of Yogyakarta, a province characterized by a unique confluence of a highly educated youth demographic and persistently low regional minimum wages (UMR), the gig economy has transitioned from a supplementary income source to a primary livelihood for thousands of households.

However, beneath the optimistic narrative of micro-entrepreneurship and flexibility lies a profound structural paradox rooted in Economic Law. Platform workers in Indonesia operate within a highly exploitative legal gray area, systematically classified as "independent contractors" or "partners" under the guise of a partnership contract (kemitraan). In reality, this arrangement often manifests as "bogus self-employment" (kemitraan semu), where platforms act as monopolistic market-makers to circumvent standard labor protections, minimum wage guarantees, and comprehensive social security nets. Consequently, the promised autonomy is frequently overshadowed by extreme precarity. As the market reaches saturation and competition among platform providers intensifies, the initial incentives that attracted workers to the gig economy have gradually been replaced by stringent "algorithmic management"—a system where artificial intelligence and data-driven metrics dictate worker behavior, monitor performance, and enforce compliance with uncompromising rigidity.

This shift toward algorithmic dominance has profound implications for human dignity. Workers find themselves subjected to unilateral commission cuts, fluctuating dynamic pricing mechanisms, and the perpetual threat of automated account suspensions without transparent or fair appeal processes. The digital architecture of these platforms operates as an invisible, yet omnipresent panopticon, reducing

human labor to quantifiable data points and eroding the fundamental dignity associated with decent work. In response to the escalating global crisis of platform worker exploitation, the International Labour Organization (ILO) published the flagship WESO (2021) report , establishing comprehensive normative benchmarks for decent work in the digital platform economy. This authoritative report strongly recommends algorithmic transparency, the right to collective bargaining, and protection against arbitrary algorithmic dismissals, aiming to redefine decent work for the digital age.

Despite the critical importance of ILO WESO 2021 report, empirical evaluations of its implementation and relevance within localized contexts in the Global South remain nascent. Previous literature on the gig economy in Indonesia has predominantly focused on consumer satisfaction, operational efficiency, or descriptive survival strategies of workers. There is a distinct dearth of critical, theoretically grounded research that evaluates the lived experiences of platform workers through the specific lens of international decent work standards and human dignity.

This research aims to bridge this critical gap by connecting the international governance trajectory from empirical diagnosis to binding legal codification. While the ILO WESO (2021) report served as the foundational starting point by identifying systemic decent work deficits, the recent adoption of ILO Convention No. 193 (2026) establishes the definitive normative realization for digital labor protection. By contextualizing the transition from WESO (2021) recommendations to the binding mandates of Convention No. 193 (2026) within a specific micro-socioeconomic setting, this study provides a nuanced understanding of the intersection between technological advancement, labor exploitation, and human dignity in the developing world. The findings are expected to inform localized policy interventions and contribute to the broader scholarly discourse on the urgent need for algorithmic regulation in the gig economy.

## Literature Review

### *The Evolution of Algorithmic Management in the Global South*

The gig economy represents a paradigm shift in global labor markets, characterized by task-based compensation mediated through digital platforms (Woodcock & Graham, 2019). Initially lauded for offering spatial and temporal independence, the discourse surrounding platform work has become increasingly polarized. Early studies tended to highlight worker empowerment, framing gig work as a democratizing force that allows individuals to bypass traditional corporate hierarchies and act as autonomous micro-entrepreneurs (Vallas & Schor, 2020). However, contemporary literature, particularly focused on the Global South, sharply challenges this techno-optimism and underscores the structural paradoxes inherent in the platform business model.

In developing nations—such as Indonesia—where robust social safety nets are largely absent, the gig economy rarely operates as a launchpad for genuine entrepreneurial freedom. Instead, it frequently serves as an employer of last resort for a demographic structurally excluded from the formal labor market (Graham et al., 2017; Rahman, 2021). This phenomenon gives rise to what De Stefano (2015) identifies as the fundamental contradiction of platform capitalism: the imposition of intense, factory-like managerial control over a workforce that is legally classified as independent. Furthermore, even in developed contexts, platform-capital exercises extensive, non-negotiable labor control through algorithmic management, confirming this exploitation as a highly scalable, globalized phenomenon (Veen et al., 2020). The digital platform, functioning as an absolute market-maker, leverages its technological infrastructure to unilaterally dictate the terms of exchange, thereby neutralizing the foundational premise of mutual consent in traditional contract law.

Central to this structural paradox is the concept of “algorithmic management.” Unlike traditional human-led management, digital platforms utilize automated, data-driven tools to dictate worker behavior, monitor efficiency, and enforce compliance (Kellogg et al., 2020). Algorithmic management effectively replicates traditional managerial hierarchies in a digital format that is significantly more opaque and non-negotiable (Vasudevan & Chan, 2022). Workers are subjected to continuous digital surveillance, where their autonomy is reduced to metrics such as acceptance rates, completion times, and customer ratings. This algorithmic surveillance slowly objectifies workers, transforming human labor into a highly controlled, standardized commodity (Newlands, 2022). In the Global South, where labor supply vastly outstrips demand, platforms possess disproportionate power to unilaterally dictate terms, further exacerbating the asymmetry of algorithmic control.

***Structural Coercion vs. Agency in Platform Work***

To understand why platform workers persist in exploitative environments despite deteriorating conditions, this study draws upon the theory of Structural Coercion viewed through the lens of Partnership Contract Law. Distinct from direct physical coercion, structural coercion occurs when economic systems and the absence of viable alternatives compel individuals to participate in highly disadvantageous labor arrangements (Ford & Honan, 2019). In the context of Yogyakarta, a region marked by a competitive job market and low minimum wages, the decision to engage in platform work is rarely a fully autonomous choice. Instead, it is driven by systemic economic constraints that platforms exploit to draft asymmetric partnership agreements.

Under algorithmic management, this structural coercion is weaponized to breach the fundamental principle of good faith (iktikad baik) in contract law. Platforms leverage the economic vulnerability of workers to enforce strict compliance through automated penalties, unilaterally altering the terms of the "partnership" via dynamic algorithms. The promised "flexibility" morphs into a "pseudo-flexibility," where the structural inability to exit the system forces workers to sacrifice their dignity and submit to absolute algorithmic governance. The illusion of an equal partnership is maintained through app interfaces that offer the theoretical choice to decline tasks, while the underlying algorithm practically punishes such autonomy by reducing future earning opportunities.

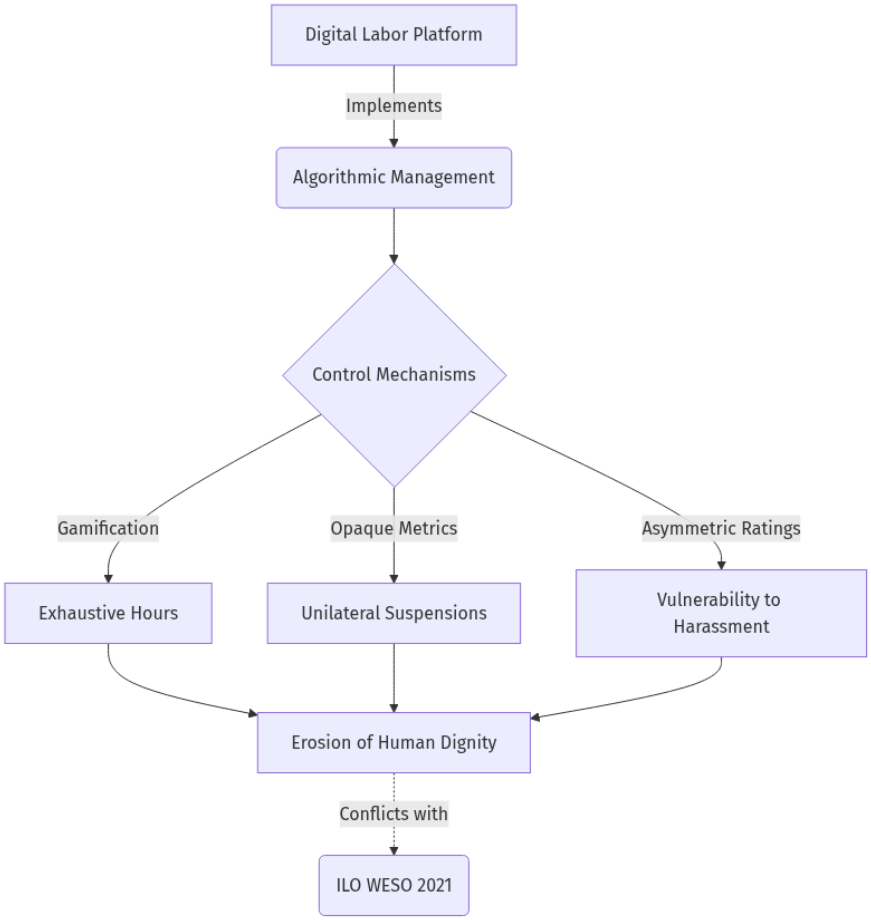



**Figure 1.** Conceptual Framework: The Cycle of Algorithmic Coercion and Dignity Erosion.

***From Decent Work Deficits to Normative Realization: The Trajectory from ILO WESO (2021) to ILO Convention No. 193 (2026)***

In response to the escalating vulnerability of platform workers worldwide, the International Labour Organization (ILO) published the WESO 2021 report, outlining a framework for decent work in the platform economy. This flagship report highlights critical gaps in digital labor protection,

explicitly emphasizing the need for algorithmic transparency, fair dispute resolution mechanisms with human mediation, and protection against unilateral account terminations.

However, because the WESO 2021 report was an advisory policy study, it lacked binding international legal enforceability. To bridge this regulatory vacuum, the ILO initiated intensive tripartite standard-setting deliberations. This process culminated on June 12, 2026, with the historic adoption of the Decent Work in the Platform Economy Convention, 2026 (No. 193) at the 114th Session of the International Labour Conference (ILO, 2026a, 2026b). Convention No. 193 transforms the diagnostic alarms raised in WESO (2021) into binding treaty obligations. Specifically, Article 8 establishes the mandatory right to algorithmic transparency and privacy protections, while Article 12 explicitly outlaws automated, unilateral account suspensions by guaranteeing human-mediated dispute resolution.

Crucially, this combined framework the report redefines decent work for the digital era by centralizing human dignity—asserting that algorithmic management must not subject workers to constant coercive surveillance or punitive financial mechanisms without equitable human oversight. This discourse aligns with growing global demands for the protection of dignity and fair working conditions in the highly precarious gig economy sector (Gandini, 2019). Together, the diagnostic baseline of ILO WESO (2021) and the binding standards of ILO Convention No. 193 (2026) serve as the normative benchmark in this study to evaluate whether the operational models of gig platforms in Yogyakarta align with universal human rights and fair labor standards.

### *Global Regulatory Responses to Algorithmic Control*

As the exploitative nature of platform capitalism becomes globally apparent, advanced economies have begun experimenting with legislative countermeasures to restrict algorithmic hegemony. Notably, Spain and the state of California have emerged as pioneering battlegrounds. The Spanish legislative framework, driven by labor unions, focuses heavily on algorithmic transparency, attempting to dismantle the "black box" of platform management (Todolí-Signes, 2021). Conversely, legislative efforts in California, such as Proposition 22, attempt to find a middle ground by maintaining the independent contractor status while instituting specific wage floors and benefits (Dubal, 2021). These contrasting approaches provide crucial theoretical benchmarks for analyzing the regulatory vacuum in developing nations, highlighting the necessity of state intervention to mediate the extreme power asymmetry between platform algorithms and human labor (Forde et al., 2017).

## Research Methods

### *Research Design and Paradigm*

This study employs a qualitative approach utilizing a descriptive-analytical case study design. This methodology was selected to deeply explore the phenomenon of algorithmic control and its impact on human dignity based on the direct empirical experiences of digital platform workers in Yogyakarta. A qualitative paradigm allows the researchers to capture emotional nuances, psychological pressures, and survival strategies of workers that cannot be adequately quantified by statistical figures. By focusing on lived experiences, the research bridges the gap between abstract algorithmic mechanics and tangible human impacts.

### *Sampling Technique and Informant Selection*

The informants in this study were selected using purposive sampling with heterogeneity criteria, facilitated by a snowball sampling technique initiated at various informal driver basecamps across Yogyakarta, to obtain a rich and diverse variation of perspectives. This recruitment strategy ensures access to authentic, grassroots worker networks while mitigating the selection bias inherent in purely random sampling. The total number of informants is 11 active platform workers residing and operating in the Special Region of Yogyakarta. This sample size of 11 is considered adequate as it achieved data saturation—the point at which no new themes or information emerged regarding algorithmic control practices from additional interviews. The informants were strategically categorized into three clusters to capture specific sectorial and gendered nuances: 1. Cluster 1 (Male Passenger Transport Drivers - 4 Informants): Male drivers of cars and motorcycles with an active tenure of over 3 years (e.g., Ms, Dy, Ag, Si). 2. Cluster 2 (Female Drivers - 3 Informants): Female online motorcycle taxi drivers facing unique socio-cultural and safety vulnerabilities (e.g., Da, Ek, Ro). 3. Cluster 3 (Food and Goods

Delivery Couriers - 4 Informants): Workers strictly bound by time targets and order performance metrics (e.g., Ai, Jo, Mh, B***a).

To provide a transparent overview of the research subjects, the demographic and operational profiles of the 11 informants are detailed in Table 1 below.

| Pseudonym | Gender | Vehicle Type | Cluster | Tenure | Avg. Working Hours | Primary Complaint |
|---|---|---|---|---|---|---|
| M***s | Male | Car (Four-Wheeler) | 1 (Driver) | > 3 years | 10-14 hours/day | Exhaustive hours for bonus |
| D***y | Male | Car (Four-Wheeler) | 1 (Driver) | > 3 years | 10-12 hours/day | High maintenance costs |
| A***g | Male | Motorcycle | 1 (Driver) | > 3 years | 10-12 hours/day | Decreased real income |
| S***i | Male | Motorcycle | 1 (Driver) | > 3 years | 12 hours/day | Externalized risk (engine breakdown) |
| D***a | Female | Motorcycle | 2 (Female Driver) | 2 years | 8-10 hours/day | Safety and harassment risks |
| E***k | Female | Motorcycle | 2 (Female Driver) | > 3 years | 8-10 hours/day | Asymmetric rating system |
| R***o | Female | Motorcycle | 2 (Female Driver) | > 3 years | 8-12 hours/day | Unfair customer-centricity |
| A***i | Male | Motorcycle | 3 (Courier) | 2 years | 12 hours/day | Lack of appeal mechanism |
| J***o | Male | Motorcycle | 3 (Courier) | > 3 years | 12-14 hours/day | Dehumanization ("like robots") |

| Pseudonym | Gender | Vehicle Type | Cluster | Tenure | Avg. Working Hours | Primary Complaint |
|---|---|---|---|---|---|---|
| M***h | Female | Motorcycle | 3 (Courier) | 1.5 years | 10 hours/day | Harsh tariff reductions |
| B***a | Male | Motorcycle | 3 (Courier) | > 4 years | 10-12 hours/day | 50% income drop over time |

Table 1. Informant Demographics and Operational Profiles
(Note: Table numbering will be adjusted accordingly, the Data Display matrix in Findings will now be designated as Table 2).

***Data Collection Procedures***

Primary data was collected through in-depth, face-to-face, semi-structured interviews conducted during July 2026. To capture the authentic, unfiltered realities of platform work, the interviews took place in various informal, grassroots settings preferred by the workers themselves. These locations primarily included traditional roadside food stalls (angkringan) and informal driver basecamps scattered across critical operational hotspots in Yogyakarta, specifically around Tugu Station, the Gejayan educational district, Taman Siswa, Bugisan, and the bustling Kranggan Market. Conducting the research in these naturalistic environments was crucial for establishing rapport and trust, allowing the informants to speak candidly about their frustrations without fear of digital surveillance or platform retaliation.

Each interview session lasted approximately 45 to 90 minutes and was guided by a semi-structured protocol. The interview guide was meticulously designed to explore complex themes bridging Economic Law and sociology, focusing specifically on algorithmic transparency, experiences with unilateral suspensions, daily working hours, the distribution of operational costs, and the effectiveness (or lack thereof) of in-app dispute resolution mechanisms. Prior to the interviews, all informants were provided with a detailed explanation of the research objectives. Formal Informed Consent forms were signed, ensuring absolute confidentiality, the anonymization of their identities (using pseudonyms), and their voluntary participation in strict accordance with rigorous academic ethical standards.

***Data Analysis Techniques***

The transcribed interview data was systematically analyzed using the interactive Thematic Analysis model proposed by Miles, Huberman, and Saldaña (2020). This rigorous analytical framework encompassed three concurrent and iterative stages: data reduction, data display, and conclusion drawing/verification.

During the initial data reduction phase, the raw interview transcripts were meticulously coded line-by-line. This process involved filtering out extraneous narratives and pinpointing recurring keywords, emotional responses, and specific incidents related to algorithmic coercion and contract asymmetry. These initial codes were subsequently aggregated into broader analytical themes reflecting the normative pillars of decent work outlined in the ILO WESO 2021 report and the principles of Economic Law. Next, in the data display stage, a comprehensive matrix was constructed (presented as Table 2). This matrix served to visually synthesize the specific operational phenomena and corresponding algorithmic impacts experienced by each distinct informant cluster, allowing for robust cross-case comparisons. Finally, during the conclusion drawing phase, the synthesized data was interpreted against the established theoretical frameworks of structural coercion and bogus self-employment, ensuring a transparent, logical, and evidence-based progression from raw qualitative data to robust theoretical conclusions.

**Research Findings and Discussion**

Based on the thematic analysis of the transcripts from 11 informants, the findings of this study confirm a significant clash between the algorithmic control of platforms and the standards of decent work and human dignity, as regulated in ILO WESO 2021 report. The reduced qualitative data is systematically presented (data display) in Table 2. The findings are categorized into three major themes that elucidate the intersection of algorithmic injustice, gender vulnerabilities, and structural coercion.

| **Informant Cluster** | **Work Phenomenon** | **Algorithmic Impact (Coercion)** | **Contradiction with ILO WESO (2021) & Violated ILO Convention No. 193 Articles** |
|---|---|---|---|
| **Cluster 1:** Male Drivers (4 informants) | On-bid time 10-14 hours/day; exorbitant vehicle maintenance costs absorbing 50% of income. | "Pseudo-flexibility" driven by gamification; hidden penalties for ignoring unfeasible tasks. | Violation of standard working hour limits & Occupational Safety (OHS). (Violates ILO Convention No. 193, Articles 9 & 10). |
| **Cluster 2:** Female Drivers (3 informants) | Double vulnerability: threat of customer harassment and rigid platform rating systems. | Absolute rating system with no defense mechanism; extreme customer-centricity overriding driver safety. | Violation of decent work principles: Right to fair dispute resolution and human mediation. (Violates ILO Convention No. 193, Articles 8 & 12). |
| **Cluster 3:** Couriers (4 informants) | Drastic and unilateral tariff reductions; immense psychological burden ("treated like robots"). | Automated suspensions (auto-suspend) and order deductions for declining non-sensical delivery routes. | Violation of decent work principles: Algorithmic transparency and prohibition of coercive surveillance. (Violates ILO Convention No. 193, Articles 8 & 12) |

Table 2. Thematic Data Synthesis Matrix (Data Display)

***The Illusion of Autonomy and Algorithmic Injustice***

The temporal flexibility frequently heralded as the hallmark of the gig economy is, in reality, a manifestation of "pseudo-flexibility." Technically, platform workers possess the freedom to determine their operational hours. However, the omnipresent pressure exerted by the algorithmic management system to maintain high ratings and chase daily gamified bonuses forces workers to operate far beyond reasonable human limits. The algorithm does not physically compel the worker to drive; instead, it utilizes a highly sophisticated form of financial conditioning engineered to extract maximum labor during peak demand while minimizing platform liabilities during idle periods.

This systemic conditioning is vividly illustrated by informants in Cluster 1. M***s, a senior male driver, explicitly articulated the deceptive nature of this autonomy through a profound sense of entrapment:

> *"People on the outside think we are our own bosses. That is a complete lie. To achieve the daily bonus, which is the only way to actually make a decent living, I cannot just work when*

> *I want to. Even if there are no orders, the application must remain 'On'. I am terrified to decline a trip because my acceptance rate will drop, and the algorithm will 'punish' me by withholding orders for hours. Consequently, I have to be online beyond normal limits, averaging 10 to 14 hours every single day, just staring at the screen in my car."*

The necessity to remain logged into the application, waiting for algorithmic task allocation without guaranteed compensation for idle time, constitutes a form of unpaid digital standby labor. From an Economic Law perspective, this represents a severe abuse of the partnership contract. The platform monopolizes the driver's time and operational capacity but completely evades the legal responsibility of compensating them for "standby time"—a core labor right under formal employment statutes. This practice starkly contradicts the principles of decent work, which mandate fair remuneration for hours committed to an employer's disposal.

Furthermore, the algorithmic architecture is designed to be profoundly asymmetric, actively marginalizing the workers' bargaining power. The system prioritizes logistical efficiency and consumer satisfaction above all else, often treating the human labor mediating the service as highly dispensable. J***o (Cluster 3), a food delivery courier, highlighted the dehumanizing effect of this absolute control:

> *"We are essentially treated like robots. If it rains, the system demands we move faster. If there is a traffic jam, the system doesn't care, it just docks our performance score. It is unequivocally inhumane, but because we are desperate for the income to feed our families, we cannot protest. We just have to keep moving and accept whatever the system throws at us. We are partners on paper, but slaves to the algorithm in reality."*

This sentiment encapsulates the severe erosion of human dignity. The worker ceases to be an independent agent capable of negotiating the terms of their labor and instead becomes a biological extension of the digital application.

***Exploitation Through Unilateral Evaluation and Automated Suspension (Auto-Suspend)***

The vulnerability of platform workers is drastically compounded by the unilateral evaluation systems employed by digital platforms. These systems, predominantly reliant on customer-generated star ratings, serve as the primary determinant for future task allocation and account longevity. For female workers (Cluster 2), this customer-centric evaluation creates a double vulnerability. Not only do they face the physical risks inherent in navigating urban traffic and nighttime operational hazards, but they must also endure immense emotional labor to appease customers, knowing that a single arbitrary negative review can trigger an automated suspension.

R***o (Cluster 2) criticized the absolute, unyielding nature of the algorithm, which remains oblivious to ground realities such as extreme weather, dangerous delivery locations, or inherently difficult customer behavior:

> *"The space for us to defend ourselves is practically non-existent. A customer gave me one star because I refused to enter a dark alleyway at 11 PM to deliver her food. I explained I felt unsafe, but the algorithm doesn't read context, it only reads the '1-star'. I was suspended for three days. The system's absolute priority is to pamper the customer, regardless of the truth or the driver's safety."*

This lack of due process becomes particularly alarming in cases involving severe disputes. A***i (Cluster 3) drew a chilling comparison regarding the asymmetry of platform policies in handling sexual harassment allegations. He noted that if a driver is accused by a customer, the partnership is terminated instantaneously by the algorithm without any formal hearing or presentation of evidence. Conversely, if a driver reports a customer for harassment, the platform frequently remains passive, issuing standard automated apologies while prioritizing revenue over worker safety.

This complete absence of a fair, human-mediated dispute resolution mechanism directly contradicts the core recommendations of the ILO WESO 2021 report and constitutes a flagrant breach of Article 12 of ILO Convention No. 193 (2026). When suspensions (temporary or permanent partnership terminations) are executed by automated emails—without affording the worker a transparent avenue for appeal or legal counsel—the platform exercises dictatorial power. Under

traditional Contract Law, such unilateral termination without a fair hearing would be deemed an unlawful breach of contract. Yet, under the guise of "kemitraan," platforms execute these dismissals with total impunity, stripping the worker of basic legal and human dignity.

***Structural Coercion and the Externalization of Operational Risks***

The escalating cost of living in Yogyakarta stands in stark contrast to the real income of gig workers, which has steadily declined due to aggressive tariff wars and a race-to-the-bottom pricing strategy adopted by competing platforms. B***a (Cluster 3), a veteran driver, reported a staggering 50% decrease in daily earnings compared to his initial years on the platform. This unilateral tariff reduction by the platform highlights a severe failure of mutual benefit, a core tenet of Partnership Contract Law. The workers do not remain in the gig economy because they are satisfied; they are trapped due to the complete absence of viable alternatives in the formal labor market, vividly validating the theory of Structural Coercion.

To maximize profitability, digital platforms execute a masterclass in risk externalization, severely skewing the economic burden of the partnership. The entire cost of operations—including fuel, daily vehicle maintenance, insurance, and even the mandatory installment payments for platform-branded attributes—is entirely offloaded onto the "partners." S***i (Cluster 1) reported suffering millions of Rupiah in losses due to a catastrophic engine failure while executing an order. This incident forced him to cease operations for 20 days, during which he received zero financial assistance or compensation from the platform. From an Economic Law perspective, this represents a highly exploitative market failure: the platform absorbs the economic surplus from the mediated service while the worker shoulders 100% of the depreciation and physical risk, stripping the "partnership" contract of any equitable validity.

***International Comparison and the Urgent Need for Algorithmic Transparency***

The vulnerabilities experienced by drivers in Yogyakarta are not isolated incidents; rather, they reflect a systemic flaw in the gig economy model proliferating across the Global South. Empirical studies by Woodcock and Graham (2019) regarding logistics couriers in China, and findings by Veen (2020) concerning food-delivery work in Australia, confirm an identical pattern: algorithmic management inevitably creates a "pseudo-flexibility" that forces workers to disregard physical safety in pursuit of gamified performance targets. The exploitation documented in Yogyakarta is the logical conclusion of a business model deployed in regions with surplus labor and relaxed labor regulations.

The unilateral suspension practices and the absence of appeal mechanisms reported by all informant clusters constitute a flagrant departure from the substantive guidelines of the ILO WESO 2021 report. The report explicitly recommends algorithmic transparency, establishing the fundamental need for workers to comprehend the specific metrics utilized to evaluate, penalize, or terminate them. The reality in Yogyakarta demonstrates that without the ratification and aggressive enforcement of such international conventions at the national level, the autonomy promised by digital platforms will remain a sophisticated facade for the objectification and exploitation of human labor.

***Global Policy Comparison: Learning from Europe and the United States***

The regulatory vacuum in Indonesia, which enables the aforementioned exploitation, becomes glaringly apparent when juxtaposed with recent legislative developments in the Global North. While Yogyakarta's platform workers suffer under the guise of "partnership," jurisdictions like Spain and California have actively intervened to recalibrate the power asymmetry.

In Spain, the landmark Ley Rider (Riders' Law) of 2021 explicitly recognized gig delivery couriers as wage laborers rather than independent contractors, mandating platforms to provide formal employment contracts and disclose the mathematical parameters of their algorithms to labor unions (Todolí-Signes, 2021). This directly addresses the algorithmic transparency mandated by ILO WESO 2021 report. Conversely, in California, the passage of Proposition 22 created a "third category" of workers—retaining independent contractor status but guaranteeing a wage floor equivalent to 120% of the local minimum wage, alongside stipends for health insurance (Dubal, 2021).

Although imperfect, these international precedents highlight the severe legislative inertia in Indonesia. The absolute externalization of operational risks (as experienced by Si) and the unilateral

automated dismissals (as critiqued by Ro and A***i) persist in Yogyakarta precisely because the Indonesian state has yet to decisively define the legal boundaries of algorithmic gig work (De Stefano, 2015; Forde et al., 2017). Therefore, the lived realities of these 11 informants serve as a critical empirical mandate for the Indonesian government to adopt localized legislative frameworks, drawing inspiration from Spain's algorithmic transparency and California's minimum wage floor, to safeguard human dignity in the digital era.

**Conclusion**

This study set out to evaluate the algorithmic working conditions of gig workers in Yogyakarta against the standards of ILO WESO 2021 report. The findings unequivocally demonstrate that platform work has evolved from a supplementary, flexible income alternative into an institutionalized trap of digital exploitation. Algorithmic control manifests uniquely across clusters: male drivers endure extreme physical exhaustion due to gamified targets, female drivers face severe vulnerabilities due to asymmetric customer-centric rating systems, and couriers suffer from dictatorial tariff reductions. Collectively, these mechanisms constitute a potent form of structural coercion, where the promised "flexibility" of the gig economy is a myth used to mask highly precarious, hyper-monitored labor in a stagnant formal economy. Ultimately, the existing "partnership" model systematically strips workers of their human dignity through oppressive algorithmic surveillance, the total absence of equitable appeal mechanisms, and the ruthless externalization of all operational risks. This operational reality stands in stark contrast to the decent work guidelines outlined in the ILO WESO 2021 report, necessitating urgent structural reforms.

***Policy Recommendations***

Addressing the profound decent work deficits in the gig economy requires holistic, multi-stakeholder interventions guided by the normative principles of the ILO WESO 2021 report, the urgent ratification of ILO Convention No. 193 (2026), and robust Economic Law frameworks. Based on the empirical findings, this study proposes the following targeted recommendations:

1. **For the State (Government of Indonesia):** There is an urgent imperative to legally redefine the boundaries of "partnership" (*kemitraan*) contracts to eliminate regulatory arbitrage. The government must draft specialized Economic Law regulations that aggressively pierce the veil of "bogus self-employment by ratifying and incorporating the core articles of ILO Convention No. 193 into national legislation.." This reform must encompass three core elements:
    a. **Standardization of Partnership Contracts:** Mandating standardized digital contracts that explicitly prohibit unilateral, algorithmic tariff reductions without tripartite consultation.
    b. **Guaranteed Economic Floors:** Instituting a sector-specific minimum wage floor that calculates "standby time" (waiting for orders) as active working hours, ensuring compensation aligns with local living costs.
    c. **State-Mandated Welfare:** Compelling platforms to fully subsidize mandatory occupational hazard insurance (BPJS Ketenagakerjaan) for all active workers, legally shifting the burden of risk from the individual back to the corporate entity.
2. **For Digital Platforms and Labor Unions:** Companies must immediately reform their algorithmic architectures to comply with international human rights standards.
    a. **Algorithmic Transparency:** Platforms must implement absolute algorithmic transparency in accordance with Article 8 of Convention No. 193, providing workers (and state regulators) with comprehensible, localized data regarding how ratings, bonuses, and suspensions are calculated.
    b. **Independent Dispute Resolution Tribunal:** Platforms must finance the establishment of an independent, tripartite dispute resolution tribunal (comprising platform representatives, labor union advocates, and government mediators) to satisfy Article 12 of Convention No. 193. This tribunal must replace automated suspensions, ensuring that drivers can challenge dismissals in front of a human panel without the burden of absolute proof falling solely upon them.For Digital Platforms: Companies must immediately reform their algorithmic architectures. This includes implementing

absolute algorithmic transparency (openly explaining how ratings, bonuses, and suspensions are calculated) and establishing an independent, human-mediated dispute resolution tribunal where drivers can challenge automated suspensions without the burden of absolute proof falling solely upon them.

Ultimately, technological transformation and algorithmic efficiency in the developing world must be strictly subordinated to universal human values. It is the fundamental responsibility of the state to ensure that artificial intelligence serves to elevate human dignity and equitable economic growth, rather than functioning as an instrument to commodify and exploit marginalized labor.

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# ANALYSIS OF THE PROVINCES' LEADING SECTORS ON THE ISLAND OF JAVA

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***Abstract***
*This study aims to determine the leading sectors in five provinces on the island of Java: DKI Jakarta, West Java, East Java, Central Java, and the Special Region of Yogyakarta. The data used in this study are secondary data for the 2020–2025 period sourced from the Central Statistics Agency (BPS). The analytical method used in this study is the Location Quotient (LQ). An analysis of leading sectors shows that DKI Jakarta has its highest-ranking leading sector in Business Services. West Java and Central Java have their highest-ranking leading sectors in Manufacturing. East Java has its highest-ranking leading sector in Accommodation and Food Services. Meanwhile, the Special Region of Yogyakarta has its highest-ranking leading sector in Educational Services.*
***Keywords****: Leading Sectors, Location Quotient, Business Services, Manufacturing, Educational Services*

## 1. Introduction

The direction of economic development in Indonesia is economic growth that creates public welfare. To achieve equitable economic growth, it is necessary to identify resources that can be harnessed to improve public welfare. All regions in Indonesia have different resources, needs, locations, and challenges; therefore, an analysis of leading sectors is required to determine the needs specific to each region.

Leading sectors are those that can influence and drive other sectors. Leading sectors are those that make the largest contribution to the Regional Gross Domestic Product (Huda, 2021). To ensure a region's economic growth, it is necessary to analyse the region's leading sectors. Every region in Indonesia possesses potential and resources that can be harnessed to develop a thriving sector. Therefore, it is crucial to analyse leading sectors to help formulate appropriate, well-targeted policies for that region.

Economic development has not been evenly distributed across all regions; for example, Java dominates the national economy. The majority of economic activities take place on Java, giving the island a dominant role in Indonesia's economy. Based on data from the Central Statistics Agency (BPS) for 2025, the contribution of the provincial GRDP on Java accounts for 56.93% of the national Gross Domestic Product (GDP). This indicates that Java possesses significant advantages and potential, necessitating optimal management.

## 2. Literature Review

### *2.1 Gross Domestic Product (GDP)*

Gross Domestic Product (GDP) is the value of goods and services produced within a country over the course of a year (Silitonga, 2021). GDP is divided into two categories: nominal GDP and real GDP. Nominal GDP is the value of goods and services produced by a country during a given period, calculated using the prices prevailing at that time (BPS, 2025). Real GDP, on the other hand, is the value of goods and services produced by a country in a given year, calculated using the prices of a specific year as the base year (BPS, 2025).

### *2.2 Calculation of Gross Domestic Product*

GDP can be calculated using three approaches: the expenditure approach, the income approach, and the production approach. The Gross Domestic Product (GDP) calculated using the expenditure approach is derived from the total final expenditure on goods and services over the course of a year, consisting of final consumption, investment, government spending, and net exports (BPS, 2025b). Gross Domestic Product (GDP) calculated using the income

approach is derived from the income earned by the factors of production involved in a country's production process over the course of a year. The income in question includes wages, interest, rent, and profits (Silitonga, 2021). The production approach calculates GDP as the total value of goods and services produced across a country's economic sectors during a specific period, expressed in currency (BPS, 2025b).

GDP calculations are classified into two types: current and constant prices. Gross Domestic Product (GDP) at current prices is the value added of goods and services produced by all economic sectors in a country during a specific period. GDP calculations at current prices use the prices prevailing during that period (BPS, 2025). Gross Domestic Product (GDP) at constant prices is the value added of goods and services produced by all sectors in a country during a specific period. GDP calculations at constant prices use a specific base year (BPS, 2025).

In this study, the GDP data used are constant-price figures sourced from the Central Statistics Agency (BPS) and compiled using the production approach. The use of constant prices aims to avoid the effects of inflation, enabling comparisons of value added across sectors and provinces to be made more objectively and accurately.

### *2.3 Leading Sectors*

Flagship sectors are those that can serve as the primary driving force behind a region's economy (Hajeri et al., 2015). This strength is generally supported by the availability of adequate human resources, which creates a competitive advantage in specific fields. Leading sectors play a vital role in a region's economic growth. Their key roles include driving output growth, creating employment opportunities, and contributing to a region's revenue.

Location Quotient (LQ) analysis is a technique used to assess the relative advantage of an economic sector in a region by comparing the proportion of that sector's contribution to the region's total GRDP with the proportion of the same sector in a reference area, such as the national or provincial level (Basorudin et al., 2021). Through LQ analysis, economic sectors can be classified into base sectors and non-base sectors. Base sectors are those that possess a comparative advantage and have the potential to serve as the primary drivers of regional economic growth, as they can generate output that meets the region's own needs. In contrast, non-base sectors play a greater role in meeting the region's internal needs and are highly dependent on local demand (Negara and Putri, 2020). Quantitatively, leading sectors or base sectors are indicated by an LQ value greater than one (LQ > 1); non-base sectors have an LQ value less than one (LQ < 1); while an LQ value equal to one (LQ = 1) indicates that the sector's role is in a state of balance between the region's internal and external needs (Ariani et. Al, 2021).

## 3. Research Methods

This study employs a quantitative descriptive research design. This approach was chosen because the analysis was conducted systematically using objective calculation techniques based on published data. The study aims to identify leading sectors in five provinces on the island of Java, including DKI Jakarta, West Java, East Java, Central Java, and the Special Region of Yogyakarta, using the Location Quotient (LQ) method.

### *3.1 Location Quotient (LQ)*

The Location Quotient (LQ) is an analytical tool used to identify leading sectors based on economic activities in a specific region. The Location Quotient (LQ) is based on the concepts of base and non-base sectors. A base sector is an economic sector that operates within a region and can meet its own needs (Mubarok, 2020). In addition to meeting its own needs, the base sector can also export the output of economic activities operating within its region.

The non-base sector comprises economic sectors capable of meeting their own needs. Although capable of meeting their own needs, non-base sectors are unable to export the output of economic activities operating within their region (Negara and Putri, 2020).

This base concept posits that the growth and development of a region are significantly influenced by the base sector capable of driving the region's economy. Furthermore, when the base sector within the region expands its operations, this will have a significant impact on the region's economy. The sector's competitive advantage is generally supported by the availability of capital, labor, and technological advancements (Basorudin et al., 2021). Leading sectors are also interconnected with other sectors in the economy, allowing them to reinforce one another through input-output relationships. Leading sectors are identified using the Location Quotient (LQ) method, as follows (Ariani, et. Al, 2021):

$$LQ_{ijt} = \frac{\frac{S_{ijt}}{S_{jt}}}{\frac{N_{it}}{N_t}}$$

Note:

$LQ_{ijt}$ =Location Quotient for sector i in province j in year t
$S_{ijt}$ = GRDP of sector i in province j in year t
$S_{jt}$ = Total GRDP of province j in year t
$N_{it}$ = GDP of sector i in year t
$N_t$ = Total national GDP in year t

The results of the Location Quotient (LQ) calculation can be categorized as follows:

An LQ value greater than one (LQ > 1) indicates that the sector is a base sector that serves as a source of economic growth in a region. This sector has a comparative advantage because it not only meets the needs of its own region but also has the potential to distribute its output to other regions.

An LQ value equal to one (LQ = 1) indicates that the sector falls into the non-base category. Production in this sector is sufficient to meet the region's internal needs but has not yet demonstrated the ability to generate a surplus for marketing outside the region.

An LQ value of less than one (LQ < 1) indicates that the sector is classified as non-basic with a low level of self-sufficiency. Its production is not yet sufficient to meet the region's needs, so it still requires imports.

## 4. Research Findings and Discussion

The provinces on the island of Java have several economic sectors performing quite well and serving as key pillars of regional economic activity. These sectors can be categorised as leading sectors because they play a significant role in shaping the economic structure of the provinces on the island of Java and contribute to the region's economic development.

Each province has different leading sectors, as each region possesses distinct comparative advantages determined by the availability of natural resources, the quality of human resources, infrastructure, geographic location, and regional development policies.

Leading sectors are those that drive economic growth in a province (Masruri et al., 2021). In this study, the Location Quotient (LQ) method was used to analyze leading sectors. The LQ method involves comparing a sector's contribution in a specific province to the province's total GRDP. A

sector is considered a leading sector if its LQ value is greater than 1; if its LQ value is less than 1, it is not classified as a leading sector in that province.

### *4.1 Leading Sectors of DKI Jakarta Province*

Research findings indicate that the largest leading sector is corporate services, with an average LQ value of 4.257 during the observation period. The corporate services sector has consistently been a leading sector every year. This sector maintains its status as a leading sector year after year because DKI Jakarta is home to the headquarters of many major corporations operating in Indonesia. As a city teeming with corporate headquarters, DKI Jakarta has a relatively high demand for corporate services.

The financial and insurance services sector has an LQ value of 2.578 and has consistently ranked as a leading sector year after year during the 2020–2025 period. This sector has been able to maintain its leading position year after year because the Special Capital Region of Jakarta serves as the center of Indonesia's financial system, as evidenced by the presence of Bank Indonesia (the central bank), the Financial Services Authority (OJK), and numerous other financial institutions operating in the region.

The real estate sector has an LQ value of 2.069 and is projected to be a consistently leading sector each year during the 2020–2025 period. This sector is expected to remain a leading one year after year, as the Special Capital Region of Jakarta has strong demand for real estate.

**Table1. Leading Sectors of DKI Jakarta Province**

| No | Sector | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average LQ |
|---|---|---|---|---|---|---|---|---|
| 1 | Construction | 1.116 | 1.083 | 1.183 | 1.053 | 1.054 | 1.047 | 1.072 |
| 2 | Wholesale and retail trade; Repair of automobiles and motorcycles | 1.126 | 1.132 | 1.267 | 1.150 | 1.175 | 1.174 | 1.152 |
| 3 | Accommodation and food services | 1.475 | 1.543 | 1.651 | 1.499 | 1.499 | 1.526 | 1.507 |
| 4. | Information and communication | 2.071 | 2.024 | 2.003 | 2.002 | 1.954 | 1.915 | 1.995 |
| 5. | Financial and insurance services | 2.617 | 2.573 | 2.800 | 2.565 | 2.585 | 2.581 | 2.578 |
| 6. | Real estate | 2.105 | 2.078 | 2.285 | 2.067 | 2.051 | 2.034 | 2.069 |
| 7. | Business services | 4.475 | 4.420 | 4.719 | 4.228 | 4.092 | 4.037 | 4.257 |
| 8. | Educational services | 1.434 | 1.440 | 1.568 | 1.420 | 1.430 | 1.454 | 0.998 |
| 9. | Health care and social services | 1.488 | 1.452 | 1.692 | 1.559 | 1.523 | 1.515 | 1.434 |
| 10. | Other services | 2.026 | 1.941 | 2.240 | 2.060 | 1.981 | 1.954 | 1.513 |

*Source: data processed*

The corporate services sector in DKI Jakarta Province is significantly stronger than that in other provinces. In contrast, the corporate services sectors in West Java, East Java, Central Java, and the Special Region of Yogyakarta are not leading sectors, as indicated by average LQ values below 1. This may be because DKI Jakarta Province is dominated by large corporations and office complexes closely tied to the corporate services sector.

The financial and insurance services sector in DKI Jakarta Province also significantly outperforms that of other provinces. In contrast, the financial and insurance services sectors in West Java, East Java, Central Java, and the Special Region of Yogyakarta are not leading sectors, as evidenced by their average LQ values of less than 1. This may be because the Special

Capital Region of Jakarta serves as the national financial hub, closely linked to the financial and insurance sectors there.

The real estate sector in DKI Jakarta Province has an average LQ of 2.069, which is lower than the average LQ in the Special Region of Yogyakarta, at 2.349. This may be due to land constraints in DKI Jakarta Province, even though this sector also performs well there. This sector excels in DKI Jakarta due to its promising prospects, as the province serves as a metropolitan center with a high volume of economic activity. In the Special Region of Yogyakarta, the sector is supported by lifestyle and environmental conditions that are more conducive to residential living. In other provinces, this sector is not a leading sector, as evidenced by average LQ values below 1.

### *4.2 Leading Sectors of West Java Provinces*

The manufacturing sector has an LQ value of 1.986 and has consistently been a leading sector every year during the 2020–2025 period. This sector has consistently maintained its leading position year after year due to its significant share of West Java Province's GRDP. This is attributed to the substantial scale of manufacturing activities and the large number of manufacturing industries in West Java Province.

The transportation and warehousing sector has an average LQ value of 1.133 and has consistently be a leading sector year after year during the 2020–2025 period. This sector has consistently maintained its leading position because West Java Province boasts diverse geographical features, ranging from lowlands to highlands and even mountains. These geographical conditions enable West Java Province to develop its tourism potential. The tourism sector is closely tied to tourists, and tourism activities also require transportation for those visiting West Java Province.

The other services sector has an average LQ value of 1.120 and is poised to be a consistently leading sector year after year during the 2020–2025 period. This sector can remain a consistently leading one due to West Java Province's large population, projected to reach 50,759 thousand people by 2025. As a result, West Java Province has a consumer base that requires additional services, such as haircuts, laundry, and other daily necessities.

**Table 2. Leading Sectors of West Java Provinces**

| No | Sector | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average LQ |
|---|---|---|---|---|---|---|---|---|
| 1 | Manufacturing | 1.971 | 1.978 | 2.008 | 2.011 | 1.997 | 1.947 | 1.986 |
| 2 | Water supply, waste management, wastewater treatment, and recycling | 0.974 | 1.013 | 1.002 | 0.981 | 1.020 | 1.036 | 1.004 |
| 3 | Wholesale and retail trade; automobile and motorcycle repair | 1.100 | 1.080 | 1.061 | 1.057 | 1.058 | 1.051 | 1.068 |
| 4. | Transportation and warehousing | 1.230 | 1.184 | 1.092 | 1.064 | 1.101 | 1.127 | 1.133 |
| 5. | Other services | 1.159 | 1.139 | 1.139 | 1.110 | 1.093 | 1.081 | 1.120 |

*Source: data processed*

The manufacturing sector in West Java Province is significantly stronger than that of other provinces. The manufacturing sector in West Java Province has an average LQ value of 1.986. This is likely due to the presence of large manufacturing industrial zones in West Java Province. In Central Java Province, the manufacturing sector is also a leading sector, with an average LQ value of 1.541. In East Java Province, the manufacturing sector is a leading sector with an

average LQ value of 1.426. In DKI Jakarta and the Special Region of Yogyakarta, this sector is non-core, as indicated by an average LQ value below 1.

The transportation and warehousing sector in West Java Province is significantly stronger compared to other provinces. The transportation and warehousing sector in West Java Province has an average LQ value of 1.133. This is likely due to the public's transportation needs and the sector's role as a distribution channel for products from the manufacturing industry. In the Special Region of Yogyakarta, the transportation and warehousing sector is also a leading sector, with an average LQ value of 1.058. In the Special Capital Region of Jakarta, East Java, and Central Java, this sector is non-core, as indicated by an average LQ value below 1.

The other services sector in West Java Province is not the leading sector, with an LQ value of 1.120. This is the case even though West Java Province has a large consumer base, as the province with the largest population; however, its competitive advantage is smaller than those of DKI Jakarta Province and the Special Region of Yogyakarta. The other service sector in DKI Jakarta Province has an average LQ value of 2.000. In the Special Region of Yogyakarta, this sector has an average LQ value of 1.421. In the East Java and Central Java Provinces, this sector is non-core, as indicated by an average LQ value below 1.

### *4.3 Leading sectors of East Java Provinces*

The accommodation and food and beverage sector has an average LQ value of 1.723 and has consistently been a leading sector year after year during the 2020–2025 period. This sector has consistently maintained its status as a leading one because East Java Province boasts several beautiful tourist destinations that attract visitors. The influx of tourists to East Java Province will inevitably boost demand for lodging and food and beverage services, including hotels and other accommodations.

The manufacturing sector has an average LQ value of 1.426 and is expected to consistently be a leading sector year after year during the 2020–2025 period. A key factor contributing to this sector's status as a leading sector in East Java Province is the presence of active manufacturing industries within the province.

The wholesale and retail trade and automobile and motorcycle repair sector has an average LQ value of 1.381. It is poised to remain a consistently leading sector year after year during the 2020–2025 period. The factor driving this sector's consistent leadership is its significant contribution to East Java Province's Regional Gross Domestic Product (PDRB), made possible by the availability of raw materials and strong market demand. Within this sector, the dominant subsector is wholesale and retail trade—not the automobile and motorcycle repair subsector. This subsector encompasses a wide range of goods traded in general markets, including daily necessities.

**Table 3. Leading Sectors of East Java Provinces**

| No | Sector | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average LQ |
|---|---|---|---|---|---|---|---|---|
| 1 | Manufacturing | 1.417 | 1.413 | 1.426 | 1.420 | 1.436 | 1.443 | 1.426 |
| 2 | Water supply, waste management, and recycling | 1.131 | 1.135 | 1.120 | 1.100 | 1.112 | 1.136 | 1.122 |
| 3 | Wholesale and retail trade; repair of automobiles and motorcycles | 1.340 | 1.377 | 1.389 | 1.402 | 1.401 | 1.378 | 1.381 |
| 4. | Accommodation and food services | 1.791 | 1.772 | 1.724 | 1.695 | 1.673 | 1.682 | 1.723 |
| 5. | Information and communication | 1.048 | 1.046 | 1.011 | 1.003 | 0.994 | 0.985 | 1.015 |

*Source: data processed*

The accommodation and food and beverage sector in East Java Province ranks as the top priority among accommodation and food and beverage sectors in other provinces. This is likely due to the presence of attractive tourist destinations in East Java Province, which are closely linked to the accommodation and food and beverage sector. In DKI Jakarta Province, this sector is also a priority sector, with an average LQ value of 1.532. In Central Java Province, this sector is also a leading sector with an average LQ value of 1.168. In the Special Region of Yogyakarta, this sector has an average LQ value of 2.898. The accommodation and food and beverage sector in West Java Province is a non-leading sector, as indicated by an average LQ value below 1.

The manufacturing sector in East Java Province is a leading sector with an average LQ value of 1.426. However, when compared to the manufacturing sectors in West Java and Central Java Provinces, the sector in East Java is not the most prominent. This may be because industrial activity is more extensive in West Java Province. The manufacturing sector in West Java has an average LQ value of 1.986. In Central Java Province, this sector has an average LQ value of 1.541. In the Special Capital Region of Jakarta and the Special Region of Yogyakarta, this sector is non-core, as indicated by an average LQ value below 1.

The wholesale and retail trade and automobile and motorcycle repair sectors in East Java Province are leading sectors, with average LQ values of 1.381. Compared with the wholesale and retail trade and automobile and motorcycle repair sectors in other provinces, the sector in East Java Province ranks highest. This is likely due to the availability of raw materials that can be processed into finished goods with higher market value. In DKI Jakarta Province, this sector is a leading sector with an average LQ value of 1.171. In Central Java Province, this sector is also a leading sector with an average LQ value of 1.071. In West Java Province, this sector is a leading sector with an average LQ value of 1.068. In the Special Region of Yogyakarta, this sector is non-core, as indicated by an average LQ value below 1.

### *4.4 Leading sectors of Central Java Provinces*

The manufacturing sector has an average LQ value of 1.541 and is projected to remain a consistently leading sector throughout the 2020–2025 period. The factor that makes the manufacturing sector a consistently leading sector is the availability of raw materials or resources that can be utilized and processed into finished products with higher added value. Within this sector, the food and beverage industry is dominant because its products are necessities that cannot be replaced or postponed.

The education services sector has an average LQ value of 1.242 and has consistently been a leading sector year after year during the 2020–2025 period. The factors that make this sector a consistent leader year after year are the presence of universities and equivalent higher education institutions spread throughout Central Java Province, as well as the large student population pursuing education in the province.

The accommodation and food and beverage sector has an average LQ value of 1.168 and is poised to remain a consistently leading sector year after year during the 2020–2025 period. The factor driving this sector's success is the presence of resources that attract many visitors, thereby increasing demand for accommodation and food and beverage services.

**Table 4. Leading Sectors of Central Java Provinces**

| No | Sector | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average LQ |
|---|---|---|---|---|---|---|---|---|
| 1 | Manufacturing | 1.577 | 1.560 | 1.540 | 1.536 | 1.526 | 1.505 | 1.541 |
| 2 | Construction | 0.992 | 1.035 | 1.030 | 1.042 | 1.053 | 1.079 | 1.039 |
| 3 | Wholesale and retail trade; Repair of automobiles and motorcycles | 1.076 | 1.087 | 1.071 | 1.072 | 1.067 | 1.056 | 1.071 |

| No | Sector | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average LQ |
|---|---|---|---|---|---|---|---|---|
| 4. | Accommodation and food services | 1.101 | 1.122 | 1.169 | 1.183 | 1.201 | 1.235 | 1.168 |
| 5. | Educational services | 1.190 | 1.189 | 1.197 | 1.247 | 1.307 | 1.323 | 1.242 |

*Source: data processed*

The manufacturing sector in Central Java Province is a leading sector with an average LQ value of 1.541. This sector has become a leading one due to the availability of raw materials that can be processed into higher-value finished goods. Compared to other provinces, the manufacturing sector in Central Java Province is a leading sector, though it does not rank highest. In West Java Province, the manufacturing sector has an average LQ value of 1.986. In East Java Province, the manufacturing sector has an average LQ value of 1.426. The manufacturing sectors in DKI Jakarta and the Special Region of Yogyakarta are non-core sectors, as indicated by average LQ values below 1.

The education services sector in Central Java Province is a leading sector with an average LQ value of 1.242. This may be due to the presence of universities spread throughout Central Java Province. Compared with the education sectors in other provinces, the education services sector in Central Java is not the leading one. This is likely because the education sector is larger in the Special Region of Yogyakarta, with an average LQ value of 2.882. In DKI Jakarta, the education services sector has an average LQ value of 1.458. The education services sectors in West Java and East Java are non-core sectors.

The accommodation and food services sector in Central Java Province is a leading sector, with an average LQ value of 1.168. This is due to the presence of resources that can serve as tourist destinations related to the accommodation and food services sector. Compared with the accommodation and food and beverage sectors in other provinces, Central Java's sector is a leading one but not the highest-ranking. In the Special Capital Region of Jakarta and East Java, the accommodation and food and beverage sector is a leading sector. In West Java and the Special Region of Yogyakarta, this sector is non-core, as indicated by an average LQ value below 1.

### *4.5 Leading Sectors of the Special Region of Yogyakarta*

The education services sector has the highest average LQ value in the Special Region of Yogyakarta at 2.882, and this sector is poised to remain a consistently leading sector year after year during the 2020–2025 period. The factor driving this sector's consistent strength is the concentration of national universities located in the Special Region of Yogyakarta. Consequently, student spending on education is also a reason why this sector has consistently been a leading sector year after year.

The real estate sector has an average LQ value of 2.349 and is projected to remain a consistently leading sector year after year during the 2020–2025 period. The factors driving this sector's consistent strength are linked to the Special Region of Yogyakarta serving as a destination for many students from various regions to pursue their studies, a trend that goes hand in hand with the growth of the rental housing and student housing markets. Since every student from other regions needs a place to rent while attending college, this sector has become a leading sector in the Special Region of Yogyakarta. In addition to its connection to education, this sector is also linked to the tourism industry, which is equally thriving in the Special Region of Yogyakarta. A comfortable living environment adds value to the real estate sector in the Special Region of Yogyakarta.

The health services and social activities sector has an average LQ value of 2.225 and is poised to be a consistently leading sector year after year during the 2020–2025 period. The factor driving this sector's consistent leadership is the availability of hospitals that meet

national standards and serve as referral hospitals located in the Special Region of Yogyakarta. Not only residents of the Special Region of Yogyakarta but also patients from various other regions are referred to hospitals located in the Special Region of Yogyakarta.

**Table 5. Leading Sectors of the Special Region of Yogyakarta**

| No | Sector | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | Average LQ |
|---|---|---|---|---|---|---|---|---|
| 1 | Water supply, waste management, sewage, and recycling | 1.117 | 1.112 | 1.110 | 1.095 | 1.088 | 1.069 | 1.098 |
| 2 | Transportation and warehousing | 1.132 | 1.094 | 1.077 | 1.041 | 1.018 | 0.985 | 1.058 |
| 3 | Accommodation and food and beverage services | 2.885 | 2.920 | 2.925 | 2.896 | 2.898 | 2.863 | 2.898 |
| 4. | Information and communication | 2.180 | 2.330 | 2.235 | 2.166 | 2.102 | 2.018 | 2.172 |
| 5. | Real estate | 2.379 | 2.276 | 2.301 | 2.352 | 2.390 | 2.393 | 2.349 |
| 6. | Public administration, defense, and mandatory social security | 2.032 | 1,987 | 1.991 | 2.010 | 2.013 | 2.052 | 2.014 |
| 7. | Educational services | 2.771 | 2.843 | 2.850 | 2.932 | 2.943 | 2.956 | 2.882 |
| 8. | Health care and social services | 2.353 | 2.177 | 2.200 | 2.234 | 2.179 | 2.205 | 2.225 |
| 9. | Other services | 1.257 | 1.468 | 1.540 | 1.491 | 1.405 | 1.366 | 1.421 |

*Source: data processed*

The education services sector in the Special Region of Yogyakarta is a leading sector with an average LQ value of 2.882. This is likely due to the presence of many national universities in the Special Region of Yogyakarta. Compared to the education services sectors in other provinces, the one in the Special Region of Yogyakarta ranks as the highest-performing leading sector. In the Special Capital Region of Jakarta and Central Java, the education services sector is a leading sector. In West Java and East Java Provinces, this sector is non-core, as indicated by an average LQ value below 1.

The real estate sector in the Special Region of Yogyakarta is a leading sector with an average LQ value of 2.349. This is likely due to the large number of out-of-town students temporarily residing in the province during their studies, which is linked to the real estate sector. Furthermore, this is related to the pace of life and comfortable living conditions. The real estate sector in the Special Capital Region of Jakarta is also a leading sector, with an average LQ value of 2.069. In West Java, East Java, and Central Java, this sector is non-core, as indicated by an average LQ value below 1.

The health services and social activities sector in the Special Region of Yogyakarta is a leading sector with an average LQ value of 2.225. This is due to the presence of health facilities that meet national standards, which are closely linked to the health services and social activities sector. In the Special Capital Region of Jakarta, the health services and social activities sector is also a leading sector, with an average LQ value of 1.513. In West Java, East Java, and Central Java, this sector is non-core, as indicated by an average LQ value below 1.

## 5. Conclusion

This study aims to analyze the leading sectors of provinces on the island of Java. Specifically, this study aims to analyse the contribution of these sectors to provincial GRDP on the island of Java and to identify the leading sectors in provinces on the island using the Location Quotient analysis tool.

The results of the Location Quotient (LQ) analysis show that each province has diverse leading sectors. The Special Capital Region of Jakarta has the highest-ranked leading sector, namely the business services sector. West Java and Central Java provinces have manufacturing as their leading sector, while East Java province has the highest-ranked leading sector: accommodation and

food services. Meanwhile, the Special Region of Yogyakarta has the education services sector as its leading sector. This is due to the concentration of major universities in the Special Region of Yogyakarta. Each province's leading sector is significantly influenced by its geography, resource availability, and the concentration of specific industries within it.

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# WANODYATAMA IN THE DIGITAL ERA: DIGITALIZATION, GENDER EMPOWERMENT, YOGYAKARTA WOMEN-OWNED MSMEs

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***Abstract***
*Digital transformation has become an essential strategy for improving the competitiveness of Micro, Small, and Medium Enterprises (MSMEs). However, digital adoption remains uneven, particularly among women entrepreneurs who continue to face structural and socio-economic barriers. This study aims to examine the effects of digitalization and gender empowerment on the performance of women-owned MSMEs in the Special Region of Yogyakarta and investigate their interaction. Furthermore, the study explores how the local cultural philosophy of Wanodyatama, Saguh Ora Mingkuh strengthens women's resilience and adaptability during digital transformation. This study employs a mixed-methods sequential explanatory design, combining quantitative panel data analysis using secondary data from 2019–2024 with qualitative in-depth interviews involving women-owned MSMEs actively engaged in digital transformation. This study employs a mixed-methods sequential explanatory design, combining quantitative analysis using multiple linear regression based on secondary data from 2019–2024 with qualitative in-depth interviews involving women-owned MSME entrepreneurs actively engaged in digital transformation. Quantitative findings are complemented through thematic analysis of interview data to explain how the local philosophy of Wanodyatama, Saguh Ora Mingkuh is reflected in women's resilience, adaptability, and persistence throughout the digitalization process. The findings demonstrate that the interaction between digitalization and gender empowerment significantly improves business performance, confirming a strong synergistic effect. Furthermore, qualitative evidence highlights that the local cultural philosophy of Wanodyatama, Saguh Ora Mingkuh provides an essential foundation for women's resilience and adaptability during digital transformation. The study offers theoretical contributions to digital entrepreneurship and provides practical recommendations for designing integrated, gender-responsive MSME empowerment policies.*
***Keywords****: MSME performance, digitalization, gender empowerment, synergy effect, Wanodyatama*

## 1. Introduction

Digital transformation has become one of the primary drivers of global economic development, fundamentally reshaping the way businesses operate and compete (Verhoef et al., 2021; Vial, 2019). The rapid advancement of digital technologies, including e-commerce, social media, digital payment systems, and information technology-based management systems, has enabled businesses to improve operational efficiency, expand market access, and strengthen competitiveness (Nambisan, 2017; Verhoef et al., 2021). For micro, small, and medium enterprises (MSMEs), digitalization is no longer merely an innovation but a strategic necessity to survive and grow in the digital economy. Previous studies have demonstrated that the adoption of digital technology significantly improves productivity, innovation, and business sustainability (Anatan & Nur, 2023; Falentina et al., 2021; Sagala & Őri, 2024).

In Indonesia, MSMEs play a strategic role in the national economy by generating employment opportunities, supporting household income, and driving regional economic growth (Tambunan, 2011, 2019). Despite their substantial contribution, the digital transformation of MSMEs remains uneven due to several challenges, including limited digital literacy, inadequate access to technology, financial constraints, and insufficient human resource capabilities (Anatan & Nur, 2023; Widyastuti et al., 2023). These barriers reduce the ability of many MSMEs to maximize the benefits of digital technologies, thereby limiting their business performance and competitiveness (Sagala & Őri, 2024; Tambunan, 2019).

Besides technological challenges, women's empowerment has become an important pillar of inclusive economic development (Duflo, 2012; Kabeer, 1999). Women entrepreneurs contribute significantly to household economic resilience and the sustainability of MSMEs. Nevertheless, many women continue to experience barriers in accessing capital, financial resources, technology, entrepreneurial training, and business networks (Tambunan, 2011; Ughetto et al., 2020; UN Women, 2023). These limitations often reduce their opportunities to adopt digital technologies and improve business performance (McAdam et al., 2020; Susanti et al., 2023). Strengthening women's empowerment is therefore expected to enhance women's adaptability, innovation, business competitiveness, and long-term sustainability while enabling them to utilize digital technology more effectively (Pergelova et al., 2019; World Bank, 2024).

Although previous studies have examined digitalization and women's empowerment, most have analyzed these factors separately (McAdam et al., 2020; Susanti et al., 2023; Ughetto et al., 2020). Consequently, limited empirical evidence explains how digitalization and gender empowerment interact to influence the performance of women-owned MSMEs. Conceptually, integrating technological adoption with women's empowerment has the potential to generate a stronger synergistic effect than examining each factor independently, as empowered women have been shown to leverage digital technologies more intensively than their counterparts (Pergelova et al., 2019). Understanding this interaction is essential to developing more comprehensive strategies for improving MSME performance.

The Special Region of Yogyakarta (DIY) provides a unique context for this study because of its large number of MSMEs, the active participation of women entrepreneurs, and its strong local cultural values. Empirical evidence from the province shows that internet use has enabled micro and small enterprises to engage in the digital economy and has significantly improved their labour productivity and exports (Falentina et al., 2021). According to UN Women (2023), one out of every three women worldwide owns a microbusiness; however, women entrepreneurs generally earn lower profits than men. In Yogyakarta, the local philosophy of "*Wanodyatama, Saguh Ora Mingkuh*" reflects women's resilience, courage, adaptability, and perseverance in overcoming challenges, including those arising from digital transformation. Nevertheless, empirical evidence regarding how these cultural values strengthen digital adoption and improve MSME performance remains limited. In the context of regional economic dynamics, digitalization, democracy, and tourist inflows have been shown to collectively boost economic growth across Indonesian provinces (Budisusila et al., 2026a). Furthermore, the utilization of various digital media forms shapes the competitive market structure among local tourism villages in Yogyakarta, emphasizing the strategic importance of digital adoption for micro-enterprises (Budisusila & Handoko, 2023).

Unlike previous studies, this research integrates digitalization and gender empowerment within a single comprehensive analytical framework by examining the interaction (synergy effect) between these variables on women-owned MSME performance. Furthermore, this study adopts a mixed-methods sequential explanatory approach that combines quantitative panel data analysis with qualitative in-depth interviews, allowing statistical findings to be strengthened through contextual explanations (Creswell & Creswell, 2018). The incorporation of the local philosophy of "*Wanodyatama, Saguh Ora Mingkuh*" also represents a distinctive contribution, enriching the discussion of women's entrepreneurship from a local cultural perspective.

Therefore, this study aims to analyze the influence of digitalization and gender empowerment on the performance of women-owned MSMEs in the Special Region of Yogyakarta. Specifically, it examines the interaction effect between digitalization and gender empowerment while exploring how the local values of "*Wanodyatama, Saguh Ora Mingkuh*" support resilient and high-performing women entrepreneurs. To achieve these objectives, this study employs a mixed-methods sequential explanatory approach by combining quantitative panel data analysis with qualitative in-depth interviews, providing both statistical evidence and contextual understanding. The findings are expected to enrich the academic literature on digital transformation, gender empowerment, and

MSME performance, provide practical guidance for women-owned MSMEs in optimizing digital technology for business development, and offer evidence-based recommendations for policymakers and MSME development institutions in designing more inclusive digital and gender-responsive empowerment programs.

## 2. Literature Review

### *2.1 Digitalization of MSMEs*

Digitalization refers to the integration of digital technologies into business activities to improve organizational performance and create new value (Verhoef et al., 2021; Vial, 2019). In the context of micro, small, and medium enterprises (MSMEs), digitalization includes the utilization of e-commerce platforms, digital marketing, electronic payment systems, cloud computing, and information technology-based management systems. The adoption of these technologies enables MSMEs to streamline business processes, reduce operational costs, enhance productivity, and expand market access beyond geographical boundaries (Falentina et al., 2021; Nambisan, 2017).

From the perspective of the Resource-Based View (RBV), digital technology represents a strategic organizational resource capable of generating sustainable competitive advantages when effectively integrated into business operations (Barney, 1991; Teece et al., 1997). Previous studies have consistently shown that digitalization improves business efficiency, innovation capability, and long-term competitiveness among MSMEs (Anatan & Nur, 2023; Sagala & Őri, 2024; Susanti et al., 2023). In the specific context of Yogyakarta, Falentina et al. (2021) provide causal evidence that internet utilization improves the labour productivity and export performance of micro and small enterprises. Therefore, digital transformation has become a strategic necessity rather than merely a technological innovation, particularly for MSMEs operating in increasingly competitive markets (Verhoef et al., 2021). Recent studies highlight that digital transformation and e-marketplace adoption among traditional micro-businesses are strongly influenced by habit formation and social impact (Budisusila et al., 2026b). Moreover, the integration of digital media serves as a vital instrument for micro-enterprises to navigate market competition and enhance business sustainability in rural ecosystems (Budisusila & Handoko, 2023).

### *2.2 Gender Empowerment*

Gender empowerment refers to the process of providing women with equal access to economic resources, education, technology, leadership opportunities, and decision-making authority. Conceptually, empowerment encompasses the expansion of women's resources, agency, and achievements (Kabeer, 1999), and is closely intertwined with economic development in a bidirectional relationship (Duflo, 2012). Women's empowerment plays a crucial role in promoting inclusive economic development by enhancing women's capacity to participate actively in entrepreneurial activities and business management.

Despite their significant contribution to economic development, women entrepreneurs continue to face multiple barriers, including limited access to financial capital, digital technology, entrepreneurial training, and professional business networks (Tambunan, 2011, 2019; Ughetto et al., 2020). These challenges often reduce their ability to utilise digital technologies and improve enterprise performance fully (McAdam et al., 2020). According to UN Women (2023) and the World Bank (2024), strengthening women's empowerment enhances innovation, adaptability, resilience, and business sustainability, enabling women entrepreneurs to respond more effectively to changing market conditions and technological advancement.

### *2.3 MSME Performance*

MSME performance represents the overall achievement of business objectives and reflects the ability of enterprises to maintain growth and competitiveness. Business performance is commonly evaluated using three major dimensions: financial performance,

operational performance, and market performance (Susanti et al., 2023).

Financial performance includes indicators such as revenue growth, profitability, and cost efficiency. Operational performance refers to productivity, innovation capability, and efficient resource utilization, while market performance reflects customer satisfaction, market expansion, and competitive positioning. Previous studies indicate that both technological capability and organizational capacity contribute significantly to improving MSME performance (Falentina et al., 2021; Susanti et al., 2023; Tambunan, 2019). Therefore, evaluating MSME performance requires a multidimensional approach rather than relying solely on financial indicators.

### *2.4 Synergy between Digitalization and Gender Empowerment*

Recent studies have independently demonstrated the positive contribution of digitalization and women's empowerment to MSME development (Anatan & Nur, 2023; Susanti et al., 2023; Ughetto et al., 2020). However, empirical research examining the interaction between these two variables remains relatively limited. Most previous studies have analyzed digital adoption and gender empowerment separately, resulting in fragmented explanations regarding their combined influence on business performance (McAdam et al., 2020; Ughetto et al., 2020).

This study proposes that digitalization and gender empowerment create a synergistic effect, whereby empowered women entrepreneurs are more capable of adopting and utilizing digital technologies effectively. This proposition is consistent with evidence that female entrepreneurs leverage the enabling effects of digital technologies more intensively than their male counterparts (Pergelova et al., 2019) and that digital entrepreneurship carries emancipatory potential for women in emerging economies (McAdam et al., 2020). Higher levels of digital literacy, leadership capacity, and decision-making authority enable women entrepreneurs to maximize the benefits of digital transformation, thereby producing greater improvements in business performance than either factor alone (Nambisan, 2017; Pergelova et al., 2019).

Furthermore, this research introduces the local cultural philosophy *of "Wanodyatama, Saguh Ora Mingkuh"* as an additional contextual perspective. This philosophy represents the resilience, courage, adaptability, and perseverance of women in the Special Region of Yogyakarta (DIY). Integrating this local value into the analytical framework enriches the understanding of how cultural characteristics support women entrepreneurs in navigating digital transformation and strengthening MSME performance. Accordingly, the novelty of this study lies in integrating digitalization, gender empowerment, and local cultural values within a mixed-methods framework to explain the performance of women-owned MSMEs.

### *2.5 Research Hypotheses*

H1 : Digitalization affects women-owned MSME performance.
H2 : Gender empowerment affects women-owned MSME performance.
H3 : Gender empowerment strengthens the effect of digitalization on women-owned MSME performance.
H4 : The local values of *Wanodyatama, Saguh Ora Mingkuh* strengthen the performance of women-owned MSMEs in the Special Region of Yogyakarta.

## 3. Research Methods

### *3.1 Research Design*

This study employs a mixed-methods sequential explanatory design (Creswell & Creswell, 2018). The study begins with quantitative analysis using time series data regression to examine the effects of digitalization and gender empowerment on the performance of women-owned Micro, Small, and Medium Enterprises (MSMEs). Subsequently, qualitative data are collected through in-depth interviews and field observations to explain, validate, and

enrich the quantitative findings. This approach also allows the researchers to explore the local cultural values of Wanodyatama, Saguh Ora Mingkuh that shape the resilience and adaptability of women entrepreneurs in the Special Region of Yogyakarta.

### *3.2 Research Location*

This research is conducted in the Special Region of Yogyakarta (Daerah Istimewa Yogyakarta/DIY), Indonesia, covering all regencies and municipalities. The region was selected because of its significant contribution of MSMEs to the regional economy, the increasing adoption of digital technologies among business actors (Falentina et al., 2021), and the strong participation of women in entrepreneurial activities. Furthermore, Yogyakarta possesses distinctive cultural values represented by Wanodyatama, Saguh Ora Mingkuh, making it an appropriate setting for examining the interaction between digitalization, gender empowerment, and MSME performance.

### *3.3 Variables*

The study consists of one dependent variable, two independent variables, and one interaction variable. The dependent variable is **MSME Performance (Perf)**, measured by business efficiency using the expenditure-to-revenue ratio based on data provided by Statistics Indonesia (BPS).

The independent variables include **Digitalization (DG)** and **Gender Empowerment (IPG)**. To examine the moderating relationship, this study also includes an interaction variable (**DG × IPG**). In addition, qualitative information is collected through interviews to explore women's experiences, challenges, and adaptive strategies in utilizing digital technology.

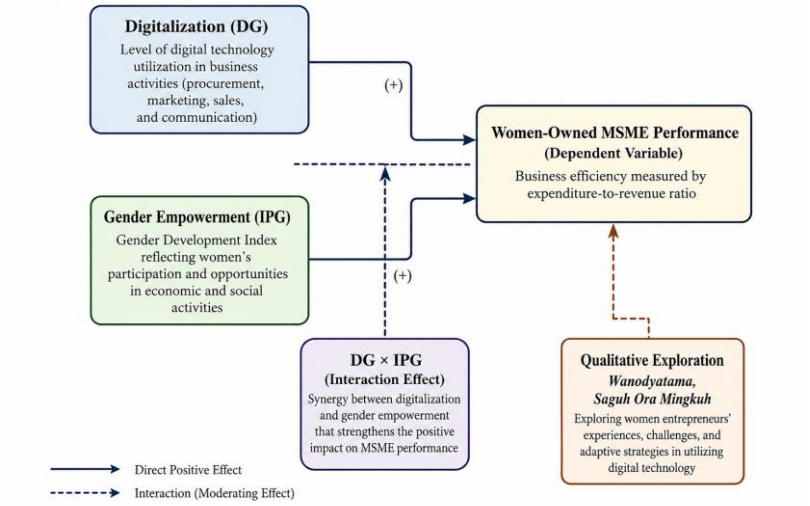



**Figure 1. Conceptual Framework**
*Source: Developed by the authors.*

Figure 1 illustrates the conceptual relationship among digitalization, gender empowerment, and women-owned MSME performance. The framework also highlights the interaction effect between digitalisation and gender empowerment, as well as a qualitative exploration of the local values of *Wanodyatama, Saguh Ora Mingkuh*.

**Table 1. Operational Definition of Variables**

| Variable | Symbol | Type | Measurement | Source |
|---|---|---|---|---|
| MSME Performance | Perf | Dependent | Expenditure-to-Revenue Ratio | BPS |
| Digitalization | DG | Independent | Digital technology utilization in procurement, marketing, sales, and communication | BPS, Regional Government Reports |

| Variable | Symbol | Type | Measurement | Source |
|---|---|---|---|---|
| Gender Empowerment | IPG | Independent | Gender Empowerment Index | BPS |
| Interaction Effect | DG × IPG | Moderating | Multiplication of DG and IPG | Authors' calculation |

*Source: Authors' compilation.*

### *3.4 Data Collection*

This study combines secondary quantitative data with primary qualitative data. The quantitative data consist of time series data obtained from official publications of Statistics Indonesia (BPS) and regional government reports covering the period from 2019 to 2024. These data provide information regarding MSME performance, digitalization, and gender development indicators across the Special Region of Yogyakarta.

The qualitative data are obtained through in-depth interviews with selected women entrepreneurs who have actively implemented digital technologies in managing their businesses. Informants are selected using purposive sampling to ensure that they possess substantial experience in digital entrepreneurship rather than merely using social media for promotion. The interviews explore their digital learning processes, adaptation to technological changes, challenges encountered, business impacts, and strategies for responding to shifting digital platforms. These narratives are expected to reveal the values of resilience, perseverance, and adaptability represented by the local philosophy of Wanodyatama, Saguh Ora Mingkuh.

To complement the interview data, field observations and documentation are also conducted. Throughout the research process, ethical principles are maintained by obtaining informed consent, ensuring voluntary participation, protecting participants' anonymity, and maintaining data confidentiality (Creswell & Creswell, 2018).

### *3.5 Data Analysis*

The quantitative data are analyzed using panel data regression to examine the influence of digitalization and gender empowerment on MSME performance (Baltagi, 2021).

The regression model is formulated as follows:

$$Perf_{it} = \beta_0 + \beta_1 DG_{it} + \beta_2 IPG_{it} + \beta_3 (DG_{it} \times IPG_{it}) + \varepsilon_{it}$$

This model is estimated using multiple linear regression analysis. Classical assumption tests, including normality, multicollinearity, heteroscedasticity, and autocorrelation, are conducted to ensure the validity of the regression model.

The qualitative interview data are analyzed using thematic analysis through coding, categorization, theme development, and interpretation (Braun & Clarke, 2006). The emerging themes are used to explain and strengthen the quantitative findings, particularly regarding how women entrepreneurs demonstrate resilience, persistence, and adaptive learning throughout the digital transformation process.

### *3.6 Research Findings and Discussion*

This section presents the results of the study, including descriptive statistics, classical assumption tests, and multiple linear regression analysis. The empirical findings are subsequently discussed by relating them to relevant theories and previous empirical studies.

**Table 2. Descriptive Statistics**

| Statistics | PERF | DG | IPG | DGIPG |
|---|---|---|---|---|
| Mean | 11.970000 | 25.613333 | 73.058333 | 1878.012 |
| Median | 11.040000 | 26.155000 | 72.520000 | 1942.805 |

| Statistics | PERF | DG | IPG | DGIPG |
|---|---|---|---|---|
| Maximum | 16.480000 | 49.650000 | 75.700000 | 3567.850 |
| Minimum | 10.780000 | 8.380000 | 71.050000 | 595.480 |
| Std. Dev. | 2.235522 | 14.499470 | 2.117436 | 1053.730 |
| Skewness | 1.700199 | 0.501921 | 0.350588 | 0.367681 |
| Kurtosis | 4.029195 | 2.419787 | 1.414990 | 2.267915 |
| Jarque–Bera | 3.155488 | 0.336087 | 0.750976 | 0.269177 |
| Probability | 0.206440 | 0.845317 | 0.686954 | 0.874076 |
| Sum | 71.820000 | 153.6800 | 438.3500 | 11268.07 |
| Sum Sq. Dev. | 24.98780 | 1051.174 | 22.41768 | 5551737 |
| Observations | 6 | 6 | 6 | 6 |

*Source: Processed data (2026).*

Table 2 presents the descriptive statistics of the variables used in this study. The average performance of women-owned MSMEs (PERF) during 2019–2024 was **11.97**, while the average digitalization level (DG) reached **25.61%**. The Gender Empowerment Index (IPG) had an average value of **73.06**, indicating a relatively stable level of gender empowerment throughout the observation period. Meanwhile, the interaction variable (DGIPG) recorded an average value of **1,878.01**, reflecting the combined influence of digitalization and gender empowerment. Overall, the descriptive statistics indicate an increasing trend in digitalization, while gender empowerment remained relatively stable over the study period. These descriptive findings provide an important foundation for the subsequent regression analysis, as they offer an initial overview of the characteristics and distribution of the research variables before examining their causal relationships.

### *3.7 Classical Assumption Test*

Classical assumption tests were conducted to ensure that the regression model satisfies the Ordinary Least Squares (OLS) assumptions before hypothesis testing. The tests include normality, autocorrelation, heteroskedasticity, and multicollinearity.

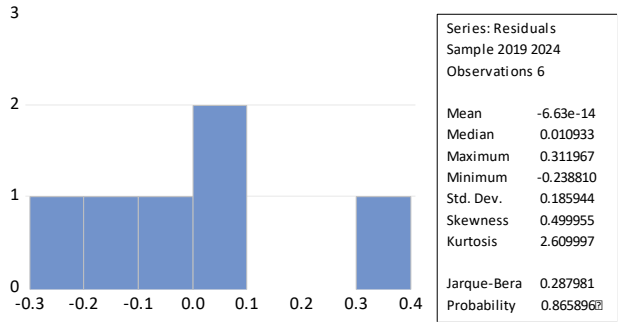



**Figure 2. Normality Test**
*Source: Processed data (2026).*

Figure 2 shows the histogram and Jarque–Bera normality test of the regression residuals. The Jarque–Bera probability value is 0.865896, which is greater than the significance level of 0.05. Therefore, the residuals are normally distributed, indicating that the regression model satisfies the normality assumption. Therefore, the regression model can be considered statistically appropriate for further hypothesis testing because the normality assumption has been fulfilled.

**Table 3. Classical Assumption Test Results**

| Test | Indicator | Result | Conclusion |
|---|---|---|---|
| Normality | Jarque–Bera Probability | 0.865896 | Normally distributed |
| Autocorrelation | Breusch–Godfrey Prob. Chi-Square | 0.0758 | No autocorrelation |

| | | | |
|---|---|---|---|
| Heteroskedasticity | Breusch–Pagan–Godfrey Prob. Chi-Square | 0.1685 | No heteroskedasticity |
| Multicollinearity | Correlation (DG–IPG) | 0.263599 | No multicollinearity |

*Source: Processed data (2026).*

The classical assumption test results indicate that the regression model satisfies all required assumptions. The Jarque–Bera probability value is greater than 0.05, confirming that the residuals are normally distributed. Likewise, the Breusch–Godfrey test shows no evidence of autocorrelation, while the Breusch–Pagan–Godfrey test indicates homoscedastic residuals. Furthermore, the correlation coefficient between Digitalization (DG) and Gender Empowerment (IPG) is only **0.263599**, which is well below the commonly accepted threshold of 0.80. Therefore, multicollinearity is not detected, and the regression model is considered appropriate for further analysis.

### *3.8 Multiple Linear Regression Analysis*

The multiple linear regression analysis was conducted to examine the effects of digitalization, gender empowerment, and their interaction on the performance of women-owned MSMEs in the Special Region of Yogyakarta.

**Table 4. Multiple Linear Regression Results**

| Variable | Coefficient | t-Statistic | Probability | Interpretation |
|---|---|---|---|---|
| Constant | 351.7973 | 10.25646 | 0.0094 | Significant |
| DG | -15.46784 | -11.64716 | 0.0073 | Significant |
| IPG | -4.781894 | -9.947157 | 0.0100 | Significant |
| DG × IPG | 0.216033 | 11.64646 | 0.0073 | Positive and significant |

*Source: Processed data (2026).*

Interestingly, the direct main effects of **Digitalization ($\beta=-15.46784, p<0.05$)** and **Gender Empowerment ($\beta=-4.781894, p<0.05$)** exhibit negative coefficients. In econometric panel regression models with interaction terms, the main effect coefficients represent the impact of a variable when the interacting partner equals zero. Economically, this suggests that adopting digital technologies without adequate empowerment and capacity building introduces initial adjustment costs, operational complexities, and resource burdens that temporarily decrease profit margins and efficiency. Similarly, increasing empowerment initiatives without adequate digital adoption may lead to overhead costs without immediate productivity gains.

However, the coefficient of the interaction term (DG×IPG) is **positive and statistically significant ($\beta=0.216033, p<0.05$).** This indicates a strong positive moderating effect: higher levels of gender empowerment enable women entrepreneurs to overcome the initial adoption barriers of digital technologies, ultimately turning digital tools into drivers of business efficiency and long-term competitiveness. This finding clearly indicates that the effectiveness of digitalization depends not only on technology adoption itself but also on the level of women's empowerment. Therefore, integrating digital transformation with gender empowerment is essential to achieving sustainable improvements in MSME performance.

**Table 5. Model Summary**

| Indicator | Value |
|---|---|
| R-squared | 0.993082 |
| **Adjusted R-squared** | **0.982704** |
| **F-statistic** | **95.69433** |
| **Prob(F-statistic)** | **0.010360** |

*Source: Processed data (2026).*

The regression results indicate that the interaction variable (**DG × IPG**) has a **positive and statistically significant** effect on the performance of women-owned MSMEs. The coefficient of **0.216033** with a probability value of **0.0073** (<0.05) indicates that gender

empowerment strengthens the positive contribution of digitalization to MSME performance. This finding suggests that women entrepreneurs with higher levels of empowerment are better able to utilize digital technologies to improve business performance.

The regression model also demonstrates a very high explanatory power. The **Adjusted R-squared value of 0.982704** indicates that approximately **98.27%** of the variation in MSME performance is explained by digitalization, gender empowerment, and their interaction. The remaining **1.73%** is explained by other variables outside the regression model.

Furthermore, the model is statistically significant as a whole. The **F-statistic value of 95.69433**, together with a **Prob(F-statistic) of 0.010360**, which is below the 5% significance level, indicates that digitalization, gender empowerment, and their interaction simultaneously have a significant effect on the performance of women-owned MSMEs in the Special Region of Yogyakarta.

### *3.9 Qualitative Findings: Wanodyatama-Saguh Ora Mingkuh*

The qualitative findings show that digital transformation among women-owned MSMEs in DIY (Yogyakarta Special Region) is not a linear or uniform process. Digitalization initially emerged as a form of pressure: shifting consumer behavior, declining offline transactions, and the demand to remain visible amid competition. *"When the shop was quiet during the pandemic, I learned that digital selling has to keep being tried, evaluated, and improved even when the initial content gets no response." (Interview with Ibu Sari, owner of a food stall in Depok District, Sleman, 25 June 2026).* This finding suggests that digital capability is socially constructed through continuous experimentation rather than acquired solely through formal digital training. Repeated experiences of trying, failing, evaluating, and adapting enable women entrepreneurs to gradually develop confidence and competence in navigating digital transformation. Therefore, learning itself becomes an important form of entrepreneurial capital.

Within this process, *ora mingkuh* (*never backing down*) can be interpreted as a culturally embedded entrepreneurial capability rather than merely a personal characteristic. The interviews demonstrate that this local philosophy enables women entrepreneurs to transform repeated failure into continuous learning, uncertainty into adaptive strategies, and business experience into sustainable capability. In this context, resilience is not only an individual attitude but also a socially constructed mechanism that sustains digital transformation. Failed content, algorithm changes, weak market response, or limited resources are not understood as the end of the effort, but as information for improving the next approach. *"Even though my content is often quiet and orders aren't many yet, I don't want to stop; I turn buyers' responses into lessons for improving how I sell and finding new connections." (Interview with Mbak Nadira, owner of a souvenir shop in Yogyakarta City, 30 June 2026).* These narratives indicate that business progress cannot be measured solely by financial outcomes. More importantly, digital transformation contributes to the gradual development of entrepreneurial capability, including market awareness, networking capacity, strategic decision-making, and adaptive learning.




**Figure 3. *Saguh Ora Mingkuh*: The Enduring Driver of MSME Digitalization**
*Source: Processed data (2026).*

More broadly, the narrative of *Wanodyatama–Saguh Ora Mingkuh* shows that women's empowerment through digitalization needs to be read as the formation of agency. Women are not merely technology users, but become subjects who interpret technology according to business needs, life experience, and local cultural values. This finding is a reminder that MSME mentoring programs should not stop at the transfer of technical skills. Mentoring needs to provide space for practice, joint evaluation, network support, and recognition of the fall-and-rise process as a natural part of learning and business growth (Figure 1).

Finally, this research confirms that successful digital transformation is a processual and collective phenomenon rather than a purely technological one. Individual resilience becomes more sustainable when supported by access to information, mentoring, business networks, community learning, and responsive public policies. Thus, *Ora Mingkuh* represents not merely persistence but a dynamic learning mechanism through which women entrepreneurs continuously transform pressure into experimentation, experimentation into reflection, and reflection into sustainable business capability.

Based on these qualitative findings, this study proposes a contextual understanding of *Wanodyatama–Saguh Ora Mingkuh* as a culturally grounded entrepreneurial capability. Rather than viewing digital transformation solely as technology adoption, this concept explains that successful digitalization among women-owned MSMEs is sustained through an iterative cycle of courage, experimentation, reflection, adaptation, and persistence. This contextual interpretation complements the quantitative findings by explaining why gender empowerment significantly strengthens the positive impact of digitalization on MSME performance. In other words, the interaction effect identified in the regression model is behaviorally reflected in women's capacity to continuously learn, adapt, and persist throughout the digital transformation process.

## 4. Conclusion

This study examined the relationships between digitalization, gender empowerment, and business performance among women-owned MSMEs in the Special Region of Yogyakarta by integrating quantitative panel regression with qualitative contextual insights. The empirical findings demonstrate that while the individual main effects of digitalization and gender empowerment exhibit negative coefficients — reflecting initial structural transition costs and resource constraints — their interaction (DG × IPG) exerts a statistically significant positive effect on business efficiency ($\beta = 0.216033$, $p < 0.05$). This confirms that gender empowerment functions as a critical moderating mechanism that enables women entrepreneurs to convert digital adoption from a source of short-term strain into a durable driver of performance.

The qualitative findings explain *why* this interaction holds. Digitalization did not initially function as an asset for women MSME actors; it first appeared as pressure — shifting consumer behavior, declining offline transactions, and unresponsive early digital content. What converted this pressure into performance gains was not the technology itself, but the local philosophy of *Wanodyatama, Saguh Ora Mingkuh ("the resilient woman who never backs down")*, which structured a recurring cycle of trying, failing, evaluating, and adapting. Within this cycle, setbacks — poor engagement, algorithm changes, weak market response — were consistently reinterpreted not as failure but as actionable information for the next attempt. This is precisely the micro-level mechanism underlying the positive (DG × IPG) coefficient: gender empowerment, expressed here as *ora mingkuh*-driven agency, is what allows digital effort to accumulate into capability — reading markets, building networks, and making more deliberate decisions — rather than dissipating as unresolved friction. In other words, the interaction term captures statistically what the interviews show behaviorally: digitalization only becomes productive when paired with the resilience and agency that gender empowerment supplies.

Theoretically, this research advances the literature by demonstrating that digital technology adoption and gender empowerment should not be analyzed in isolation, as their strategic — and, as the qualitative evidence shows, psychologically and culturally grounded — interaction generates superior organizational outcomes. Practically and from a policy standpoint, the findings suggest that interventions aimed at supporting women-owned MSMEs should move beyond isolated technological access or financial assistance. Instead, policymakers and development agencies should design integrated, gender-responsive capacity-building programs that simultaneously enhance digital literacy, leadership capacity, and cultural resilience — including deliberate recognition of the fall-and-rise learning process — to foster sustainable economic development.

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# GENERATION Z EMPLOYEE PERFORMANCE AT BANK XYZ: A PRELIMINARY DESCRIPTIVE ASSESSMENT

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## Abstract
*Generation Z is becoming an increasingly important part of the workforce and presents new human resource management challenges, particularly in the banking industry, where digital transformation, service quality, and operational accuracy require employees to adapt rapidly. This study provides a preliminary descriptive assessment of Generation Z employee performance at Bank XYZ. A quantitative survey design was used with 30 Generation Z employees selected through purposive sampling. Data were collected using a six-item employee performance questionnaire adapted from Jain and Sharma (2026) and analyzed using SPSS. The analysis included respondent characteristics, item-total correlations, and internal consistency testing. The respondents were aged 22–28 years; 63.3% were female, 76.7% held a bachelor's degree, and 66.7% were unmarried. All six performance items produced correlation coefficients above the critical r-value of 0.361, ranging from 0.736 to 0.956, and all were statistically significant at the 5% level. The instrument also demonstrated high internal consistency, with a Cronbach's Alpha of 0.904. These results indicate that the performance items function coherently within this sample and provide an adequate basis for a preliminary organization-specific assessment. However, because item-level means and composite performance scores were not reported in the available analysis, the findings should not be interpreted as evidence that employee performance is high, moderate, or low. The study therefore contributes bounded preliminary evidence for assessing Generation Z performance at Bank XYZ while emphasizing the need for cautious interpretation and broader future studies.*
***Keywords:*** *Generation Z, employee performance, banking sector, human resource management, preliminary assessment.*

## 1. Introduction

Generation Z refers to individuals born between 1997 and 2012 and is now entering the workforce in substantial numbers. In Indonesia, Generation Z represents one of the largest population groups, which makes this cohort increasingly important for the future supply of organizational talent (Nurhanisah, 2026). The growing presence of Generation Z is particularly relevant to the banking sector, where digital transformation continues to reshape work processes, service delivery, and competency requirements. As banks adopt increasingly technology-intensive systems, organizations require employees who can learn quickly, work accurately, adapt to change, and maintain service quality.

Generation Z has developed in a social and technological environment that differs from that of previous generations. Members of this cohort are commonly associated with high digital familiarity, rapid access to information, and expectations for continuous learning, meaningful work, flexibility, and work-life balance (Waworuntu et al., 2022). These characteristics may create both opportunities and challenges for human resource management. On the one hand, digital familiarity can support adaptation to technology-enabled work. On the other hand, expectations regarding career development, supervisor support, organizational culture, and flexibility can affect employees' attachment to the organization and their willingness to sustain performance over time.

Recent studies indicate that the work behavior of Generation Z is closely connected to employee engagement, leadership, workload, job satisfaction, and the broader employee experience. Novilia et al. (2026), for example, discuss quiet quitting among Generation Z employees in relation to employee engagement, transformational leadership, and workload. Aulia et al. (2025) similarly show that compensation, job satisfaction, and work-life balance are relevant to Generation Z employee loyalty. These findings reinforce the importance of understanding

Generation Z not merely as a demographic category, but as a workforce group whose performance is embedded in specific organizational conditions.

The banking industry provides a particularly important context for this issue. Banking employees are expected to maintain accuracy, timeliness, service quality, regulatory discipline, and adaptability to digital systems. At the same time, Generation Z employees tend to value supportive management, learning opportunities, and balance between work and personal life (Septiani et al., 2024; Refiyana & Maimun, 2025). The alignment between organizational expectations and employee characteristics is therefore likely to shape how effectively Generation Z employees contribute to operational and service objectives.

Employee performance is a central outcome in human resource management because it reflects how effectively employees carry out assigned duties and contribute to organizational objectives. In practice, performance can be understood through dimensions such as work quality, work quantity, timeliness, effective use of resources, independence, and commitment (Aryono & Marisi, 2024). In banking, these dimensions are especially relevant because performance is not limited to the amount of work completed; it also involves precision, reliability, responsiveness, and consistency in meeting organizational standards.

Previous research has examined several determinants of employee performance among younger workers, including digital literacy, leadership, organizational culture, job satisfaction, and work-life balance (Khaira, 2024; Widiaty, 2024; Refiyana & Maimun, 2025). However, evidence specifically focused on Generation Z performance in the banking sector remains relatively limited. Existing studies often emphasize factors that influence performance rather than providing a clearly bounded description of how Generation Z performance is assessed within a specific banking organization. This creates room for organization-level studies that establish an empirical basis for examining Generation Z employee performance in the context of banking.

Bank XYZ is used in this study as an organizational setting in which Generation Z employees are part of a workforce operating alongside ongoing digital transformation. The organization requires employees to adapt to technological change while maintaining work quality and service standards. A preliminary assessment of Generation Z employee performance can therefore provide a useful starting point for understanding how performance should be examined in this setting and for identifying the analytical boundaries of conclusions drawn from a relatively small organizational sample.

Accordingly, this study aims to provide a preliminary descriptive assessment of Generation Z employee performance at Bank XYZ. Rather than claiming population-level generalizability, the study focuses on evidence obtained from 30 purposively selected employees and interprets the findings within the specific organizational context. The research question is: What can be concluded about Generation Z employee performance at Bank XYZ from the available survey evidence? This formulation is intended to ensure that the conclusions remain consistent with the actual analysis and do not extend beyond what the data can support.

## 2. Literature Review

### *2.1 Generation Z in the Workplace*

Generation Z is commonly described as a digitally oriented generation whose workplace expectations have been shaped by continuous exposure to technology and rapidly changing information environments. Refiyana and Maimun (2025) note the importance of work-life balance and compensation in meeting the needs of Generation Z employees. From a human resource management perspective, this implies that employment practices need to address not only task allocation and compensation but also learning, flexibility, career development, and the broader employee experience. Generation Z employees also tend to evaluate organizations through the quality of their work environment and the support they receive from management. Aulia et al. (2025) emphasize the relevance of

compensation, job satisfaction, and work-life balance to employee loyalty, while Septiani et al. (2024) discuss work-life balance, managerial support, and workplace stress as important aspects of the Generation Z work experience. These findings suggest that employee performance cannot be separated entirely from the organizational context in which employees work.

For organizations, the growing presence of Generation Z requires an adaptive human resource management approach. Khaira (2024) highlights the role of digital literacy and digital leadership in employee performance, whereas Widiaty (2024) examines organizational culture and job satisfaction in relation to employee performance among Generation Z in a banking setting. Together, these studies support the view that Generation Z performance should be understood as an organizational issue involving both employee capabilities and the conditions provided by the employer.

### *2.2 Employee Performance*

Employee performance refers to the outcomes produced by employees when carrying out their roles, duties, and responsibilities in accordance with organizational expectations. Performance is closely associated with productivity, service quality, operational effectiveness, and the achievement of organizational objectives. Dahman et al. (2023) discuss performance in relation to digital literacy, work motivation, and work ability, reinforcing the idea that performance represents the observable contribution of employees within a work system rather than a purely individual trait.

In practical human resource management, employee performance may be assessed through several complementary dimensions. Aryono and Marisi (2024) identify aspects that include work quality, work quantity, timeliness, effectiveness in using resources, independence in carrying out tasks, and commitment to work and the organization. These dimensions are useful because they prevent performance from being interpreted only as output volume. An employee may complete a large amount of work, for example, but performance remains incomplete if accuracy, timeliness, or organizational responsibility is weak.

For banking organizations, a multidimensional understanding of performance is particularly important. Banking work requires accurate processing, timely completion of tasks, consistent service, responsible use of organizational resources, and the ability to perform assigned duties with an appropriate level of independence. Consequently, performance assessment in this sector should be interpreted in relation to the specific operational requirements of the organization.

### *2.3 Generation Z Performance in the Banking Context*

The relationship between Generation Z characteristics and employee performance is increasingly relevant in organizations undergoing digital transformation. Generation Z employees may have strengths in digital adaptation and learning, but their performance is also shaped by workplace support, job satisfaction, leadership, workload, and expectations for flexibility (Waworuntu et al., 2022; Khaira, 2024; Novilia et al., 2026). In this sense, performance should not be interpreted as a fixed characteristic of the generation itself. It is more appropriately understood as an employee outcome that develops within a particular organizational environment.

The banking context intensifies this need for careful interpretation because digital competence must coexist with service discipline, accuracy, and reliability. Widiaty (2024) provides evidence that organizational culture and job satisfaction are relevant to employee performance among Generation Z in a banking setting. This supports the importance of organization-specific assessment before broader conclusions are made about Generation Z as a whole.

Based on this literature, the present study treats Generation Z employee performance as the substantive construct of interest, while instrument testing is used only to establish whether the available questionnaire responses provide a sufficiently coherent basis for interpretation. This distinction is important: evidence that questionnaire items are valid and internally consistent supports measurement quality, but it does not by itself demonstrate that employees have high or low performance. Performance level requires descriptive score information, whereas validity and reliability establish the adequacy of the measurement process.

## 3. Research Methods

### *3.1 Research Design*

This study employed a quantitative descriptive survey design to provide a preliminary assessment of Generation Z employee performance at Bank XYZ. The design was selected because the study focuses on describing evidence obtained from a defined organizational sample rather than testing causal relationships among multiple variables. The study is therefore positioned as an organization-specific preliminary assessment and not as a population-level estimate of Generation Z performance in the Indonesian banking industry.

Data were collected using a structured questionnaire and analyzed using SPSS. The performance instrument consisted of six items adapted from the employee performance instrument used by Jain and Sharma (2026). In the present study, instrument diagnostics were treated as supporting analysis to determine whether the six performance items functioned coherently in the sample. The substantive construct under examination remained employee performance.

### *3.2 Population and Sample*

The study population consisted of Generation Z employees working at Bank XYZ. Purposive sampling was used because respondents had to meet the specific criterion of belonging to the Generation Z age group. A total of 30 employees participated in the study. The sample included respondents aged 22 to 28 years.

Because the sample was selected purposively and consisted of 30 respondents from one organization, the findings are interpreted only within the context of Bank XYZ. The sampling design does not provide a statistical basis for generalizing the findings to all Generation Z employees in the banking sector. This boundary is explicitly maintained throughout the interpretation of the results.

### *3.3 Data Analysis*

The analysis consisted of three components. First, respondent characteristics were summarized to describe the composition of the sample. Second, item-total correlations were examined to evaluate whether each of the six questionnaire items was adequately associated with the overall measurement. With 30 respondents, the critical r-value used in the study was 0.361 at a 5% significance level. Third, Cronbach's Alpha was used to evaluate the internal consistency of the six-item instrument.

The available analysis reported in this manuscript does not include item-level means, standard deviations, or an overall composite performance score. Consequently, the study does not classify the observed level of employee performance as high, moderate, or low. Instead, the analysis establishes whether the performance measure is sufficiently coherent to support a preliminary assessment within the sample. This analytical limitation is important because instrument quality and employee performance level are conceptually different conclusions.

## 4. Results

### *4.1 Respondent Characteristics*

The study involved 30 Generation Z employees at Bank XYZ. The respondents were between 22 and 28 years of age. The largest single age group was 23 years old, comprising eight respondents (26.7%). Female employees represented 63.3% of the sample, while male employees represented 36.7%. Most respondents held a bachelor's degree (76.7%), and 23.3% held a diploma qualification. In terms of marital status, 66.7% were unmarried and 33.3% were married. Table 1 summarizes the respondent profile reported in the study.

**Table 1. Respondent Profile**

| Characteristic | Frequency / Range | Percentage |
|---|---|---|
| Age range | 22–28 years | — |
| Modal age | 23 years (n = 8) | 26.7% |
| Female | 19 | 63.3% |
| Male | 11 | 36.7% |
| Bachelor's degree | 23 | 76.7% |
| Diploma (D3/D4) | 7 | 23.3% |
| Unmarried | 20 | 66.7% |
| Married | 10 | 33.3% |

The respondent profile provides important context for interpreting the study. It shows that the evidence comes from a relatively small and specific group of Generation Z employees rather than from a representative banking-sector sample. Accordingly, demographic characteristics are used here to describe the participants and not to support broad claims about Generation Z employees in general. This interpretation is consistent with the preliminary and organization-specific positioning of the study.

### *4.2 Measurement Adequacy of the Performance Items*

The six employee performance items were evaluated before substantive interpretation. All item-total correlation coefficients exceeded the critical r-value of 0.361. The coefficients ranged from 0.736 to 0.956, and each item had a significance value below 0.05. The internal consistency analysis produced a Cronbach's Alpha of 0.904. These results are summarized in Table 2.

**Table 2. Item-Total Correlations and Internal Consistency**

| Item | r-value | Critical r-value | Decision |
|---|---|---|---|
| P1 | 0.956 | 0.361 | Meets criterion |
| P2 | 0.840 | 0.361 | Meets criterion |
| P3 | 0.736 | 0.361 | Meets criterion |
| P4 | 0.813 | 0.361 | Meets criterion |
| P5 | 0.837 | 0.361 | Meets criterion |
| P6 | 0.739 | 0.361 | Meets criterion |
| **Cronbach's Alpha (6 items)** | | 0.904 | High internal consisten y |

The measurement results show that the six performance items are sufficiently associated with the overall measure and demonstrate strong internal consistency within this sample. This is an important methodological requirement because substantive interpretation of employee performance should be based on responses that are measured consistently. However, these coefficients describe measurement quality rather than the level of employee performance itself. A high Cronbach's Alpha does not mean that employee performance is high; it means that the items provide consistent information about the same underlying construct.

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# THE INFLUENCE OF TOURIST ATTRACTIONS, DESTINATION IMAGE, TOURIST FACILITIES AND DIGITAL PROMOTION ON THE VISITING OF GENERATION Z TOURISTS TO KALIURANG.

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**Abstract**
*This study aims to determine: (1) the simultaneous influence of tourist attractions, destination image, tourism facilities, and digital promotion on tourists' visiting intention; (2) the partial influence of tourist attractions on tourists' visiting intention; (3) the partial influence of destination image on tourists' visiting intention; (4) the partial effect of tourism facilities on tourists' visiting intention; and (5) the partial effect of digital promotion on tourists' visiting intention. The population in this study consists of all Generation Z tourists who have the potential to visit the Kaliurang tourist destination. The sample of this study includes 103 respondents. The sampling technique used is non-probability sampling with a purposive sampling method. The data analysis techniques employed include descriptive analysis, classical assumption tests, multiple linear regression analysis, and hypothesis testing using SPSS 23 software. The results of this study indicate that: (1) tourist attractions, destination image, tourism facilities, and digital promotion simultaneously have an effect on tourists' visiting intention; (2) tourist attractions partially do not have an effect on tourists' visiting intention; (3) destination image partially has an effect on tourists' visiting intention; (4) tourism facilities partially have an effect on tourists' visiting intention; and (5) digital promotion partially has an effect on tourists' visiting intention.*
***Keywords**: tourist attractions, destination image, tourism facilities, digital promotion, and visiting intention.*

## 1. Introduction

The tourism sector is a strategic sector that contributes to national economic growth, among others through job creation, increased income of the public, as well as the acquisition of foreign exchange. In addition to functioning as a driver of the economy, tourism also plays a role in preserving culture, developing areas, and improving the tourism industry has undergone fairly significant changes, especially in tourists' behavior when seeking information, determining destinations, up to sharing travel experiences through digital media.

The Special Region of Yogyakarta is included as a leading tourist destination in Indonesia with various potentials, both cultural tourism, history, education, and nature. One of the featured tourist areas of Sleman Regency is Kaliurang. This area offers various attractions that combine the natural beauty on the slopes of Mount Merapi with tourism education, culture and adventure, such as the Ullen Sentalu Museum, the Mount Merapi Museum, Tlogo Putri, as well as Lava Tour Merapi. The diversity of these potentials makes Kaliurang as one of the tourist destinations visited by tourists from inside and outside country.

Data from the Sleman Regency Tourism Office shows that the number of visits by tourists has continued to increase in recent years. In the first half of the year of 2025, the number of tourist visits reached more than four and visits dominated by Nusantara tourists. However, competition among destinations requires the ability to present tourism experiences that align with the needs and characteristics of modern travelers. One group of tourists that has become a major focus in development of tourism today is Generation Z. The generation born between 1997 and 2012 is known as digital natives who are very close to the internet, social media, and various digital platforms. These characteristics cause Generation Z to have decision-making patterns different from previous generations. Before undertaking travel they tend to seek information through social media, read reviews from other travelers, view video content, and consider experiences that can be shared back through digital platforms. Therefore, destination management today is not only focused

on providing attractions, but also must be able to build a destination image positively, provide adequate facilities, and utilize digital promotion with optimal.

In developing tourism destinations, tourist attractions are one of the factors that influence tourist visitation interest. These attractions include the beauty of nature, cultural attractions, tourist activities, or unique experiences provided by a place. The more attractive a destination is, the greater the likelihood that tourists are interested in visiting it. However, changes in tourist behavior from Generation Z show that the decision to visit is not only based on tourist attractions, but also influenced by perceptions of destination image, quality that exists and information obtained through digital media. Destination image becomes an important factor because it shapes tourist perception before making a visit. Destinations with a positive image tend to attract easier the attention of potential tourists compared to less known destinations. In addition, facilities in tourism also play a role in creating comfort and satisfaction during travel. The availability of complete, safe, comfortable, and easily accessible facilities can enhance tourist experience thus driving the emergence of interest in visiting or recommending destinations to others.

On the other hand, the advancement of digital technology has also changed how destinations are marketed tourism. Digital promotion through social media, websites, and various internet-based platforms has become an effective means of communication to reach tourists, especially Generation Z. Engaging content, tourist reviews, and influencer recommendations are able to shape positive perceptions of a destination and increase the desire to visit. Various previous studies show that tourist attractions, destination image, facilities, and digital promotion are factors that can influence travel intent of tourists. However, research results on the influence of each variable still show inconsistencies. Some studies found that digital promotion significantly affects visiting interest, while other studies show different results. These differences indicate a research gap that needs to be examined further, especially at Kaliurang tourism destination with a focus on Generation Z tourists. Generation Z. Based on this phenomenon, this study aims to analyze the influence of tourist attractions, destination image, tourism facilities, and digital promotion on visiting interest of Generation Z tourists to Kaliurang tourist area. The results are expected to contribute to the development of tourism management science and serve as input for destination managers and local governments in formulating strategies for developing tourism that aligns with the characteristics of Generation Z travelers in the digital era. digital.

## 2. Literature Review

### *2.1 Tourism*

Tourism is the activity and process of taking time away from home in an effort to undertake travel, recreation, and enjoyment while utilizing the provision of commercial services (Fauziah, 2021). Tourism is not only about the object but also the overall tourist experience including attractions, accessibility facilities, services, promotion, and interaction social.

### *2.2 Visiting Interest*

In the context of tourism, the interest in visiting is defined as a person's desire to to visit a place considered attractive (Ratnaningtyas et al., 2023). For Generation Z, the decision to visit a place is not only driven by recreational needs but also by the extent to which the destination can provide experiences that can be shared digitally and reflect their personal identity.

### *2.3 Tourist Attraction*

Tourist Attraction According to (Jefri Putri et al., 2021), tourist attraction is the ability of an object or stimulus to attract attention and influence decision and behavior of individuals, especially in the realm of marketing communication. Tourist attraction according to the Act No. 10 of 2009 is everything that has uniqueness, beauty, and value in the form of diversity of natural wealth, culture, and man-made products that become targets or destinations for tourist visits.

### *2.4 Destination Image*

A tourist destination is a place or geographic area that serves as a travel destination for tourists in which tourist activities include attractions, accessibility, and supporting facilities and auxiliary facilities (Widayati & Widiastuti, 2022). Destination image is defined as a set of beliefs, ideas, and impressions held by a person about a tourist destination (Iskandar & Samosir, 2021).

### *2.5 Tour Facilities*

Facilities are one of the infrastructure that can support success in a business. This aspect greatly influences the priorities of tourists who will make a visit. Facilities are resources provided by an entity of a business or organization to support comfort and provide convenience for customers in accessing products or services (Dedy & Alfandi, 2022).

### *2.6 Digital Promotion*

Digital promotion, as described by (Aghazadeh & Khoshnevis, 2024), is a form of marketing activity conducted through internet-based media with the aim to increase consumer engagement and broaden market reach. On the other hand, promotion digital is essentially a form of persuasive communication designed to persuade and influence consumer behavior.

## 3. Research Methods

This study uses a quantitative approach with a causal research type, aimed at analyzing the influence of tourist attraction, destination image, facilities, and digital promotion on the visiting interest of Generation Z tourists to Kaliurang. This study was conducted in March-April 2026 to obtain accurate data in line with the period of Generation Z tourist visits. The population of this study is all Generation Z tourists who have visited Kaliurang tourist destination, while the sample was determined using non-probability sampling with purposive sampling method based on criteria set by the researcher. Data were obtained through the distribution of questionnaires prepared based on indicators of each research variable, namely tourist attraction, destination image, facilities, digital promotion and visiting intention of tourists.

The data source used are primary data obtained directly from respondents. Before analysis, the research instrument was tested through validity tests and reliability tests to ensure data quality. Subsequently, the data were analyzed using SPSS; the analysis stages include classical assumption tests consisting of normality tests, tests of multicollinearity and heteroscedasticity tests. Hypothesis testing was done using an F-test to determine the effect simultaneously and a t-test to determine the partial effect of each variable. Impact on the dependent variable, as well as the coefficient of determination to measure the model's ability to explain the variations that occur in the dependent variable.

### *3.1 Results of the research instrument test*

The validity test was conducted to assess whether the research instrument was able to accurately measure the intended variables. This study involved 103 respondents, resulting in an r-table value of 0.163 at a 5% significance level ($\alpha = 0.05$). An indicator was considered valid if its calculated correlation coefficient (r-count) exceeded the r-table value. The results of the validity test for each indicator are presented in Table 1.

**Table 1. Validity Test Results**

| riable | dicator | scription |
|---|---|---|
| ourist attractions | 1 | Valid |
| | 2 | Valid |
| | 3 | Valid |
| | 4 | Valid |
| | 5 | Valid |
| stination image | 1 | Valid |
| | 2 | Valid |
| | 3 | Valid |
| | 4 | Valid |
| | 5 | Valid |
| urist facilities | 1 | Valid |
| | 2 | Valid |
| | 3 | Valid |
| | 4 | Valid |
| | 5 | Valid |
| | 6 | Valid |
| | 7 | Valid |
| | 8 | Valid |
| gital promotion | 1 | Valid |
| | 2 | Valid |
| | 3 | Valid |
| | 4 | Valid |
| | 5 | Valid |
| | 6 | Valid |
| siting intention. | 1 | Valid |
| | 2 | Valid |
| | 3 | Valid |
| | 4 | Valid |
| | 5 | Valid |
| | 6 | Valid |
| | 7 | Valid |
| | 8 | Valid |

*Source: Primary data processed (2026)*

The reliability test was conducted to evaluate the internal consistency of the research instrument, ensuring that it consistently measured the research variables. In this study, the reliability of the instrument was assessed using Cronbach's Alpha coefficient.

***Table 2. Reliability Test Results***

| Variable | of items | Description |
|---|---|---|
| Tourist attractions | 5 | Reliabel |
| Destination image | 5 | Reliabel |
| ourist facilities | 8 | Reliabel |
| Digital promotion | 6 | Reliabel |
| Visiting intention. | 8 | Reliabel |

*Source: Primary data processed (2026)*

### *3.2 Descriptive Analysis Results of Respondent Characteristics*

In this study, the descriptive analysis of respondents was categorized based on several characteristics. The respondents were Generation Z tourists aged 18–25 years, the majority of whom were university students, residing in Yogyakarta and its surrounding areas, and had visited Kaliurang at least once. Most respondents reported that their primary purpose of visiting Kaliurang was for recreational activities with friends or family.

**Tabel 1. Respondent Characteristic Based on Gender**

| Gender | Total |
|---|---|
| Male | 32 |
| Female | 71 |
| **Total** | **103** |

*Source: Primary data processed (2026)*

**Tabel 2. Respondent Characteristics By Age**

| Age | Number of Respondents |
|---|---|
| 12-15 Years | 3 |
| 16-18 Years | 5 |
| 19-21 Years | 42 |
| 22-24 Years | 48 |
| 25-27 Years | 5 |
| **Total** | **103** |

*Source: Primary data processed (2026)*

**Tabel 3. Respondent Characteristics by Occupation**

| Occupation | Number of Respondent |
|---|---|
| Student | 10 |
| College student | 81 |
| Worker | 12 |
| **Total** | **103** |

*Source: Primary data processed (2026)*

**Tabel 4. Respondent Characteristics Based on Income**

| Income | Amount |
|---|---|
| < Rp 500.000 | 15 |
| Rp 500.000 – Rp 1.500.000 | 32 |
| Rp 1.500.000- Rp 2.000.000 | 23 |
| Rp 2.000.000 – Rp 3.000.000 | 18 |
| > Rp 3.000.000 | 15 |
| **Total** | **103** |

*Source: Primary data processed (2026)*

**Tabel 5. Respondent Characteristics by Domicilie**

| Domicilie | Number of Respondent |
|---|---|
| Yogyakarta City | 37 |
| Sleman Regency | 42 |
| Bantul Regency | 7 |
| Kulon Progo Regency | 1 |
| Gunung Kidul Regency | 1 |
| Others | 15 |
| **Total** | **103** |

*Source: Primary data processed (2026)*

### *3.3 Classical Assumption Test Results*

**Table 8. Normality Test Results**

| | | Unstandardized Residual |
|---|---|---|
| N | | 103 |
| Normal Parameters[a,b] | Mean | ,0000000 |
| | Std.Deviation | 2,45532999 |
| Most Extreme Differences | Absolute | ,108 |
| | Positive | ,091 |
| | Negative | -,108 |
| Asymp. Sig. (2-tailed) | | .005[c] |
| Monte Carlo Sig. (2-tailed) | Sig. | .168[d] |

*Source: Primary data processed (2026)*

Based on the normality test results in Table IV.13 using the Kolmogorov-Smirnov test Kolmogorov-Smirnov, an initial significance value of 0.005 was obtained. The value is smaller than 0.05, indicating that the data are not yet normally distributed. Therefore, a re-test was performed using the Monte Carlo method to obtain more accurate results. Based on the results of the Monte Carlo test, the Monte Carlo significance value is 0.168. According to the normality test criteria, if the significance value is ≥ 0.05, then the data is considered normally distributed. Because the obtained significance value is 0.168 ≥ 0.05, thus it can be concluded that the data in this study are distributed normal.

**Table 9. Multicollinearity Test Results**

| Variable |
|---|
| Tourist attractions |
| Destination image |
| Tourist facilities |
| Digital promotion |

*Source: Primary data processed (2026)*

From the results of the multicollinearity test that has been performed, Table IV.14 shows the tourist attraction variable has a tolerance value of 0.448 and VIF 2.230, the variable destination image has a tolerance value of 0.451 and VIF 2.217, the facility variable tourism has a tolerance value of 0.422 and VIF 2.370, and the digital promotion variable has a tolerance value of 0.422 and VIF 2.370. Multicollinearity tests function to detect high correlation among the independent variables. Based on the processed multicollinearity test data, it can be concluded that each independent variable does not show multicollinearity because the value tolerance > 0.10 and VIF < 10.

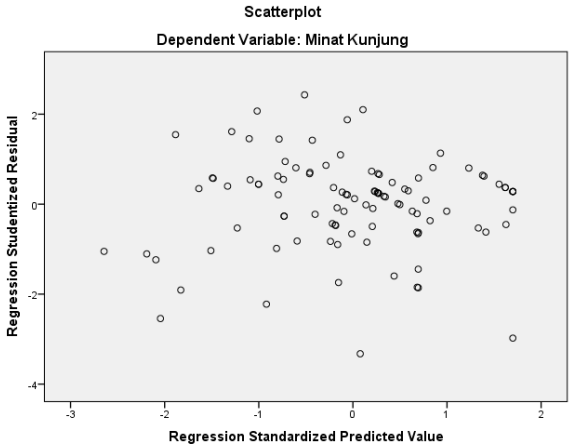



**Figure 1. Heteroskedasticity Test Results**
*Source: Primary data processed (2026)*

The heteroskedasticity test conducted by the researcher on Figure IV.5. Test of heteroskedasticity is considered a good model if a graph does not contain a particular pattern. Based on the heteroskedasticity test, it can be concluded that this research does not exhibit heteroskedasticity because the data spread and does not form any particular pattern.

### *3.4 Results of Multiple Linear Regression Analysis*

**Table 10. Results of Multiple Linear Regression**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 6,049 | 2,774 | | 2,181 | ,032 |
| | Tourist attractions | ,199 | ,160 | ,126 | 1,249 | ,215 |
| | Destination image | ,563 | ,153 | ,369 | 3,679 | ,000 |
| | Tourist facilities | ,220 | ,095 | ,240 | 2,308 | ,023 |
| | Digital promotion | ,180 | ,150 | ,124 | 1,197 | ,234 |

*Source: Primary data processed (2026)*

Based on the results of the generalized linear regression analysis test in Table IV.10 above, it can be obtained the following equation:

$$Y = 6.049 + 0,199X_1 + 0,563X_2 + 0,220X_3 + 0,180X_4$$

Y : Visiting intention
$X_1$ : Tourist attractions
$X_2$ : Destination image
$X_3$ : Tourist facilities
$X_4$ : Digital promotion

### *3.5 Hypothesis Test Results*

**Table 11. F-Test Results**

| Model | | Sum of Squares | Df | Mean Square | F | Sig |
|---|---|---|---|---|---|---|
| 1. | Regresion | 764.185 | 4 | 191.046 | 30.447 | .000[b] |
| | Residual | 614.922 | 98 | 6.275 | | |
| | Total | 1379.107 | 102 | | | |

Source: Primary data processed (2026)

Based on the F test results in Table IV.16 the simultaneous influence of attraction of tourism, destination image, tourist facilities, and digital promotion on visit intention is shown by F-calculated 30.447 ≥ F-table 2.465 or at p-value (sig) 0.000 < 0.05, therefore H0 is rejected and Ha1 is accepted, meaning tourism attraction, destination image, tourist facilities and digital promotion collectively influence visit intention to visit.

**Table 12. T-test Results**

| **Coefisien** | | | | | |
|---|---|---|---|---|---|
| **Unstandardized Coefficients** | | | **Standardized Coefficients** | | |
| **Model** | **B** | **Std. Eror** | **Beta** | **T** | **Sig.** |
| (constant) | 6.049 | 2.774 | | 2.181 | .032 |
| Tourist attractions | .199 | .160 | .126 | 1.249 | .215 |
| Destination image | .563 | .153 | .369 | 3.679 | .000 |
| Tourist facilities | .220 | .095 | .240 | 2.308 | .023 |
| Digital promotion | .180 | .150 | .124 | 1.197 | .234 |

*Source: Primary data processed (2026)*

1) Partial influence of tourism attractiveness on tourists' intention to visit In this study, the t-test is intended to test the partial influence of tourism attractiveness on visitors' intention to visit with the following hypothesis formulations as follows:

   H02: Tourism attractiveness, on a partial basis, does not affect visiting interest tourists.
   Ha2: Tourism attractiveness, on a partial basis, affects visiting interest tourists.

   Based on Table IV.12 the partial influence of tourism attractiveness on interest of visiting tourists is shown by the unstandardized coefficient (B), amounting to 0.126 with t-statistic 1.249 < t-table 1.984 or with p-value (sig) 0.215 > 0.05, therefore H02 is accepted and Ha2 is rejected, meaning tourism attractiveness, on a partial basis, does not affect visitors' intention to visit

2) Partial influence of destination image on tourists' visiting interest In this study, the t-test is intended to test the partial influence of destination image on visiting interest with the following hypotheses as follows:

   H03: Destination image, on a partial basis, does not affect visiting interest tourists.
   Ha3: Destination image, on a partial basis, affects visiting interest tourists.

   Based on Table IV.12 the partial influence of destination image on interest of visiting tourists is shown by the unstandardized coefficient (B), amounting to 0.369 with t-statistic 3.679 > t-table 1.984 or with p-value (sig) 0.00 < 0.05, thus l l i . H03 rejected and Ha3 accepted means that destination image partially has an effect on tourists' intention to visit

3) The partial effect of tourism facilities on tourists' intention to visit

   H04: Tourism facilities partially do not have an effect on intention to visit tourists.
   Ha4: Tourism facilities partially have an effect on intention to visit tourists.

   Based on Table 12, the partial effect of destination image on intention to visit tourists is indicated by the unstandardized coefficient (B), amounting to 0,240 with t-count 2,308 > t-table 1,984 or at p value (sig) 0,023 < 0,05, then H04 rejected and Ha4 accepted, which means tourism facilities partially have an effect on tourists' intention to visit.

4) The partial effect of digital promotion on tourists' intention to visit

   H05: Digital promotion partially does not have an effect on intention to visit tourists. Ha5: Digital promotion partially has an effect on intention to visit tourists.

   Based on Table IV.12, the partial effect of destination image on intention to visit tourists is indicated by the unstandardized coefficient (B), amounting to 0,124 with t-count 1,197 < t-table 1,984 or at p value (sig) 0,234 > 0,05, then H05 accepted and Ha5 rejected, which means that digital promotion partially does not have an effect on tourists' intention to visit.

**Table 13. Results of the Coefficient of Determination**

| Model | R | R *Square* | *Adjusted R Square* | Std. *Eror of the Estimate* |
|---|---|---|---|---|
| 1 | .744[a] | .554 | .536 | 2.505 |

*Source: Primary data processed (2026)*

Based on the test results in Table IV.18, it can be concluded that the Adjusted R Square value is 0,536 or 53.6% and it can be concluded that tourist attraction, destination image, tourism facilities and digital promotion can affect tourists' visit intention by 53.6%, while the other 46.4% is influenced by other factors or other variables that are outside of this study.

1) The influence of tourist attraction, destination image, tourist facilities and digital promotion on the intention to visit by tourists. Based on the F-test results conducted in this study, it is concluded that tourist attractions, destination image, tourist facilities, and digital promotion simultaneously influence the intention to visit by tourists. That is, the higher the attraction, the higher the attractiveness, the better the destination image, the better the tourist facilities and the more attractive the digital promotion, the higher the intention to visit by tourists. Based on the analysis results in Table IV.18, an R Square value of 0.554 was obtained. This indicates that the variables of tourist attraction, destination image, and tourist facilities and digital promotion together can explain 55.4% of the variation in the intention to visit by tourists. The remaining 44.6% is influenced by other factors not studied, such as E-WOM (Setyowati & Liliyan, 2022), price (Nurbaeti et al., 2021), service quality and reputation of the tourist destination (Atun & Ngulya, 2025).

   The Adjusted R Square value of 0.536 indicates that after adjusting for the number of variables and sample size, this research model still has sufficient ability to explain the dependent variables well. The R value of 0.744 indicates a strong relationship between the independent variables and the intention to visit. That is, in aggregate, tourist attraction, destination image, tourist facilities, and digital promotion influence the intention to visit. However, parsimoniously, only the destination image and tourist facilities have a significant effect on the intention to visit, while tourist attractions and digital promotion do not have a significant effect on the intention to visit. Meanwhile, the Std. Error of the Estimate value of 2.505 reflects a relatively small prediction error, so the regression model used can be said to be quite good and accurate in predicting the intention to visit tourists.

   This finding shows that to attract the interest of Gen Z, tourism managers Kaliurang need to combine various elements, not rely on a single factor alone. The combination of beauty and uniqueness of attractions, the destination's reputation, comfort of facilities, and massive digital promotion are needed to encourage the interest to visit significantly. This result is in line with studies (Dahmiri & Bhayangkari, 2022) and (Hutasoit et al., 2022) which assert that promotion, facilities, and the daya collective tourism attraction jointly influences the interest in visiting tourists.

2) Effect of tourist attraction on tourists' visiting interest.
   Based on the t-test results in this study, it can be concluded that attraction of tourism does not affect the interest in visiting tourists. That is, the more high or low the tourist attraction, the less it will make the visiting interest higher or lower the visiting interest of tourists. This is supported by the unstandardized coefficient (B) which has a positive value of 0.126. In the context of Kaliurang, its destination characteristics are relatively well known and tend to be considered ordinary or offer less novelty compared to other destinations that are more viral, and thus no longer the main factor in decision making. Generation Z considers other aspects such as facility comfort, aesthetic photo spots, that are aesthetic, accessibility, and the destination image that is trending on social media, so that even though the

natural attraction of Kaliurang is quite good, this does not directly encourage an increase in visiting interest, so this finding is in line with the research (Setyowati & Liliyan, 2022) which also found that tourist attraction does not significantly affect the visiting interest.

3) Effect of destination image on tourists' visiting interest.
Based on the t-test results in this study, it can be concluded that the destination image affects the visiting interest of tourists. Meaning, the better the destination image, the higher the visiting interest of tourists. This is supported by the unstandardized coefficient (B) which has a positive value of 0.369. The hypothesis stating that the destination image has a significant influence on visiting interest in partial terms is accepted, meaning the better the destination image, in the minds of tourists Kaliurang, the higher their interest to visit, and conversely, so this finding is in line with the research (Wahyudi & Setiadi, 2023) which proves that the destination image has a significant influence on visiting interest, visiting the Gronjong Wariti Tourism Destination in Kediri Regency.

4) Effect of tourism facilities on tourists' visiting interest.
Based on the t-test results in this study, it can be concluded that tourism facilities affect visiting interest. That is, the better the facilities, the higher the visiting interest of tourists. Hypothesis stating that tourist facilities have a partial influence on the willingness to visit is accepted, which means the more complete, comfortable, and adequate the facilities available in Kaliurang, the higher the interest of Generation Z travelers to visit, so this finding aligns with the study (Nurbaeti et al., 2021) which proves that facilities have a significant influence on the intention to visit tourists at Cipondoh Lake Tourist Object, Tangerang City.

5) The Influence of digital promotion on tourist visitation interest.
Based on the t-test results in this study, it can be concluded that promotion digital does not affect visitors' visitation interest. That is, the more attractive or unattractive digital promotions will not make the visitation interest higher or lower among visitors. For Generation Z in the Kaliurang context because they have been exposed to various promotional content every day, leading to saturation with promotions and more trust in content such as reviews and others' experiences compared to official promotions, so this finding aligns with the study (Riestiana & Sudrajat, 2025) which also found that digital promotion does not have an influence significant on visiting interest at Karawang Tourist Village.

## 4. Conclusion

Hence to increase visitors' visitation interest one way is to strengthen the positive destination image of the destination, especially at attractions such as Museum Ullen Sentalu, Tlogo Putri Kaliurang, Merapi Volcano Museum and Lava Jeep Tour Merapi through presenting a unique, authentic, and memorable travel experience that can shape perceptions that are favorable and encourage tourist interest to visit. In the image variable the destination that obtained the lowest average score of 4.21, namely "I assess the tourism infrastructure in Kaliurang is adequate for visitors from outside the area" and " I assess this destination as having a uniqueness not possessed by other tourist destinations, although still categorized as high. The lowest value in the destination image perception indicates that there are still perceptions that are not fully satisfactory according to tourists towards the Kaliurang tourist area. Thus, for the managers of the Kaliurang tourist area this means there is a need to improve the quality of tourism infrastructure, strengthen the uniqueness compared to other locations, and be consistent in building a strong brand and in line with tourist experiences. This effort is important to shape a positive perception on an ongoing basis so as to

increase tourists' interest in visiting.

Therefore, to increase tourists' visiting interest one way is by improving the facilities at the tourist site, especially facilities at the Ullen Sentalu Museum, Tlogo Putri Kaliurang, Merapi Mountain Museum and Lava Jeep Tour Merapi. facilities variable, namely "I feel that toilet and bathroom facilities in the Kaliurang Tourism Area are available completely," achieving the lowest average score of 4.01, although still categorized as high. The lowest value in cleanliness and toilet availability aspects shows that these basic facilities still need the attention of the managers. This finding strengthens the finding that tourism facilities significantly affect the interest to visit, where tourists will be more attracted to come if facilities are well provided and comfortable to use. Therefore, for Kaliurang tourism managers there is a need to improve the cleanliness standards, maintenance, and the completeness of facilities comprehensively and evenly, such as toilet cleanliness for tourists so that visitors are comfortable when visiting the Kaliurang tourist area. This effort is important to create tourist comfort so that it can encourage tourists' visiting interest.

Future researchers are expected to develop existing findings by seeking relevant new variables and phenomena, and expanding the research sample so that the results are more accurate and generalizable. In addition, exploration of other variables such as the influence of electronic word of mouth (e-WOM), price, service quality, and reputation of tourist places should be conducted to identify additional factors the visiting interest of tourists, especially Generation Z, to the Kaliurang tourist area.

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# THE DETERMINANT OF SUSTAINABILITY REPORTING AND THE EFFECT ON FIRM VALUE

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***Abstract***
*This study aims to examine the determinants of sustainability reporting and the impact of sustainability reporting on firm value. Five factors are identified as antecedents or determinants of sustainability reporting practices, namely green accounting, environmental management systems, company size, profitability, and leverage ratio. Furthermore, this study also examines the effect of sustainability reporting practices on firm value. This research explores the behavior of companies in the energy sector on the Indonesia Stock Exchange during the 2022-2024 reporting period. The sample was determined using a purposive method with criteria based on the completeness of data required for analysis. Based on the set criteria, 15 companies were obtained, resulting in 45 company-period observations over 3 reporting periods. Data analysis was carried out using Warp-PLS 7.0. The analysis results provide evidence that green accounting, company size, and profitability are determining factors for sustainability reporting practices. The study, however, did not find evidence that sustainability reporting practices affect firm value. There is further evidence that the factors which were not proven to be determinants of sustainability reporting practices, namely environmental management systems and leverage, actually have a direct impact on firm value.*
***Keywords****: green accounting, environmental management, sustainability, firm value.*

## 1. Introduction

Environmental issues like climate change and global warming have become global concerns. This has raised worldwide awareness about the importance of sustainable business practices. Internationally, the Paris Agreement was set in 2015 as a significant step to limit global temperature rise. Contributions made to implement the results of the agreement require each country to provide clear, transparent, and understandable information about their greenhouse gas (GHG) emission reduction targets (United Nations Framework Convention on Climate Change (UNFCCC, 2016).

Following up on that commitment, Indonesia ratified it through Law Number 16 of 2016. This law serves as the legal basis for the commitment to meet the Net Zero Emission target by 2060. One of the ways is through regulations related to sustainable forest management, forest conservation, as well as deforestation and forest degradation (Indonesia, 2016).

Companies in the energy sector, like mining, often exploit natural resources massively without considering the sustainability of the surrounding environment. Business activities carried out by companies in the energy sector include Oil, Gas, and Coal (covering exploration, mining, production, and processing of fossil fuels) as well as Renewable Energy. These activities are closely related to the exploitation and processing of natural resources, so their operations can have a negative impact on the surrounding environment.

The commitment to achieving Net Zero Emissions is becoming really relevant for energy companies listed on the Indonesia Stock Exchange. According to data from LCDI (Low Carbon Development Indonesia), the energy sector is the main focus because it is the sector that contributes the most to national carbon emissions, reaching more than 50% of total emissions in Indonesia in 2022 (LCDI, 2022). Of course, this makes the energy sector one of the key players in achieving Net Zero Emission by 2060.

Green accounting is an accounting concept that connects environmental costs or budgets to company activities. Green accounting serves as a measurement and reporting tool that integrates environmental costs and risks (in monetary terms) into the accounting system, ensuring that companies can be accountable for their environmental commitments while also analyzing the impact on company performance (Handoko & Santoso, 2023). By implementing green accounting, companies can improve their environmental performance because they can identify the benefits and costs resulting from carrying out environmental activities.

The company's efforts to manage environmental impact are carried out through the

implementation of an Environmental Management System (EMS), which is based on both international and national standards. The recognized international standard is ISO 14001. Implementing ISO 14001 aims to achieve better environmental performance through pollution prevention, resource efficiency (energy, water, materials), and waste reduction (Sugiyarti et al., 2023). Regarding its impact on financial performance, research shows that ISO 14001 certification tends to have a positive and significant effect (Paneka, 2025), as it is considered to provide a competitive edge and legitimacy in the eyes of stakeholders (Aprilasani et al., 2017).

Stakeholder theory states that a business is a collection of relationships between various parties who have different interests in creating value for those parties. Because of these differing interests, conflicts among them become increasingly complex. The role of executives is to reduce conflicts between these parties by showing evidence that the company can continue its business in the future. This is demonstrated by caring, focusing attention on creating, maintaining, and aligning relationships among those stakeholders (Ghozali, 2020).

This study aims to test whether the implementation of environmental accounting and the application of environmental management systems affect the level of sustainability disclosure, and further, whether sustainability disclosure affects the company's value.

## 2. Literature Review

### *2.1 Stakeholder Theory*

According to stakeholder theory, organizations need to observe and watch how groups of stakeholders are formed. In this case, the main challenges they face, as well as how willing they are to use the resources they have, can either support or harm the company (Sentanu et al., 2025). This theory states that the continuity of a company's activities should be able to provide additional benefits to stakeholders. Companies are expected to be accountable for their operational activities to the public and to run an ethical business (Gregory et al., 2016) as cited in (Ayuningtias & Andayani, 2025).

The stakeholder theory is a concept that focuses on the well-being of parties that have an interest in the company. Organizational management needs to take important steps for their benefit and report its activities. From this perspective, all involved parties have the right to get information about how the company runs its business while paying attention to the surrounding environment (Dura & Suharsono, 2022).

### *2.2 Legitimasi Theory*

This theory emphasizes the concept of organizational legitimacy, which tries to make sure that they act within the frameworks and norms that exist in society, meaning they try to convince others that the business can be officially accepted (Ghozali, 2020). This theory focuses on the idea of organizational legitimacy, which is about making sure they operate within society's rules and norms, basically trying to show others that the business can be officially accepted (Deegan, 2019). So that the company can run smoothly, managers must meet society's expectations to build a socially legitimate position for the company (Dura & Suharsono, 2022).

The manifestation of legitimacy in business can be reflected through the company's environmental activity reports. By revealing positive environmental performance, the company is expected to gain social recognition and optimize its financial strength over the long term.

### *2.3 Green Accounting*

Conceptually, green accounting is similar to conventional accounting, but it includes environmental aspects, which benefits stakeholders in supporting the decision-making process. Green accounting is a way of bookkeeping that incorporates environmental factors into a company's financial statements. It involves recording costs for environmental preservation (like emission reduction costs, land rehabilitation, or conservation programs) as part of the company's operating expenses. This is different from conventional accounting, which often overlooks external environmental impacts, such as ecosystem damage or the social costs of exploiting natural resources (Utami & Nuraini, 2020).

All of that information is presented in an integrated accounting reporting package, so it can be used by users as a basis for assessment and decision-making, whether economic or non-

economic (Lako, 2018). The implementation of green accounting in this context highlights the principle of conservation, which means saving materials and energy (saving land, materials, and energy). It is based on ecological concepts. Green accounting aims to improve efficiency in managing the environment by taking into account the costs related to the environment and the benefits generated, thus having a positive impact on environmental protection (Handoko & Santoso, 2023).

### *2.4 Environmental Management System (EMS)*

Environmental Management System (EMS) is a systematic and structured framework for managing the environmental impacts of an organization's activities, products, or services. It involves identifying, controlling, and reducing environmental risks through planning, implementation, monitoring, and continuous improvement processes. The goal is to ensure compliance with environmental regulations, reduce waste, and improve resource efficiency, often integrated with practices like green accounting.

The International Organization for Standardization (ISO) is an organization that issues ISO 14001, an international standard on Environmental Management Systems. This standard forms the basis for the ISO 14001 concept, which is a system that helps manage the environment properly and is voluntary. The implementation of the ISO 14001 Environmental Management System is expected to improve the organization's environmental performance, ensure compliance with environmental regulations, and support the achievement of established environmental goals. ISO 14001 can be applied to organizations of various sizes, types, and business sectors.

### *2.5 Sustainability Reporting*

According to the 2021 GRI Standards, a sustainability report is a report prepared and published by an organization to provide information about the various economic, social, and environmental impacts arising from its operations. This information reflects both the positive and negative impacts generated by the organization's activities. The sustainability report serves as a communication tool for the company to stakeholders to show its commitment to sustainable business practices, social responsibility, and transparency in implementing good governance (Rahmannita, 2024).

The disclosure of a sustainability report reflects the company's accountability for the economic, social, and environmental impacts caused by its operational activities (Afifah, Fujianti, & Mandagie, 2022). By sharing sustainability information, the company aims to gain social legitimacy and maintain its reputation in the public eye. With growing public and investor awareness of environmental, social, and governance issues, this report is becoming increasingly important.

According to the 2021 GRI guidelines, disclosures include two types: general standard disclosures and specific standard disclosures. General standard disclosures aim to provide basic information about the organization, including its operational context, governance structure, and the company's approach to managing sustainability impacts. Meanwhile, specific standard disclosures cover material topics divided into three main categories: economic, environmental, and social.

### *2.6 Firm Value*

A company's value is an indicator that reflects how much the market values the overall performance and prospects of a company. Company value not only describes the current financial position, but also the expectations regarding the company's ability to generate profits and maintain business sustainability (Riadi, 2021)

A high company value reflects strong investor confidence in the company's prospects. In a study conducted by Gustinya (2022), it was also explained that company value is a measure of how much the company can provide prosperity to its shareholders, which is reflected in the stock price. An increase in stock value indicates that the company’s value is going up, as investors believe the company has good profit potential and sustainability. added that a company's value reflects the market's perception of management's success in running

operations that are efficient, ethical, and environmentally responsible. Companies with a good reputation in environmental sustainability generally have higher market value (Lestari & Khomsiyah, 2023).

### *2.7 Hypothesis Formulation*

#### 2.7.1 *Green Accounting, Sustainability Reporting, and Firm Value*

According to legitimacy theory, companies have a social contract with society to pay attention to its needs. Using green accounting is seen as a way to show environmental responsibility and can boost the company's image in the public eye. Spending on business practices to fulfill this social contract helps the company provide sustainability reports. The more a company spends on environmental costs, the more information it has about its environmental and social responsibilities. Therefore, the more it invests in environmental costs, the greater its legitimacy with shareholders, which can raise the company's value. So, the hypothesis is formulated like this:

H1a: Green accounting affects the sustainability reporting
H1b: Green accounting affects the firm value

#### 2.7.2 *Environmental Management System, Sustainability Reporting, and Firm Value*

Legitimacy theory posits that implementing EMS is a means for companies to gain social recognition and legitimacy through compliance with environmental norms and transparency in managing their ecological impact (Bahri & Cahyani, 2021). Research by Soedjatmiko et al. (2021) found that environmental management has a significant positive effect on firm value, indicating that companies with good environmental management tend to have higher firm value. ISO 14001 certification provides a competitive edge, improves operational efficiency, and strengthens reputation in the eyes of investors (Aprilasani et al., 2017; Sueb & Keraf, 2012). Research by Sari et al. (2025) also shows that ISO 14001 certification, as a representation of an environmental management system, positively impacts company value because it signals credibility and environmental responsibility to investors. So, the hypothesis is formulated like this:

H2a: Environmental management system affects the sustainabilty reporting
H2b: Environmental management system affects the firm value

#### 2.7.3 *Firm Size and Sustainability Reporting*

Company size describes how big or small a company's operations are. Larger companies generally have higher levels of operational activity and greater visibility in the public eye compared to smaller companies. According to legitimacy theory (Deegan, 2004), large companies tend to face higher pressure from society, investors, and regulators to increase information transparency. Therefore, large companies usually face greater pressure from the public, government, and investors to improve transparency and comply with sustainability reporting standards (Oktaviani & Amanah, 2019.).

So, the hypothesis is formulated like this:
H3: Firm value affects the sustainability reporting

#### 2.7.4 *Profitability, Sustainability Reporting, and Firm Value*

High profitability also allows management to increase information transparency as a form of accountability to stakeholders (Meinawati & Wirakusuma, 2020). Based on legitimacy theory (Deegan, 2004), companies that earn large profits tend to expand non-financial disclosures, such as sustainability reports, in order to maintain public trust and strengthen their social legitimacy.

Empirically, previous research has shown that profitability positively affects

sustainability report disclosure (Liana, 2019; Sitanggang & Paramitadewi, 2022; Meinawati & Wirakusuma, 2020). This indicates that companies generating high profits tend to use sustainability reporting as a strategy to strengthen their reputation and increase investor confidence (Meinawati & Wirakusuma, 2020). Therefore, the hypothesis is formulated as follows:

H4a: Profitability affects the sustainability reporting
H4b: Profitability affects the firm value

#### 2.7.5 *Leverage, Sustainability Reporting, and Firm Value*

According to the agency theory proposed by (Michael C Jensesn, 1976), leverage plays an important role in explaining the relationship between shareholders (principals) and managers (agents). High levels of company debt can create conflicts of interest between management and capital owners, as creditors pressure management to ensure the company meets its financial obligations. To minimize information asymmetry and maintain the trust of creditors and investors, companies tend to increase transparency through broader information disclosure, including in sustainability reports. In this way, leverage can be one of the factors that encourage companies to enhance disclosure as a form of accountability to external parties. Previous studies have shown that leverage plays a role in influencing the extent of a company's sustainability report disclosures.

Companies with high leverage have a larger proportion of debt, so they face stricter scrutiny from creditors. Creditors need adequate information to assess the company's ability to meet its financial obligations and manage the business risks it faces. Therefore, companies are encouraged to increase transparency through broader information disclosure, including economic, social, and environmental information presented in sustainability reports. This disclosure is expected to reduce information asymmetry, increase creditor trust, and demonstrate the company's commitment to long-term business sustainability. Thus, the hypothesis is formulated as follows:

H5a: Leverage affects the sustainability reporting
H5b: Leverage affects the firm value

#### 2.7.6 *Sustainability Reporting and Firm Value*

CSR disclosure can boost a company's reputation because the company's concern for environmental and social factors is seen as its concern for the continuity of its business, so investors will respond positively to this kind of business practice. Based on legitimacy theory, companies carry out CSR practices in order to legitimize the company in the eyes of their stakeholders. Previous research has confirmed this theory by providing evidence that CSR practices affect the company's value. Thus, the hypothesis is formulated as follows:

H6: Sustainability reporting affects the firm value

## 3. Research Methods

### *3.1 Population and Samples*

This study uses a quantitative approach with subjects being energy sector companies listed on the Indonesia Stock Exchange (IDX). In this study, data was collected from the company's sustainability and annual reports and analyzed quantitatively or statistically, with the main goal of testing the established hypothesis. This study was chosen because it aims to measure the impact of green accounting variables and environmental management systems on the value of energy sector companies listed on the IDX. 15 energy sector companies qualify as research samples. This study uses data from the 2022-2024 period (3 observation periods), so the data analyzed amounts to 45 company-years. Here’s the process of determining the data until we got a total of 45 data.

**Table 1. Samples**

| No | | Number of companies |
|---|---|---|
| 1 | Energy sector companies that were consistently listed on the Indonesia Stock Exchange during the 2022 – 2024 period. | 73 |
| 2 | Energy sector companies that have not published annual reports and sustainability reports on their company websites or on the Indonesia Stock Exchange website during the 2022 – 2024 period. | (22) |
| 3 | Energy sector companies that do not use GRI 2021 during the 2022 – 2024 period. | (29) |
| 4 | Energy sector companies on the Indonesia Stock Exchange that do not provide complete information regarding data according to the variables to be studied | (7) |
| 5 | Completed data for analysis | 15 |

*Source:* Indonesian Stock Exchange

### *3.2 Analysis*

This study uses Warp PLS 7.0 to test the research model. This software is used because the testing is done simultaneously on the relationships between the identified variables. The capability of this software to test models simultaneously is expected to support the construction of complex research models with 5 independent variables, namely green accounting (GA), environmental management system (EMS), company size (SIZE), profitability (PROF), and leverage (LEV). It then places one mediating variable, which is CSR disclosure (SR), and one dependent variable, which is firm value (FIRM_VAL).

In model testing, this study did not test the outer model because each variable was measured with only one indicator, so validity and reliability tests were not conducted. Therefore, the testing was carried out directly on the inner model by testing the structural model. Table 2 shows the results of the inner model testing on the structural model that was built.Based on Table 2, it appears that the P-value for APC, ARS, and AARS is <0.05, which means we can conclude that the model is fit. Next, AVIF and AFVIF are <3.3, meaning there are no signs of multicollinearity in the structural model, and finally, the GoF value is >0.36, which means that the structural model built is a strong model.

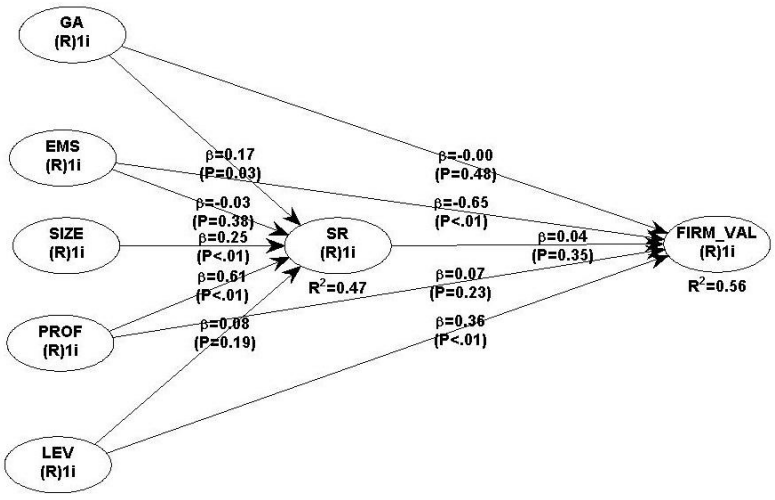



**Figure 1. The Result of Analysis**
*Source*: output of Warp PLS 7.0

Figure 1 shows the results of testing the structural model that was built. Based on this figure, the results can be presented in Table 3. Table 3 shows that hypothesis 1a is supported,

while hypothesis 1b is not supported. On the other hand, the analysis results indicate that hypothesis 2a is not supported, but hypothesis 2b is supported. Furthermore, hypothesis 3, hypothesis 4a, and hypothesis 5b are also supported, while hypotheses 4b and 5a are not supported.

**Table 3. Hypothesis Testing Results**

| No | Hypothesis | Value (P-Value) | Conclusion |
|---|---|---|---|
| 1 | H1a: Green accounting affects the sustainability reporting | 0,17 (0,03) | Supported |
| 2 | H1b: Green accounting affects the firm value | -0,00 (0,48) | Not Supported |
| 3 | H2a: Environmental management system affects the sustainabilty reporting | -0,03 (0,38) | Not Supported |
| 4 | H2b: Environmental management system affects the firm value | -0,65 (<0,01) | Supported |
| 5 | H3: Firm value affects the sustainability reporting | 0,25 (<0,01) | Supported |
| 6 | H4a: Profitability affects the sustainability reporting | 0,61 (<0,01) | Supported |
| 7 | H4b: Profitability affects the firm value | 0,07 (0,23) | Not Supported |
| 8 | H5a: Leverage affects the sustainability reporting | 0,08 (0,19) | Not Supported |
| 9 | H5b: Leverage affects the firm value | 0,36 (<0,01) | Supported |
| 10 | H6: Sustainability reporting affects the firm value | 0,04 (0,35) | Not Supported |

*Source:* Output of Warp PLS 7.0

## 4. Research Findings and Discussion

### *4.1 Green accounting affects the sustainability reporting*

The analysis shows that the hypothesis is supported. It means the higher the environmental cost, the more disclosure in the sustainability report. This means the bigger the costs a company spends on environmental activities, the more CSR practices there are. In other words, the environmental costs a company incurs are indeed really used to enhance CSR disclosure.

This supports the legitimacy theory which states that spending on business practices to meet this social contract helps companies provide complete sustainability reports. Without enough financial support to pay attention to environmental issues, companies cannot provide evidence to the public that they have run their business properly.

### *4.2 Green accounting affects the firm value*

Based on the test results that have been carried out, Green Accounting does not affect the company's value. These results do not support the hypothesis. The findings show that how high or low the costs a company spends on the environment are is not a crucial factor in investors' evaluation of a company.

The results of this study are in line with the research by Hadiwibowo et al. (2023), which stated that spending on the environment does not directly increase a company's value. This result does not support stakeholder theory. For companies that are still in the early stages of implementation, environmental costs are often not balanced with visible financial benefits. As a result, investors often ignore information related to environmental costs as a crucial component of company evaluation.

### *4.3 Environmental management system affects the sustainabilty reporting*

The analysis shows that an environmental management system does not affect the sustainability reporting. It means that H2a is not supported. The findings show that whether

companies have an environmental management system does not differ in sustainability practices. The results of this study are different from the previous research, which stated that spending on the environment by implemented EMS does not directly increase sustainability practices. This result does not support legitimacy theory.

### *4.4 Environmental management system affects the firm value*

Based on the test results conducted, the Environmental Management System affects the Company Value with a negative direction of influence. These results support the second hypothesis (H2b) that the Environmental Management System has an effect on the company's Value.

Environmental Management Systems like ISO 14001 are designed to help companies manage environmental impacts in a structured way, improve efficiency in resource use, and ensure compliance with environmental regulations. In practice, implementing ISO 14001 requires a large initial investment and operational costs, such as certification audits and updating eco-friendly technologies. The high cost is often seen by investors as a reduction in net profit. As a result, the market tends to respond negatively because it sees certification as a financial burden that doesn't guarantee direct economic benefits.

### *4.5 Firm value affects the sustainability reporting*

The analysis results show that company size affects sustainability practices, which means H3 is supported. These analysis results support legitimacy theory, which states that big companies have high risks, so they need to show their legitimacy to the public.

Larger companies tend to have more complex operational activities and broader relationships with various parties, such as investors, the government, and the public. That's why big companies usually have a higher need to share information related to their activities, including information about economic, social, and environmental performance presented in sustainability reports. The results of this study are in line with the research by Afifah et al. (2022), Oktaviani and Amanah (2019), Abdulsalam and Babangida (2020), and Dewi and Pitriasari (2019), which show that company size has a positive effect on sustainability report disclosure.

### *4.6 Profitability affects the sustainability reporting*

Based on the tests that have been conducted, profitability has been proven to affect sustainability reporting. Therefore, the first hypothesis stating that profitability influences sustainability reporting can be accepted. These results show that a company's ability to generate profit can influence the extent of sustainability information disclosure carried out by the company.

This research is supported by the study of Nioko and Hendrani (2024), which shows that profitability has a positive effect on sustainability report disclosure. According to the research by Liana (2019), Sitanggang and Paramitadewi (2022), as well as Meinawati and Wirakusuma (2020), they also show that profitability positively affects sustainability report disclosure.

### *4.7 Profitability affects the firm value*

The results of this study do not support the hypothesis that profitability affects company value. The results also do not support existing theories that suggest profitability sends a positive signal to investors, which would increase company value.

### *4.8 Leverage affects the sustainability reporting*

Based on the test results that have been carried out, leverage does not affect sustainability reporting. Therefore, the second hypothesis stating that leverage affects sustainability report disclosure cannot be accepted. This indicates that the use of debt is common in corporate financing structures, so the level of leverage is no longer a distinguishing factor in determining the extent of sustainability report disclosures.

The results of this study support the research by Fitriani et al. (2026), which showed that leverage does not affect the disclosure of sustainability reports. The results of this study are

also in line with the research by Rahmannita (2024), Sinaga and Teddyani (2020), Ulfa et al. (2025), and Bisma et al. (2023), who also found that leverage does not affect the disclosure of sustainability reports.

### *4.9 Leverage affects the firm value*

The analysis results support the hypothesis that leverage affects company value. This study shows that companies don't experience a negative impact of leverage, but investors can read that leverage sends a positive signal to investors, which increases the company's value. This result contradicts existing theories that suggest when a company faces high leverage, it is considered to have a higher default risk and is seen as unable to continue its business.

### *4.10 Sustainability reporting affects the firm value*

The results of this study do not support the hypothesis that sustainability practices affect company value. The results also do not support existing theories that suggest sustainability practices send positive signals to investors, thereby increasing company value.

## 5. Conclusion

This research shows that green accounting practices, company size, and profitability affect sustainability practices. This means that for energy companies, sustainability practices are important for companies that implement green accounting, have high profitability, and are large in size.

Overall, the findings illustrate that there are casuistic results in the energy sector. This is evident in the results of analyses that differ from previously established theories. It is seen in findings showing that green accounting, profitability, and sustainability reporting do not affect company value. However, environmental management systems and leverage do affect company value, with leverage having a positive effect on it. These research results should be understood carefully and considered within the context of the characteristics of energy companies in Indonesia.

The limitation of this research is that the results are very casuistic in energy companies but do not exist in other sectors.

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# A TROPICAL MULTI-SEMIRING FRAMEWORK FOR EVALUATING MSME DIGITAL FINANCING PATHWAYS

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***Abstract***
*Digitalization expands financing options for micro, small, and medium enterprises (MSMEs), yet each pathway presents a different configuration of cost, dependence, inclusion, and resilience. This study develops a tropical multi-semiring framework for evaluating banks, independent fintech providers, platform lending, Digital Credit Unions, and managed hybrid pathways under common rules. Five MSME profiles are calibrated using financing-need categories from Bank Indonesia's BISAID database and constraint characteristics reported by Statistics Indonesia; detailed provider and intervention parameters remain computational scenarios. Cost is evaluated through weighted accumulation and min-plus route selection, dependence through a maximum-based Tropical Financing Dependence Index, and inclusion and resilience through weakest-link operations. The resulting architecture is monotone under no-harm interventions, Pareto-consistent for nonnegative weights, and Lipschitz-stable to normalized perturbations. Baseline advantages are distributed: platform lending has the lowest cost, banks the lowest dependence, and the hybrid pathway the highest resilience. After adaptive three-intervention packages, Digital Credit Unions are most robust for four profiles, whereas the hybrid pathway is most robust for manufacturing; banks nevertheless retain distinct choice regions. Recommendations should therefore be profile-specific and transparent about assumptions.*
***Keywords:*** *MSMEs; digital finance; multi-semiring; tropical algebra; financing dependence.*

## 1. Introduction

Digitalization has become an important component of the transaction and financing infrastructure available to MSMEs. In the first quarter of 2026, QRIS acceptance reached approximately 44 million merchants, most of which were MSMEs, indicating that digital payment footprints have become increasingly extensive and may support creditworthiness assessment (Bank Indonesia, 2026a). Transaction data, cash-flow records, and service integration can reduce information asymmetry, accelerate verification, and broaden financing access for businesses that lack conventional collateral or an adequate formal credit history (Bank Indonesia, 2024; Teima et al., 2022).

Greater access does not imply that all financing pathways provide the same institutional quality. Banks may offer stability and prudential oversight, but their procedures can be burdensome for microenterprises. Independent fintech providers and platform lenders may accelerate disbursement, yet can increase dependence on data, payment channels, algorithms, market access, or technology vendors. Digital Credit Unions may strengthen member-based relationships, but still face digitalization costs, scale constraints, and vendor-dependence risks. Managed hybrid pathways may combine institutional strengths, although their effectiveness depends on contracts, interoperability, risk allocation, and partner substitutability.

Financing evaluation therefore cannot be reduced to a comparison of interest rates. Administrative charges, approval time, documentation burdens, collateral, data dependence, switching costs, accessibility, transparency, continuity, and recovery must be considered together. A single average can conceal a critical weakness: one pathway may be inexpensive but highly dependent, while another may be inclusive but insufficiently resilient. A suitable framework must preserve the distinct logic of each dimension before combining them at the decision stage.

Bank Indonesia's BISAID database provides profiles of MSMEs seeking development financing, while Statistics Indonesia's *Profile of Micro and Small Industries 2024* supplies official context concerning capital, business constraints, internet use, and marketing (Bank Indonesia, n.d.; Statistics Indonesia, 2025). These sources do not report every cost, platform-dependence, inclusion, resilience, and intervention variable for the same observational units. This study therefore adopts a methodological-computational design that combines officially calibrated profiles with explicitly labeled scenario parameters. The approach is more realistic than a purely illustrative example, but it is not presented as an empirical population estimate for Indonesian MSMEs.

The study addresses three questions. First, how do five financing pathways differ in cost, dependence, inclusion, and resilience across heterogeneous MSME profiles? Second, how do institution-neutral interventions change critical dependence sources and financing-autonomy margins? Third, which pathways remain preferable under different policy weights and feasibility thresholds? The contributions are: (1) a dimension-preserving multi-semiring evaluation; (2) the Tropical Financing Dependence Index (TFDI), Tropical Financing Autonomy Margin (TFAM), and Comparative De-locking Effect (CDE) as diagnostic tools; (3) integration of officially calibrated profiles with transparent computational scenarios; (4) symmetric comparison under common thresholds, interventions, tie rules, and sensitivity procedures; and (5) formal bounds, monotonicity, Pareto consistency, existence, perturbation stability, and piecewise-linear weight dependence.

## 2. Literature Review

### *2.1 Digital finance, transaction costs, and MSME heterogeneity*

Digital finance can reduce search, verification, and coordination costs, consistent with transaction-cost and MSME-digitalization perspectives (Williamson, 1985; OECD, 2021). Alternative data allow financial institutions to infer business activity from payments, sales, or supply chains, so decisions need not rely exclusively on conventional collateral. Bank Indonesia (2024) emphasizes the importance of innovative digital-financing models while recognizing that models must match business needs and capabilities. Consequently, disbursement speed, collateral, and financing price receive different importance for rural producers, marketplace traders, manufacturers, digital-service firms, and community suppliers.

### *2.2 Ecosystem dependence and contestability*

Digital ecosystems connect financing to data, payments, markets, visibility, and logistics (Adner, 2017; Chen et al., 2022). Platforms provide access to these resources but may create power asymmetries when rules, reputations, and customer relationships are not portable (Cutolo & Kenney, 2021; Yu & Sekiguchi, 2024). Dependence is not identical to platform use; it becomes problematic when an MSME lacks a realistic alternative, faces high switching costs, or loses data and reputation upon exit. Data portability and open finance can improve contestability, but require interoperable standards, security, meaningful consent, and alternative providers capable of using transferred data (OECD, 2024; Bank for International Settlements, 2026).

### *2.3 Institutional pathways and resilience*

Banks, fintech providers, platforms, Credit Unions, and hybrid partnerships represent different governance arrangements rather than a predetermined quality ranking. Resource-dependence theory explains how organizations manage reliance on actors controlling critical resources (Pfeffer & Salancik, 2003). Organizational resilience includes capacities to anticipate, cope with, and adapt to disruption (Duchek, 2020). In MSME finance, resilience concerns channel redundancy, interoperability, service continuity, recovery, and partner substitutability. Cooperative principles may support member control and inter-organizational collaboration (International Cooperative Alliance, n.d.), but any advantage is realized only when translated into digital capacity, data governance, security, and viable vendor choice (World Council of Credit Unions, 2025).

### *2.4 Tropical algebra and coordinated multi-semiring evaluation*

Let $E_{\min}$ and $E_{\max}$ denote the min-plus and max-plus layers on the extended real line. Their idempotent additions and common ordinary-additive product are

$$x \oplus_{\min} y = \min\{x, y\}, \qquad x \oplus_{\max} y = \max\{x, y\}, \qquad x \otimes y = x + y. \tag{1}$$

Minimum or maximum selects among competing alternatives, whereas ordinary addition accumulates sequential burdens (Baccelli et al., 1992). Inclusion and resilience use the meet operation on the unit interval,

$$([0,1], \wedge), \qquad x \wedge y = \min\{x, y\}. \tag{2}$$

A meet operation alone is not a full semiring. Therefore, the term *multi-semiring* is used operationally for a coordinated product of dimension-specific ordered structures, not to claim that the entire product is one semiring. This preserves each aggregation law and connects the outputs only afterward through a common burden order and a weighted Chebyshev map, consistent with multi-metric idempotent modeling (Somasundaram & Baras, 2011).

$$\mathcal{S} = \mathcal{E}_{\min} \times \mathcal{E}_{\max} \times ([0,1], \wedge) \times ([0,1], \wedge), \tag{3}$$

## 3. Research Methods

### *3.1 Design, data sources, and calibration*

The study uses a methodological-computational design. Financing-need ranges are calibrated using BISAID categories, and constraint characteristics are constructed with reference to BISAID, Statistics Indonesia (2025), and Bank Indonesia (2024). Each item is labeled as official data, calibrated profile, scenario parameter, or model output. Official data improve profile realism but do not convert the five profiles into five observed firms. Provider prices, administrative burdens, approval time, documentation, collateral, dependence, inclusion, resilience, readiness, and intervention effects remain transparent computational parameters.

**Table 1. Calibrated MSME profiles and principal constraints**

| Code | Profile | Financing need | Principal constraints |
|---|---|---|---|
| $h_1$ | Rural micro food producer | IDR 10-50 million | Working capital, documentation, raw materials, logistics |
| $h_2$ | Female marketplace trader | IDR 10-50 million | Working capital, digital visibility, payments, switching cost |
| $h_3$ | Small processing/manufacturing firm | Above IDR 100 million | Working capital/investment, collateral, technology, continuity |
| $h_4$ | Creative or digital-service firm | IDR 50-100 million | Alternative data, payments, reputation, interoperability |
| $h_5$ | Community-based commodity supplier | Above IDR 100 million | Inventory, logistics, coordination, alternative market channels |

*Source:* authors' calibration based on Bank Indonesia's BISAID, Statistics Indonesia (2025), and Bank Indonesia (2024); profiles are not five individual firms.

The alternative set comprises banks, independent fintech providers, platform lending, Digital Credit Unions, and managed hybrid pathways. The evaluation dimensions and operators are summarized below.

**Table 2. Dimension-specific aggregation and decision meaning**

| Dimension | Source components | Aggregation rule | Direction |
|---|---|---|---|
| Cost | Price, administration, time, documentation, collateral burden | Weighted sum within each route; minimum across admissible routes | Lower is better |
| Dependence | Data, payment, algorithm, vendor, market-channel exposure | Maximum critical source (TFDI) | Lower is better |
| Inclusion | Accessibility, usability, transparency, appeal | Meet/weakest link | Higher is better |
| Resilience | Continuity, interoperability, recovery, redundancy | Meet/weakest link | Higher is better |
| Policy comparison | Common burden vector | Weighted Chebyshev maximum | Lower is better |

*Source:* authors' specification based on Baccelli et al. (1992) and Somasundaram and Baras (2011).

### *3.2 Common state, feasibility, and dominance*

For profile $h$ and pathway $a$, define the evaluation state and the common burden vector by

$$X_{ha} = (C_{ha}, D_{ha}, I_{ha}, R_{ha}), \qquad b_{ha} = (C_{ha}, D_{ha}, 1 - I_{ha}, 1 - R_{ha}). \tag{4}$$

The common order is componentwise minimization,

$$b_{ha} \preccurlyeq b_{hb} \Leftrightarrow b_{ha,j} \leq b_{hb,j} \quad (j = 1, \dots, 4). \tag{5}$$

For threshold vector $\theta = (\bar{C}, \bar{D}, \underline{I}, \underline{R})$, the feasible set is

$$\mathcal{F}_h(\theta) = \{a: C_{ha} \leq \bar{C},\ D_{ha} \leq \bar{D},\ I_{ha} \geq \underline{I},\ R_{ha} \geq \underline{R}\}. \tag{6}$$

Within the same profile-specific decision space, pathway $a$ weakly dominates $b$ when

$$a \preccurlyeq_h b \Leftrightarrow b_{ha} \preccurlyeq b_{hb}, \qquad b_{ha} \neq b_{hb}. \tag{7}$$

### *3.3 Dimension-specific indicators and final envelope*

Cost components are normalized against fixed anchors. Within route $r$, they accumulate through a weighted ordinary sum, while the minimum across admissible routes implements min-plus selection:

$$C_{ha} = \min_{r \in \mathcal{R}_{ha}} \left( \sum_{\ell=1}^{m_r} \alpha_{r\ell}\, n_{ha,r\ell} \right), \qquad \alpha_{r\ell} \geq 0, \quad \sum_{\ell} \alpha_{r\ell} = 1. \tag{8}$$

Dependence is the maximum normalized exposure,

$$D_{ha} = \mathrm{TFDI}_{ha} = \max_{1 \leq j \leq p} d_{ha,j}. \tag{9}$$

Inclusion and resilience follow weakest-link aggregation,

$$I_{ha} = \min_{1 \leq j \leq q} i_{ha,j}, \qquad R_{ha} = \min_{1 \leq j \leq r} r_{ha,j}. \tag{10}$$

Autonomy capacity and its margin from the healthy threshold $\tau = 0.50$ are

$$A_{ha} = \min\{1 - D_{ha}, I_{ha}, R_{ha}\}, \qquad \mathrm{TFAM}_{ha} = A_{ha} - \tau. \tag{11}$$

For $w = (w_C, w_D, w_I, w_R)$ on the nonnegative simplex, the weighted Chebyshev envelope is

$$\Omega_w(b_{ha}) = \max\{w_C C_{ha}, w_D D_{ha}, w_I(1 - I_{ha}), w_R(1 - R_{ha})\},\ w_j \geq 0, \quad \sum_j w_j = 1. \tag{12}$$

### *3.4 Adaptive three-intervention packages and readiness*

Let $\mathcal{H} = \{h_1, \dots, h_5\}$, $\mathcal{A} = \{B, F, P, CU, H\}$, and $\mathcal{K} = \{K_1, \dots, K_8\}$. The candidate package set is

$$\mathfrak{P}_3 = \{P \subseteq \mathcal{K} : |P| = 3\}, \qquad |\mathfrak{P}_3| = \binom{8}{3} = 56, \quad 5 \times 5 \times 56 = 1{,}400. \tag{13}$$

The interventions are data and reputation portability ($K_1$), payment interoperability ($K_2$), alternative-data scoring ($K_3$), transparency and appeal mechanisms ($K_4$), vendor substitution and exit planning ($K_5$), multi-homing and channel redundancy ($K_6$), shared or modular infrastructure ($K_7$), and managed hybrid partnership ($K_8$). Every capability is available to every institutional alternative under the same definition and nominal intensity.

For the present experiment, institutional readiness is a primitive scenario coefficient,

$$\rho_{hak} \in [0,1], \qquad h \in \mathcal{H},\ a \in \mathcal{A},\ k \in \mathcal{K}, \tag{14}$$

representing the realizable fraction of intervention $k$ for profile $h$ through pathway $a$. It is not an official institutional rating or a permanent quality score. Future calibration may decompose readiness into profile relevance, implementation capacity, and interface compatibility, but that decomposition is not claimed to have generated the present tables.

Let $Z_{ha} \in [0,1]^s$ collect all normalized source components, $u_k$ be nominal intensity, and $\Delta_k$ be the signed source-effect vector. Package $P$ first updates source components,

$$Z_{ha}^P = \Pi_{[0,1]^s}(Z_{ha} + \textstyle\sum_{k \in P} \rho_{hak}\, u_k \Delta_k), \tag{15}$$

and then recomputes $C, D, I, R$, TFAM, and the burden vector. A candidate is retained only when

$$C_{ha}^P \leq C_{ha}, \quad D_{ha}^P \leq D_{ha}, \quad I_{ha}^P \geq I_{ha}, \quad R_{ha}^P \geq R_{ha}. \tag{16}$$

With equal weights $w^{(0)} = (1/4, 1/4, 1/4, 1/4)$, the adaptive package set is

$$\mathfrak{P}_{ha}^{\mathrm{opt}} = \underset{P \in \mathfrak{P}_{ha}^{NH}}{\arg\min} \Omega_{w^{(0)}}\big(b_{ha}^P\big). \tag{17}$$

All minimizers are optimal; a table may display one representative when several packages tie. The Comparative De-locking Effect measures reduction in the critical dependence source,

$$\mathrm{CDE}_{ha}^P = D_{ha} - D_{ha}^P. \tag{18}$$

### *3.5 Independent weight and threshold audits*

Preference sensitivity uses the tenths grid

$$\mathcal{W} = \left\{\left(\frac{m_1}{10}, \dots, \frac{m_4}{10}\right) : m_j \in \mathbb{Z}_{\geq 0},\ \textstyle\sum_{j=1}^4 m_j = 10\right\}, \qquad |\mathcal{W}| = \binom{13}{3} = 286. \tag{19}$$

At the nominal threshold, after feasibility and Pareto screening, the winner set is

$$\mathcal{M}_h(w) = \underset{a \in \mathcal{N}_h(\theta^{(0)})}{\arg\min}\ \Omega_w\big(b_{ha}^{\mathrm{opt}}\big). \tag{20}$$

A tie divides one credit equally, and the percentage frequency is

$$\kappa_{ha}(w) = \begin{cases} |\mathcal{M}_h(w)|^{-1}, & a \in \mathcal{M}_h(w), \\ 0, & a \notin \mathcal{M}_h(w), \end{cases} \qquad f_{ha} = \frac{100}{286} \sum_{w \in \mathcal{W}} \kappa_{ha}(w). \quad (21)$$

Feasibility sensitivity is a separate audit. With three levels for each of four thresholds,

$$\mathcal{T} = T_C \times T_D \times T_I \times T_R, \qquad |\mathcal{T}| = 3^4 = 81. \quad (22)$$

The percentage of tested regimes in which an adaptive pathway remains feasible is

$$\phi_{ha}(\theta) = \mathbf{1}\left[C_{ha}^{\text{opt}} \le \bar{C},\ D_{ha}^{\text{opt}} \le \bar{D},\ I_{ha}^{\text{opt}} \ge \underline{I},\ R_{ha}^{\text{opt}} \ge \underline{R}\right], \qquad g_{ha} = \frac{100}{81} \sum_{\theta \in \mathcal{T}} \phi_{ha}(\theta). \quad (23)$$

The 286 weight vectors are not nested in the 81-threshold loop. If $n_H, n_A, n_K, q, s, r, n_W, n_T$ denote the numbers of profiles, alternatives, interventions, interventions per package, source components, route components, weight vectors, and threshold combinations, the corrected worst-case time is

$$T = O\left(n_H n_A \binom{n_K}{q} (s + r) + n_H (n_A^2 + n_W n_A + n_T n_A)\right). \quad (24)$$

The fixed design is computationally small; combinatorial growth becomes important only when the intervention catalogue or package size expands.

### *3.6 Mathematical properties of the decision architecture*

The following results concern internal model consistency, not empirical validity of the scenario parameters.

**Lemma 1 (idempotent route selection).** Duplicating an admissible route does not change the selected cost, and adding a new route cannot increase it:

$$\min(C_1, \dots, C_m, C_j) = \min(C_1, \dots, C_m), \qquad \min(C_1, \dots, C_m, C_{m+1}) \le \min(C_1, \dots, C_m). \quad (25)$$

*Proof.* Minimum is idempotent, and the minimum over an enlarged set cannot exceed the previous minimum. This justifies min-plus language across routes, while weighted ordinary accumulation remains within a route.

**Proposition 1 (bounds).** For normalized indicators and $\tau \in [0,1]$,

$$0 \le A_{ha} \le 1, \qquad -\tau \le \text{TFAM}_{ha} \le 1 - \tau. \quad (26)$$

*Proof.* The three arguments $1 - D_{ha}$, $I_{ha}$, and $R_{ha}$ lie in [0,1]; their minimum therefore lies in the same interval.

**Proposition 2 (no-harm monotonicity).** If a package satisfies Equation (16), then for every nonnegative policy weight,

$$b_{ha}^P \preccurlyeq b_{ha}, \qquad \Omega_w(b_{ha}^P) \le \Omega_w(b_{ha}), \qquad \text{TFAM}_{ha}^P \ge \text{TFAM}_{ha}. \quad (27)$$

*Proof.* Each burden component cannot increase. Nonnegative multiplication and the maximum preserve componentwise order. The minimum defining autonomy cannot decrease. Strict improvement is not guaranteed when a changed component is nonbinding.

**Proposition 3 (Pareto consistency).** For two pathways in the same profile,

$$b_{ha} \preccurlyeq b_{hb} \Rightarrow \Omega_w(b_{ha}) \leq \Omega_w(b_{hb}) \quad \forall\, w \geq 0. \tag{28}$$

*Proof.* Multiplication by nonnegative weights and the maximum preserve the componentwise inequality. Hence Pareto filtering cannot remove a pathway with a strictly smaller envelope than its dominator.

**Proposition 4 (existence).** If the feasible nondominated set $\mathcal{N}_h(\theta)$ is finite and nonempty, then

$$\arg\min_{a \in \mathcal{N}_h(\theta)} \Omega_w(b_{ha}) \neq \varnothing. \tag{29}$$

*Proof.* A real-valued function on a finite nonempty set attains a minimum. Proportional tie allocation is a reporting convention, not an existence assumption.

**Proposition 5 (perturbation stability).** For burden vectors $b$ and $\tilde{b}$,

$$\left|\Omega_w(b) - \Omega_w(\tilde{b})\right| \leq \| w \odot (b - \tilde{b}) \|_\infty \leq \| b - \tilde{b} \|_\infty. \tag{30}$$

*Proof.* The difference between two maxima is bounded by the maximum componentwise difference. Thus, if every normalized burden component has absolute error at most $\varepsilon$, the envelope error is at most $\varepsilon$; under equal weights, the sharper bound is $\varepsilon/4$.

**Corollary 1 (piecewise-linear weight dependence).** For fixed $b$, $w \mapsto \Omega_w(b)$ is convex, continuous, and piecewise linear. Its active-component boundaries satisfy

$$w_j b_j = w_\ell b_\ell, \qquad j \neq \ell. \tag{31}$$

Consequently, winning pathways can change across finitely many weight regions without discontinuity in any pathway's score.

### *3.7 Worked calculation and computational sequence*

**Table 3. Reconstruction of the aggregate Bank baseline calculation**

| Stage | Scenario inputs | Calculation | Output |
|---|---|---|---|
| Cost | $n_1 = 0.440;\ n_2 = 0.300;\ n_3 = 0.500$ $n_4 = 0.360;\ n_5 = 0.505;\ \alpha = 0.20$ | $C = 0.20 \times (0.440 + 0.300 + 0.500 + 0.360 + 0.505) = 0.421$ | $C = 0.421$ |
| Dependence | $d_1 = 0.210;\ d_2 = 0.348$ $d_3 = 0.250;\ d_4 = 0.180;\ d_5 = 0.300$ | $D = max(d)$ | $D = 0.348$ |
| Inclusion | $i_1 = 0.720;\ i_2 = 0.640$ $i_3 = 0.560;\ i_4 = 0.680$ | $I = min(i)$ | $I = 0.560$ |
| Resilience | $r_1 = 0.700;\ r_2 = 0.620$ $r_3 = 0.650;\ r_4 = 0.680$ | $R = min(r)$ | $R = 0.620$ |
| Autonomy | $1 - D = 0.652;\ I = 0.560$ $R = 0.620$ | $A = min(0.652; 0.560; 0.620)$ $TFAM = A - 0.500$ | $A = 0.560$ $TFAM = +0.060$ |
| Feasibility | $\theta = (0.75; 0.75; 0.35; 0.40)$ | All four inequalities satisfied | Feasible |
| Equal-weight envelope | $w = (0.25; 0.25; 0.25; 0.25)$ | $\Omega = max(0.10525; 0.08700; 0.11000; 0.09500)$ | $\Omega = 0.110$ |
| Adaptive summary | $Baseline\ TFAM = 0.060$ $Adaptive\ TFAM = 0.157$ | $Gain = 0.157 - 0.060$ | $+0.097$ |

*Source*: authors' calculation. The cost-component vector is an explicit computational decomposition selected to reproduce the aggregate Bank row; it is not an additional empirical observation.

The program first evaluates 25 baseline cases. For every case, it enumerates 56 three-intervention packages and produces 1,400 candidate evaluations before no-harm screening. Surviving packages are ranked by the equal-weight envelope. The resulting adaptive states are then evaluated in two independent procedures: 286 weight vectors at the nominal threshold and 81 threshold combinations for feasibility. Ties divide one decision credit equally.

Design objectivity is supported by five procedures: common dimensions and anchors; the same eight capabilities and package size; no institutional bonus or penalty; explicit treatment of the hybrid alternative and ties; and profile-, weight-, and threshold-specific reporting. These procedures reduce structural bias but do not remove scenario uncertainty.

## 4. Research Findings and Discussion

### *4.1 Baseline conditions*

No pathway dominates every dimension. Platform lending records the lowest average cost but the highest dependence, lowest inclusion, and most negative autonomy margin. Banks have the lowest dependence and a positive TFAM, although their average cost is highest. Digital Credit Unions and managed hybrid pathways have intermediate costs and relatively strong inclusion and resilience; the hybrid pathway records the highest resilience.

**Table 4. Average baseline outputs and TFAM after adaptive packages**

| Alternative | Cost *C* | Dependence *D* | Inclusion *I* | Resilience *R* | Baseline TFAM | Adaptive TFAM |
|---|---|---|---|---|---|---|
| Bank | 0.421 | 0.348 | 0.560 | 0.620 | +0.060 | +0.157 |
| Independent fintech | 0.340 | 0.588 | 0.420 | 0.520 | -0.126 | -0.003 |
| Platform lending | 0.285 | 0.924 | 0.200 | 0.360 | -0.440 | -0.271 |
| Digital Credit Union | 0.327 | 0.450 | 0.620 | 0.620 | +0.040 | +0.187 |
| Managed hybrid pathway | 0.330 | 0.460 | 0.600 | 0.700 | +0.040 | +0.179 |

*Source:* model calculations using calibrated profiles and authors' computational scenario parameters.

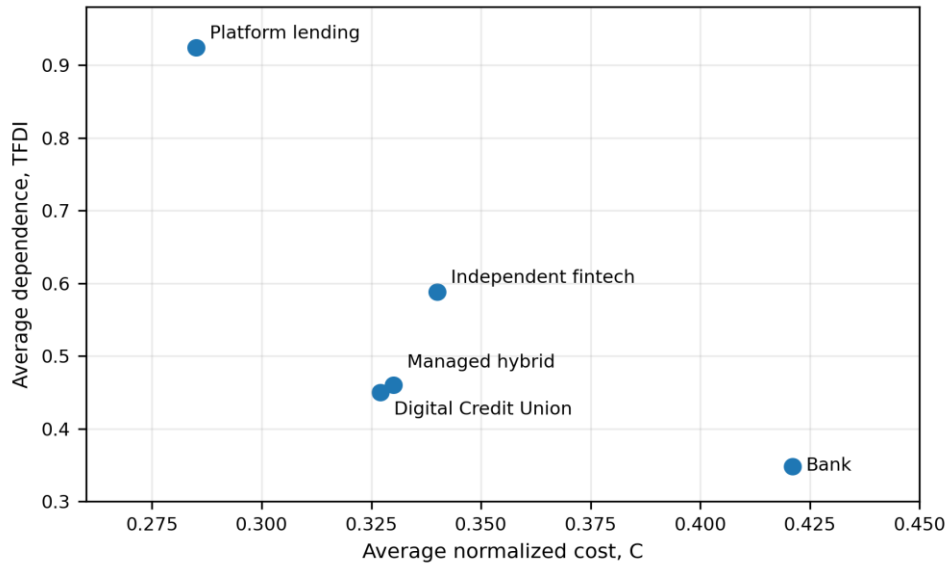



**Figure 1. Cost-dependence positions of financing pathways at baseline.**
*Source:* authors' calculations.

Under equal weights, baseline results differ by profile. The managed hybrid pathway has the lowest envelope for $h_1$; banks lead for $h_2$ and $h_4$; banks, Digital Credit Unions, and the hybrid pathway tie for $h_3$; and banks and the hybrid pathway tie for $h_5$. These outcomes are conditional scenario results, not a universal institutional ranking.

### *4.2 Effects of adaptive packages*

Average TFAM improves for every alternative. Digital Credit Unions rise from 0.040 to 0.187, managed hybrid pathways from 0.040 to 0.179, banks from 0.060 to 0.157, independent fintech approaches the neutral point, and platform lending remains negative. Improvement across every institutional form confirms that the intervention catalogue was not designed exclusively for one type. Differences reflect baseline conditions, active dependence sources, and assumed readiness.

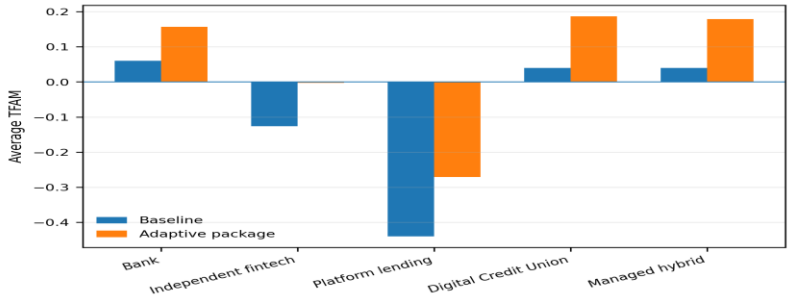



**Figure 2. Average autonomy margins before and after adaptive packages.**
*Source:* authors' calculations.

**Table 5. Equal-weight selections before and after adaptive packages**

| Profile | Baseline winner | Adaptive winner | Reported package | Adaptive TFAM |
|---|---|---|---|---|
| $h_1$ | Managed hybrid pathway | Digital Credit Union | $K_6 + K_7 + K_8$ | +0.174 |
| $h_2$ | Bank | Digital Credit Union | $K_3 + K_7 + K_8$ | +0.196 |
| $h_3$ | Bank, Digital Credit Union, managed hybrid | Managed hybrid pathway | $K_4 + K_5 + K_8$ | +0.220 |
| $h_4$ | Bank | Digital Credit Union | $K_3 + K_7 + K_8$ | +0.191 |
| $h_5$ | Bank, managed hybrid | Managed hybrid pathway | $K_4 + K_6 + K_8$ | +0.208 |

*Source*: authors' calculations. Each displayed package is one reporting representative if several equal-weight minimizers tie.

The nonnegative autonomy-margin gains are consistent with Proposition 2: every retained package satisfies the no-harm inequalities, so autonomy capacity cannot decrease. This is an internal guarantee of the screening rule, not evidence that implementation is costless or equally effective in real institutions.

### *4.3 Stability across weights and thresholds*

**Table 6. Frequency of selection across 286 post-intervention policy-weight vectors (%)**

| Profile | Bank | Digital Credit Union | Managed hybrid |
|---|---|---|---|
| $h_1$ | 20.6 | 45.5 | 33.9 |
| $h_2$ | 0.0 | 78.0 | 22.0 |
| $h_3$ | 0.0 | 25.9 | 74.1 |
| $h_4$ | 22.0 | 57.7 | 20.3 |
| $h_5$ | 23.8 | 67.5 | 8.7 |

*Source*: authors' calculations; independent fintech and platform lending receive 0% on the tested weight grid.

Digital Credit Unions are most frequently selected for $h_1$, $h_2$, $h_4$, and $h_5$, while the hybrid pathway is most frequent for $h_3$. Banks retain nonzero choice regions for $h_1$, $h_4$, and $h_5$. The equal-weight winner is not always the most robust across the full grid: for $h_5$, the hybrid pathway wins at equal weights, but Digital Credit Unions occupy the larger tested preference region. Corollary 1 explains how the winner can change while each pathway's score remains continuous. Frequencies describe internal stability across a discrete grid, not empirical market probabilities.

Across the 81 threshold combinations, banks, Digital Credit Unions, and managed hybrid pathways remain feasible for all five profiles after intervention. Independent fintech feasibility ranges from 44.4% to 100%, depending on the profile. Platform lending is infeasible under all tested combinations because dependence or inclusion remains outside the tested thresholds. These results do not establish general institutional inferiority; they describe the selected scenarios and three-intervention limit.

### *4.4 Economic, managerial, policy, and human-dignity implications*

Financing evaluation should distinguish contractual price from institutional exposure. A fast and inexpensive pathway may generate long-term dependence costs, while a stable pathway may impose higher process burdens. Decision makers should therefore consider cost, TFDI, inclusion, resilience, and TFAM jointly rather than selecting a pathway from one indicator.

Recommendations should be profile-specific. Rural producers require documentation, raw-material, and logistics support; marketplace traders require reputation portability, algorithmic transparency, and alternative payment channels; manufacturers require working-capital continuity and interoperability; digital firms require alternative data and vendor substitutability; community suppliers require coordination and distribution networks. Uniform programs risk overlooking binding constraints.

Interventions should be interpreted as capabilities available to multiple institutions. Data portability is not platform-specific, and shared infrastructure is not exclusive to cooperatives. Banks can partner with fintech providers, Credit Unions can use modular vendors, and platforms can improve contestability through portability and multi-homing. Symmetry in nominal model treatment does not imply equal implementation costs, regulatory feasibility, or organizational difficulty.

Human dignity cannot be reduced to one score. Its relevance emerges through economic agency: MSMEs should understand data use, have meaningful appeal mechanisms, be able to transfer reputation, choose among providers, and exit without losing business continuity. Consistent with the capability approach, digitalization is inclusive when it expands substantive choices rather than merely increasing transaction volume (Sen, 1999). Lower lock-in is therefore both an efficiency objective and a condition for informed consent, voice, and contestability.

## 5. Research Limitations and Future Directions

The profiles and financing-need ranges are calibrated from official sources, but the study does not use complete records for five observed individual firms. Detailed cost, dependence, inclusion, resilience, readiness, and intervention-impact parameters remain computational scenarios. Results should not be used to rate particular institutions or estimate behavior for all Indonesian MSMEs.

Symmetric dimensions and nominal intervention intensity reduce design bias but do not ensure equal implementation costs, regulatory constraints, or organizational capability. The 286 weight vectors and 81 threshold combinations demonstrate internal sensitivity, not external validation. The model omits default probability, provider profitability, over-indebtedness, cybersecurity, compliance, and temporal dynamics. Full numerical replication also requires

publication of the complete matrices $\rho_{hak}$, $u_k$, $\Delta_k$, source components, fixed normalization anchors, and computational code.

Future research should recalibrate parameters using detailed BISAID records, MSME surveys, provider interviews, expert elicitation, implementation costs, and before-and-after pilots. It should also estimate interaction effects among interventions, integrate uncertainty distributions, include dynamic transition costs, and test whether model-recommended packages improve observed autonomy and business continuity.

## 6. Conclusion

The tropical multi-semiring framework evaluates MSME digital-financing pathways while preserving the logic of each dimension. Cost is treated as an accumulated burden subject to minimum route selection, dependence as a critical maximum source, and inclusion and resilience as weakest links. A common burden order, feasibility and Pareto screening, and a weighted Chebyshev envelope then compare alternatives without concealing one weakness behind an average.

The research questions yield connected answers. First, the pathways exhibit distinct trade-offs: platform lending has the lowest baseline cost, banks the lowest dependence, and the managed hybrid pathway the highest resilience. Second, adaptive three-intervention packages applied under no-harm screening improve the autonomy margin of every alternative, although gains differ with profiles and readiness. Third, no universal winner emerges. Digital Credit Unions are most robust for four profiles in the weight audit, the hybrid pathway for manufacturing, and banks retain choice regions for several profiles.

Mathematically, route duplication does not alter min-plus selection; autonomy indices have explicit bounds; no-harm packages cannot worsen the burden envelope or TFAM; Pareto filtering is consistent with nonnegative weights; a selected alternative exists for every finite nonempty feasible set; and the envelope is Lipschitz-stable and piecewise linear in policy weights. These guarantees strengthen transparency and replicability but do not replace field calibration, regulatory analysis, or external validation.

The practical contribution is a transparent audit procedure: classify data status, calculate dimension-specific indicators, inspect critical sources and weakest links, screen feasibility, test dominance, apply symmetric no-harm capabilities, and conduct independent weight and threshold audits. Before operational policy or provider selection, the scenario parameters must be calibrated with field data, implementation costs, and regulatory constraints.

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# TOWARD A BEHAVIOR FORMATION ARCHITECTURE FOR THE DIGITAL ECONOMY: AN INTEGRATIVE LITERATURE FRAMEWORK

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***Abstract***
*The digital economy has altered the conditions under which behaviour takes shape. Knowledge about behaviour, however, remains organised along disciplinary lines rather than around the process by which behaviour emerges, and fragmentation of this kind restricts the accumulation of coherent knowledge while obscuring how individuals make sense of digital environments and convert that sense into action. This paper treats the integrative literature review as a theory-building method and uses it to synthesise seven foundational behavioural perspectives: Structure–Agency, Culture, Cross-Cultural Behaviour, Emotion, Decision-Making, Ethics and Justice, and Behavioural Economics. The synthesis yields a higher-order conceptual framework, the Behavior Formation Architecture (BFA), which redistributes those perspectives across four interdependent domains, Contextual Architecture, Interpretive Architecture, Behavioral Processing Architecture and Behavioral Enactment, and explains how behaviour is progressively formed within digital environments. Established theories are not displaced. They are repositioned as complementary mechanisms within a single explanatory system, and the architecture specifies a recursive relationship in which enacted behaviour reshapes the conditions from which it emerged. Three claims follow. Behaviour formation admits an integrative account; it is the conceptual mechanism linking digital environments with human action; and the integrative literature review is a serviceable instrument for building such an account. The framework provides a foundation for empirical and theoretical work on human-centred digital transformation.*
***Keywords***: *behaviour formation; digital economy; integrative literature review; behavioural science; digital transformation; conceptual framework.*

## 1. Introduction

Few forces are reshaping contemporary societies as profoundly as the digital economy. Artificial intelligence, digital platforms, big data analytics and algorithmic systems have rewritten the terms on which value is created, interaction occurs and decisions are made by individuals, organisations and governments alike. Asia illustrates this most sharply. Rapid digital transformation across the region has stimulated innovation, widened access to financial services and reinforced economic integration, even as it has intensified concerns about ethical governance, digital inequality and algorithmic bias. Such a trajectory indicates that the sustainability of the digital economy will not be settled by technological progress alone. It turns equally on how well the processes through which human behaviour develops in increasingly digital contexts are understood (VanderWeele, 2017).

Whatever their pace, these advances yield outcomes that remain dependent on human action. Technologies do not generate innovation, organisational change or societal value on their own. Those outcomes emerge instead from the ways individuals interpret digital environments, assign meaning to new technologies, process information and act on what they conclude (Faraj et al., 2018; Constantinides et al., 2018; Orlikowski, 2000). Such dependence runs through every level of the system. Employees determine whether emerging technologies are adopted at all. Managers exercise judgement in shaping digital strategy, consumers decide how far platforms warrant trust, and policymakers steer digital ecosystems through regulatory and governance choices. Digital transformation therefore succeeds or fails on the processes through which human behaviour develops and finds expression.

Recognition of this dependence has prompted a large body of research across the behavioural disciplines. Structural perspectives account for behaviour in terms of institutional arrangements and

human agency, whereas sociocultural approaches emphasise shared values and collective meanings. Psychological theories attend to cognitive and emotional processes; behavioural economics explains behaviour through bounded rationality and systematic decision biases; ethical perspectives take up moral judgement and responsible conduct. Between them these traditions have generated considerable insight into the mechanisms underlying human behaviour.

That knowledge remains organised around disciplinary boundaries rather than around the process of behaviour formation itself. Reviews of digital transformation reach this conclusion with some consistency. The field advances through fragmented theoretical perspectives, and stronger conceptual integration is needed if complex human and organisational phenomena are to be explained (Vial, 2019; Nadkarni & Prügl, 2021; Verhoef et al., 2021; Reis et al., 2023). Individual studies illuminate specific behavioural mechanisms. What they offer far less often is an account of how contextual conditions, meaning construction, behavioural processing and enactment jointly produce behaviour, with the result that the literature holds a rich collection of explanations and no overarching architecture that would integrate them. The principal theoretical limitation, this study argues, is therefore an absence of integrative architecture rather than an absence of behavioural theories. Existing theories explain particular dimensions of behaviour; they rarely clarify how those dimensions interact as components of a unified behavioural system. Theoretical fragmentation of this kind constrains the cumulative development of behavioural knowledge, and does so most acutely within the multidisciplinary setting of the digital economy.

The study addresses that limitation through an integrative literature review (ILR), synthesising insights from seven foundational behavioural perspectives: Structure–Agency, Culture, Cross-Cultural Behaviour, Emotion, Decision-Making, Ethics and Justice, and Behavioural Economics. These are not treated as alternative or competing explanations. The review repositions them instead according to the distinct yet complementary roles they play within the process of behaviour formation, and the synthesis issues in the **Behavior Formation Architecture (BFA)**. BFA is an integrative literature framework that conceptualises behaviour formation as a dynamic process arising from the interaction of four interrelated domains, Contextual Architecture, Interpretive Architecture, Behavioral Processing Architecture and Behavioral Enactment, all of them embedded within the wider digital environment.

Three contributions follow. The first is to behavioural science, where the study moves beyond isolated theoretical perspectives towards an integrated understanding of how behaviour is formed. The second is to the digital transformation literature, in which behaviour formation is positioned as the conceptual mechanism connecting digital environments with human action. A third contribution is methodological, illustrating the potential of the integrative literature review as a theory-building approach capable of consolidating dispersed theoretical knowledge into a coherent conceptual architecture. Taken together, they provide a stronger foundation for future research on human-centred digital transformation, ethical governance and human flourishing.

## 2. Literature Review

### *2.1 Human Behaviour in the Digital Economy*

The emergence of the digital economy has altered the contexts in which human behaviour develops and is expressed. Digital technologies transform organisational structures, business models and patterns of social interaction; in doing so they also reshape how individuals interpret information, construct meaning, regulate emotion, decide and respond to environments that change quickly. Understanding human behaviour has become essential to explaining digital transformation for precisely this reason. Technological innovations generate organisational and societal value only once they are translated into purposeful human action (Faraj et al., 2018; Verhoef et al., 2021).

Within digital environments, behavioural responses arise from an ongoing interplay between technological infrastructures, institutional arrangements, cultural norms, psychological processes and ethical considerations. The features of a technology cannot on their

own account for decisions such as whether to adopt artificial intelligence or to engage with a platform-based ecosystem. Those responses are shaped, rather, by how individuals read their surrounding context, process the information available to them, weigh possible courses of action and finally translate their evaluations into behaviour. Behaviour is better understood, then, as a multidimensional formation process than as a direct response to technological change. Existing behavioural research nevertheless remains dispersed across theoretical traditions, most studies examining specific mechanisms while the broader process through which behaviour is formed goes unaddressed. Fragmentation of this kind limits any integrated understanding of behaviour in the digital economy, and it is what motivates the more comprehensive conceptual explanation attempted here.

### *2.2 Foundational Perspectives on Behaviour Formation*

Behaviour formation has been examined through multiple disciplinary traditions, each illuminating a particular mechanism. To prepare the ground for integration, the seven perspectives reviewed here are organised according to the functional stage of behaviour formation to which they principally contribute, rather than by discipline. This organisation foreshadows the four architectural domains developed in Section 4 and makes explicit that each domain integrates more than one tradition.

#### *1) Contextual foundations: Structure–Agency*

Structure–Agency theory explains behaviour through the interplay of institutional arrangements, organisational structures and human agency (Giddens, 1984; Archer, 1995; Emirbayer & Mische, 1998; Stones, 2005). Behaviour is socially embedded, emerging from the opportunities and constraints established by broader systems, yet reproduced and transformed through situated action. Applied to digital settings, the tradition shows technological infrastructures operating less as fixed determinants than as structures enacted in use, since individuals constitute the very structures that go on to shape their behaviour (Orlikowski, 2000). External conditions are well handled by structural accounts. What remains underspecified is how those conditions come to be interpreted before any response emerges.

#### *2) Interpretive foundations: Culture and Cross-Cultural Behaviour*

Cultural and cross-cultural perspectives argue that behaviour is shaped through shared meanings, values, identities and norms (Hofstede, 2001; Schwartz, 1992; Schein, 2010; Triandis, 1995; House et al., 2004). Rather than reacting directly to objective conditions, individuals actively construct meaning from the environments in which they are situated, so that the same technological setting often gives rise to different behavioural responses because interpretation is culturally shaped. In digital settings, this culturally shaped interpretation increasingly operates on content pre-filtered by recommendation algorithms, so that cultural variation in meaning-making interacts with, rather than simply precedes, platform-driven personalisation. These perspectives clarify how contextual conditions become behaviourally meaningful. The subsequent transformation of interpretation into behavioural readiness they leave largely unexplained.

#### *3) Processing foundations: Emotion and Behavioural Economics*

Psychological and behavioural economics perspectives focus on the internal processes through which interpreted meaning is transformed into behavioural readiness. Research on emotion highlights the roles of affective appraisal and emotion regulation in shaping behavioural responses (Lazarus, 1991; Gross, 1998; Barsade & Gibson, 2007). Behavioural economics, in parallel, shows decision-making to be constrained by bounded rationality, heuristic thinking and systematic cognitive biases rather than governed by fully rational evaluation (Simon, 1997; Kahneman, 2011; Tversky & Kahneman, 1974; Gigerenzer, 2008; Thaler & Sunstein, 2008). Between them these perspectives explain how individuals interpret information, regulate emotional responses and balance competing motivations before behavioural

intentions emerge. Continuous, granular feedback from digital platforms, delivered through metrics, notifications and algorithmically timed prompts, engages these affective and heuristic processes with a frequency and immediacy that pre-digital environments rarely afford. A recurring difficulty is that such work proceeds in isolation from the structural and cultural contexts that condition the very cognitive and affective processes it describes.

***4) Enactment foundations: Decision-Making, Ethics and Justice***

Decision-making and ethical perspectives help explain how behavioural intentions are translated into observable action. Decision theory focuses on how individuals convert intentions into behaviour when operating under constraint, whereas ethics and justice perspectives emphasise that enactment is also shaped by moral judgement, perceptions of fairness and a sense of social responsibility (Rawls, 1971; Greenberg, 1990; Jones, 1991; Treviño, 1986; Rest, 1986). In digital settings, enactment encompasses responsible technology use, ethical use of artificial intelligence, adaptive behaviour and sustainable digital participation. Behavioural outcomes are thus well described. Integration with the contextual and psychological mechanisms that precede action is, however, thin.

### *2.3 Comparative Synthesis of Behavioural Perspectives*

Behavioural science provides rich explanations of human behaviour, and the review shows those explanations to be organised by discipline rather than by the process through which behaviour is formed. Each perspective captures an important mechanism. None captures the dynamic interaction among contextual conditions, interpretation, processing and enactment. Table 1 sets out the core assumption, primary mechanism and principal contribution or limitation of each perspective, and identifies the domain of the proposed Behavior Formation Architecture to which it contributes. The mapping is deliberately many-to-one. Each of the four domains integrates one or more traditions, so that what results is genuine synthesis and not a relabelling of existing categories.

**Table 1. Comparative synthesis of behavioural perspectives underpinning the Behavior Formation Architecture**

| Perspective | Core assumption | Primary mechanism | Principal contribution / limitation | BFA domain |
|---|---|---|---|---|
| Structure–Agency | Behaviour is enabled and constrained by institutional and technological structures, yet reproduced through agency | Contextual influence | Explains external conditions; underspecifies internal interpretation | Contextual Architecture |
| Culture | Behaviour is shaped by shared values, identities and norms | Meaning construction | Explains why identical conditions yield different responses; limited on processing | Interpretive Architecture |
| Cross-Cultural Behaviour | Interpretation of environments is culturally embedded and varies across settings | Comparative interpretation | Explains behavioural variation; limited on internal mechanisms | Interpretive Architecture |
| Emotion | Behaviour is regulated by affective appraisal and emotion regulation | Affective processing | Explains motivational and affective readiness; often isolated from context | Behavioral Processing Architecture |
| Behavioural Economics | Choice is bounded, heuristic and susceptible to bias | Cognitive processing | Explains departures from rational choice; often decontextualised | Behavioral Processing Architecture |
| Decision-Making | Intentions are translated into action under constraint | Action selection | Explains enactment of behaviour; limited integration with antecedents | Behavioral Enactment |
| Ethics and Justice | Action is governed by moral judgement and fairness | Normative evaluation | Explains responsible conduct; limited integration with preceding mechanisms | Behavioral Enactment |

*Source*: Authors' own work

### *2.4 Toward a Behavior Formation Architecture*

What the comparative synthesis indicates is that existing behavioural theories are best read as complementary mechanisms, each operating within a different domain of behaviour formation, and not as rivals for a single explanatory position. Their individual explanatory strength is not in question. Their conceptual isolation from one another is. The literature provides a wide range of explanations for human behaviour while lacking any overarching architecture that would integrate those perspectives into a coherent account of the formation process.

The **Behavior Formation Architecture (BFA)** is proposed here to meet that need, as a higher-order conceptual synthesis developed through an integrative literature review. Established theories are reorganised, not displaced, into four interdependent domains, Contextual Architecture, Interpretive Architecture, Behavioral Processing Architecture and Behavioral Enactment, which together explain how behaviour is progressively formed through the interaction of external conditions with internal mechanisms in the digital economy.

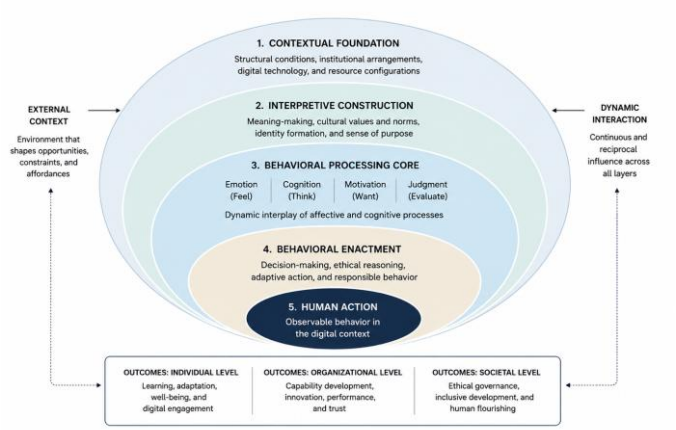



**Figure 1. The Behavior Formation Architecture (BFA): an integrative literature framework for behaviour formation in the digital economy.**

Figure 1 presents the architecture as an integrated system of four mutually reinforcing domains operating within the digital environment. Contextual Architecture represents the external institutional, technological and organisational conditions that shape behavioural opportunities. Interpretive Architecture explains how individuals construct meaning from those conditions through values, identities and cultural frames. That meaning is then transformed within the Behavioral Processing Architecture, where affective, cognitive, motivational and judgemental mechanisms interact to produce behavioural readiness, and Behavioral Enactment marks the stage at which readiness is converted into observable action through decision-making and ethical reasoning.

The digital environment within this architecture is no passive setting. It permeates each domain, amplifying contextual signals, accelerating interpretive processes and continually reshaping the informational conditions that bear on both processing and enactment. The architecture is recursive rather than linear, and that distinction carries weight. Behavioural actions feed back into the surrounding context through organisational learning, technological adaptation and institutional change. Formation therefore proceeds as a continuing cycle rather than a sequence terminating in a single behavioural outcome.

## 3. Research Methods

### *3.1 Research Design*

An integrative literature review (ILR) is adopted here to develop a higher-order conceptual explanation of behaviour formation in the context of the digital economy. Narrative reviews summarise existing knowledge and systematic reviews synthesise empirical evidence; the ILR does something different, critically evaluating, comparing and integrating diverse theoretical perspectives to generate new conceptual insights and extend existing theory (Torraco, 2005, 2016; Whittemore & Knafl, 2005; Snyder, 2019; Webster & Watson, 2002). Recent methodological advances have established the approach as a rigorous instrument of theory building in management and organisation research, capable of producing original conceptual contributions rather than descriptive syntheses alone (Elsbach & van Knippenberg, 2020; Post et al., 2020; Cronin & George, 2023).

### *3.2 Review Procedure*

The review followed established methodological guidance for integrative literature reviews (Torraco, 2005, 2016; Whittemore & Knafl, 2005; Snyder, 2019), proceeding through four sequential stages of problem identification, literature selection, critical evaluation and integrative synthesis.

***1) Stage 1: Problem identification***

The first stage defined the conceptual problem underpinning the review. Substantial scholarship across sociology, psychology, behavioural economics, organisation studies and ethics has generated rich explanations of human behaviour, yet these perspectives have largely evolved within separate disciplinary traditions. What the literature offers as a result are fragmented accounts of behavioural mechanisms, with relatively limited insight into how behaviour emerges through the interplay of contextual, interpretive, psychological and behavioural processes. This conceptual fragmentation constitutes the central research problem of the present study.

***2) Stage 2: Literature selection***

The review employed purposive theoretical sampling to identify perspectives representing the major traditions of behavioural science. Rather than seeking exhaustive coverage, it focused on traditions that jointly explain complementary mechanisms of behaviour formation. Seven perspectives were selected: Structure–Agency, Culture, Cross-Cultural Behaviour, Emotion, Decision-Making, Ethics and Justice, and Behavioural Economics. Selection followed four criteria: each represents an established tradition with substantial influence on behavioural research; each explains a distinct mechanism of behaviour formation; together they span the contextual, interpretive, psychological and behavioural dimensions; and, despite this complementarity, they have rarely been synthesised into a unified explanation. Foundational theories were complemented by peer-reviewed work published principally between 2019 and 2026 on digital transformation, the digital economy, responsible innovation and human-centred digital development.

***3) Stage 3: Critical evaluation***

Selected literature was analysed conceptually rather than methodologically. Each perspective was examined along four analytical dimensions: core theoretical assumptions, primary behavioural mechanism, principal theoretical contribution and conceptual limitation. Rather than assessing empirical robustness, this stage identified complementary explanatory mechanisms and revealed the conceptual gaps that prevent an integrated account of behaviour formation.

***4) Stage 4: Integrative synthesis***

The final stage reorganised the perspectives according to their functional roles in behaviour formation. Instead of retaining disciplinary classifications, the synthesis grouped complementary mechanisms into four higher-order domains—Contextual

Architecture, Interpretive Architecture, Behavioral Processing Architecture and Behavioral Enactment—whose interaction constitutes the proposed Behavior Formation Architecture (Figure 1).

### *3.3 Review Framework*

To enhance transparency, the review procedure is summarised in Figure 2, which illustrates how fragmented behavioural perspectives were synthesised into the proposed architecture.

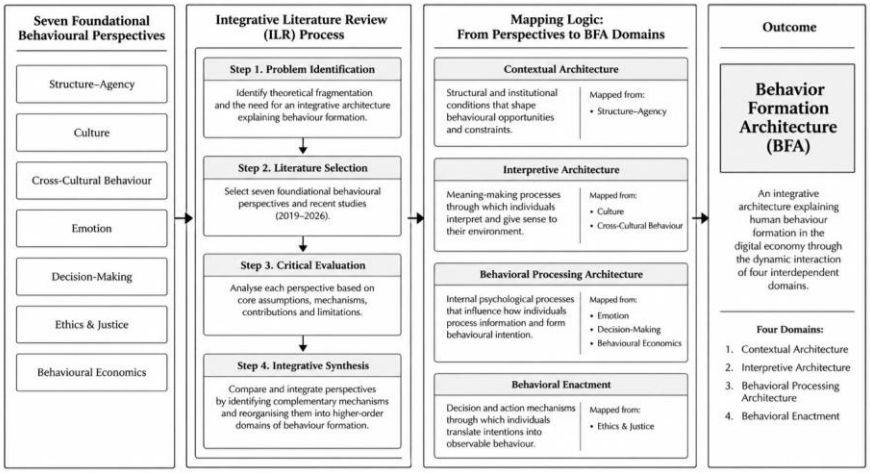



**Figure 2. The integrative literature review process for developing the Behavior Formation Architecture.**

The review begins with the identification of fragmented behavioural perspectives, followed by purposive selection, critical evaluation of theoretical mechanisms, and integrative synthesis. Rather than producing a taxonomy of theories, the process culminates in the Behavior Formation Architecture, which constitutes the study's principal theoretical contribution.

### *3.4 Methodological Trustworthiness*

Statistical generalisability is not the aim of an integrative literature review, but conceptual rigour remains essential to theoretical credibility (Cronin & George, 2023). Four strategies were adopted to that end. Transparency was pursued by documenting the rationale underlying theory selection and synthesis alike, and conceptual pluralism by treating behavioural theories as complementary sources of insight rather than competing explanations. Assessing every perspective against the same evaluation criteria preserved analytical consistency and permitted systematic comparison across traditions. The architecture itself, finally, is positioned as a higher-order synthesis that organises existing behavioural knowledge, and is not offered as a substitute for the theories on which it draws.

## 4. Development of the Behavior Formation Architecture

### *4.1 An Integrative Architecture of Behaviour Formation*

Read together, the seven perspectives differ less in what they claim than in where they look. Structural perspectives attend to the conditions that make behaviour possible; cultural perspectives to how individuals interpret those conditions; psychological and behavioural-economic perspectives to the internal processes by which interpretation becomes behavioural readiness; decision-making and ethical perspectives to the translation of intention into observable action. Each illuminates a genuine mechanism, and none is sufficient on its own to explain how behaviour emerges within the complex realities of the digital economy. Behaviour formation is inherently multidimensional, and it is that multidimensionality which the architecture developed below is built to accommodate.

### *4.2 Why the Digital Economy Requires This Architecture*

The digital economy does not merely provide a setting to which the seven perspectives are subsequently applied. Several of its properties bear directly on how the architecture's domains must be specified, and each is addressed within the domain it principally affects. Algorithmic mediation and personalisation change what is available for interpretation in the first place, since platforms pre-select and rank the informational field individuals encounter, a condition without a clear equivalent in cultural theories developed for unmediated social environments. Continuous feedback and datafication compress the interval between behaviour and its contextual consequences, so that reinforcement, ordinarily a slow and dispersed process in institutional and cultural theory, becomes near-instantaneous and machine-governed. Digital affordances, such as variable reward schedules and engineered notification timing, intervene directly in affective and motivational processing rather than operating only as external stimuli awaiting cognitive appraisal. The speed and scalability of digital enactment, finally, allow a single behavioural instance to be replicated and propagated far faster than organisational learning or institutional evolution have historically proceeded. These properties are not illustrations layered onto a general behavioural account; they require the four domains developed below to be specified differently than they would be for a non-digital environment.

#### *4.2.1 Domain I: Contextual Architecture*

Contextual Architecture represents the external conditions that shape behavioural opportunities and constraints. Behaviour does not emerge in isolation. It is embedded within institutional arrangements, organisational structures, technological infrastructures and governance systems. Drawing on Structure–Agency theory, the domain treats context less as a direct determinant of behaviour than as the environment in which formation begins, an environment itself enacted through use rather than fixed in advance (Orlikowski, 2000). In the digital economy this contextual layer extends beyond Orlikowski's enacted structures. Platform architectures and datafication practices render institutional conditions continuously loggable, algorithmically governed and revisable in real time, so that context is structured not merely through use but through ongoing, machine-mediated reconfiguration, a condition classical Structure–Agency theory was not built to specify. What the domain contributes is a location for the origin of behaviour in conditions that are structured yet mutable. Its limit, which the next domain addresses, is that contextual conditions acquire behavioural significance only once they have been interpreted.

#### *4.2.2 Domain II: Interpretive Architecture*

Interpretive Architecture explains how individuals construct meaning out of contextual conditions. Behavioural responses are mediated by values, identities, cultural norms and socially shared interpretations rather than arising as direct reactions to objective environments. Its foundations lie in the cultural and cross-cultural traditions, which show individuals interpreting digital environments through belief systems already in place and producing different responses to conditions that are much the same. Personalisation and algorithmic curation complicate this account further. Digital platforms pre-select and rank the very material available for interpretation, so that meaning construction operates on an informational environment already shaped by prior algorithmic inference about the individual, not on a neutral field of contextual signals, a condition cultural theories developed for unmediated social environments do not anticipate. Behavioural variation of the kind structural accounts cannot reach is what this domain explains. It bridges external structure and internal processing, and what distinguishes it from Contextual Architecture is a focus on subjective meaning in place of objective condition.

#### *4.2.3 Domain III: Behavioral Processing Architecture*

Behavioral Processing Architecture is the internal mechanism through which interpreted meaning develops into behavioural readiness. It gathers emotion regulation,

cognitive evaluation, motivation, judgement and bounded rationality into a unified account of behavioural processing. Emotion, cognition and decision-making do not operate here as separate functions; the architecture conceptualises them as interdependent processes running simultaneously, so that individuals interpret information, regulate emotional responses, weigh competing motivations and manage uncertainty before any behavioural intention emerges. Digital affordances intervene directly at this level. Notification design, variable-ratio reward schedules and gamified feedback are engineered to engage affective appraisal and motivational processing rather than merely to inform cognition, so that part of the processing this domain describes is triggered by design choices external to the individual rather than arising solely from internal deliberation, a mechanism with no clear analogue in pre-digital behavioural-economic accounts. Explicating that internal transformation addresses a critical explanatory gap left between interpretive accounts and behavioural enactment, and it is what makes this domain the core explanatory mechanism of the framework.

#### *4.2.4 Domain IV: Behavioral Enactment*

Behavioral Enactment concerns the translation of behavioural readiness into observable action. Behaviour is realised through decision processes shaped by ethical reasoning, fairness perceptions and contextual judgement. In digital settings this encompasses responsible technology use, ethical adoption of artificial intelligence, adaptive organisational behaviour and sustainable digital participation. What distinguishes enactment here from enactment in analogue settings is speed and scale. A single digital action can be replicated, logged and propagated near-instantaneously, so its consequences return to the contextual domain far faster than organisational learning or institutional evolution have historically operated. The domain's contribution is to treat action as a generative moment rather than an endpoint. Enacted behaviour reshapes contextual conditions through organisational learning, technological adaptation and institutional evolution, closing the recursive loop that separates the architecture from linear behavioural models.

#### *4.2.5 Inter-Domain Mechanisms and the Formation Sequence*

Identifiable transition mechanisms, rather than assertion, connect the four domains, and the explanatory work of the architecture lies in these transitions rather than in the domains themselves. Formation proceeds or breaks down at each transition, which is why specifying the mechanisms is what separates an explanatory architecture from a taxonomy of stages. Three forward transitions and one recursive return are proposed.

Contextualisation to interpretation is governed by *salience and framing*. Contextual conditions acquire behavioural significance only once attended to and rendered meaningful; the governing mechanism is selective attention coupled with the activation of cultural and identity schemata (Emirbayer & Mische, 1998; Hofstede, 2001). A contextual signal that is not attended to, or that is framed through an incongruent schema, does not enter formation, which is why identical conditions initiate divergent trajectories.

The move from interpretation to processing turns on *appraisal and motivational engagement*. Interpreted meaning enters processing only when appraised as self-relevant and affectively charged (Lazarus, 1991; Barsade & Gibson, 2007). Meaning that is cognitively understood yet motivationally inert generates no behavioural readiness. Here is the point at which endorsed values may fail to mobilise action, and here, accordingly, is the first locus of the value–action gap.

Passage from Behavioral Processing to Behavioral Enactment occurs through the volitional translation of readiness into action, contingent on the availability of

contextual opportunity. Behavioural intentions are realised only where individuals exercise volitional control within conditions that permit action (Ajzen, 1991; Sheeran & Webb, 2016). Constrain the opportunity, or fail to convert the readiness, and the well-documented intention–behaviour gap appears. Opportunity is itself embedded within the surrounding context, so this transition reconnects enactment to the conditions represented in Contextual Architecture, making opportunity an endogenous component of behaviour formation rather than an external influence upon it.

Feedback from Behavioral Enactment to Contextual Architecture is driven by sedimentation and reinforcement, and completes the recursive cycle. Behaviour does not end with enactment. Repeated actions become embedded in organisational routines, social norms and technological infrastructures, reshaping the contextual conditions that bear on subsequent behaviour (Orlikowski, 2000; Bandura, 1986). Reinforcement that corrects existing patterns tends to stabilise the cycle, whereas reinforcement that accumulates generates amplifying dynamics. Digital environments tilt towards the latter. Algorithmic systems continuously reward, prioritise and reproduce prior behaviour, allowing early enactments to exert disproportionate influence over what is formed later.

### *4.3 Propositions*

Four propositions follow from these mechanisms and render the architecture testable. Each specifies a directional relationship, its governing mechanism, and the condition under which that relationship strengthens or weakens (Table 2). The propositions form a closed loop, which allows the architecture to predict not only how behaviour is formed but where and why formation fails.

**Table 2. Propositions specifying the transitions of the Behavior Formation Architecture**

| | Proposition | Governing mechanism | Moderating / boundary condition |
|---|---|---|---|
| P1 | The influence of contextual conditions on behaviour is mediated by interpretive construction. | Selective attention and schema activation | Mediation strengthens as the novelty or ambiguity of the digital environment increases. |
| P2 | Interpreted meaning propagates to behavioural processing only when appraised as self-relevant and affectively engaged. | Appraisal and motivational engagement | Propagation fails absent motivational engagement, irrespective of the strength of the underlying values. |
| P3 | Behavioural readiness translates into enactment in proportion to volitional control and contextual opportunity. | Intention formation and volitional control | The readiness–enactment relationship weakens as contextual constraint increases. |
| P4 | Enacted behaviour reconfigures contextual conditions, closing the formation loop. | Sedimentation and reinforcement | The loop is amplifying under algorithmic reinforcement and stabilising otherwise. |

### *4.4 The Value–Action Gap as Inter-Domain Misalignment*

Behavioural research has long been troubled by the persistent discrepancy between what individuals value and how they ultimately behave, a pattern commonly referred to as the value–action gap. Existing explanations typically attribute the inconsistency to shortcomings within a single construct, such as weak attitudes or inadequate behavioural intentions (Kollmuss & Agyeman, 2002). The architecture proposed here conceptualises the gap instead as a

misalignment across domains, a reframing that allows the point of discontinuity to be located rather than merely named.

Two forms of inter-domain misalignment follow from the proposed transition mechanisms. The first occurs between Interpretive Architecture and Behavioral Processing Architecture, where individuals interpret and endorse particular values without appraising those values as personally meaningful or self-relevant. Such values remain cognitively recognised yet motivationally inert, acknowledged intellectually but unable to generate behavioural readiness. The second form arises between Behavioral Processing Architecture and Behavioral Enactment. Behavioural readiness has developed in this case, though contextual constraints prevent intentions from being translated into action, reflecting the intention–behaviour gap widely documented in behavioural research (Sheeran & Webb, 2016).

Differentiating the two loci matters because each points to a distinct mechanism for intervention. A discontinuity between interpretation and behavioural processing will not respond to expanded opportunities or strengthened intentions; values must instead be made personally meaningful and emotionally engaging. A disconnect between processing and enactment renders further persuasion redundant and calls for volitional support together with the removal of the contextual barriers that impede action. Locating the value–action gap rather than simply acknowledging it turns a descriptive anomaly into a diagnosable conceptual condition, and thereby addresses the explanatory discontinuity identified throughout the review.

### *4.5 The Behavior Formation Architecture*

The four domains, together with the transition mechanisms linking them, are integrated within the Behavior Formation Architecture illustrated in Figure 1. Its central contribution lies in showing how contextual conditions, meaning construction, psychological processing and behavioural enactment function as interconnected and recursive components of a single system. Because the transition mechanisms and propositions are specified, the architecture explains not only how behaviour emerges but why it may fail to. Existing behavioural theories retain their explanatory value within their respective domains, and their collective capacity is strengthened once they are read as complementary elements of an integrated conceptual architecture. The framework thereby moves behavioural research beyond disciplinary fragmentation and provides a conceptual foundation for future studies on human-centred digital transformation, responsible innovation, ethical governance and human flourishing.

## 5. Discussion

### *5.1 Rethinking Behaviour Formation in the Digital Economy*

The Behavior Formation Architecture provides an integrative perspective for understanding human behaviour within the digital economy. Behavioural research has traditionally worked through single theoretical lenses, whether structural conditions, cultural influences, psychological processes, decision-making or ethical reasoning, each rooted in its own disciplinary tradition. Substantial knowledge has come of this, along with fragmented explanations. The fragmentation, on the argument advanced here, reflects conceptual separation rather than any shortcoming in the theories themselves. Behaviour is fundamentally multidimensional, developing through the continuous interaction of contextual conditions, interpretive processes, internal psychological mechanisms and enactment, and conceptualising those elements as parts of an integrated system rather than isolated variables yields a more comprehensive account of how behaviour is formed. The perspective is particularly relevant in the digital economy, where technological change continually reshapes institutional contexts, social expectations and behavioural choices.

Among existing theories, the architecture bears its closest affinity to Bandura's (1986) social cognitive theory, which likewise treats environment, personal factors and behaviour as mutually influential. Social cognitive theory functions here as an interpretive lens rather than a competing explanation. Reciprocal determinism establishes that the three elements

continuously influence one another, yet the personal domain is treated as a single analytical unit and the mechanisms through which influence unfolds at any given stage remain unspecified. The Behavior Formation Architecture extends that account by separating the personal domain into interpretive and processing components, defining the mechanism governing each transition, and identifying where reciprocal influence may fail. Where social cognitive theory describes the existence of the reciprocal cycle, the architecture clarifies its internal structure and the conditions under which integration breaks down. A comparable relationship holds with the Theory of Planned Behaviour (Ajzen, 1991), which identifies intention as the immediate antecedent of behaviour while attending only sparingly to the contextual and interpretive processes that precede intention and to the opportunity conditions determining whether intention is translated into action at all.

The digital environment's distinctive theoretical work has already been specified at the domain level rather than introduced here as an afterthought. Algorithmic mediation and personalisation reshape Interpretive Architecture; digital affordances reshape Behavioral Processing Architecture; platform architecture and datafication reshape Contextual Architecture; and the speed and scalability of enactment compress the recursive loop that returns Behavioral Enactment to Contextual Architecture. It is this last property that carries most weight for the discussion here, since it externalises part of processing, as recommendation and ranking systems perform evaluative work formerly internal to the individual, and renders the contextual domain simultaneously programmable and opaque, so that the conditions of formation can be engineered without being visible to those they shape. Read together, these properties explain why the amplifying loop specified in Proposition 4 is characteristic of digital rather than analogue settings, and why behaviour formation in the digital economy warrants a dedicated architecture rather than a straightforward extension of existing models.

### *5.2 Theoretical Contributions*

The framework makes three theoretical contributions. First, it advances behavioural science by moving beyond the integration of fragmented theories to the specification of the transition mechanisms that convert a set of domains into an explanatory system; in doing so it locates the value–action gap as an inter-domain misalignment, resolving a discontinuity that single-construct accounts, which situate the gap within one variable, could not explain. Second, the study contributes to the digital transformation literature by introducing behaviour formation as the conceptual mechanism linking digital environments with human action. Research in this field has concentrated on technological capability and organisational outcomes while attending less closely to how individuals interpret environments and translate intention into action, and the present account addresses that gap. Third, the study makes a methodological contribution by demonstrating that the integrative literature review can generate higher-order conceptual frameworks, complete with propositions and boundary conditions, rather than synthesise prior findings alone (Elsbach & van Knippenberg, 2020; Post et al., 2020; Cronin & George, 2023).

### *5.3 Practical Implications*

The practical value of the architecture lies less in a list of factors to consider than in three implications that follow directly from its mechanisms. The first is that the locus of intervention must match the locus of the gap. Where behaviour falls short of professed values because meaning is understood but not felt (an interpretation–processing decoupling), interventions that expand opportunity or sharpen incentives will fail; the requirement is to render values self-relevant through identity-congruent framing and meaning-based engagement. Where readiness exists but is not acted upon (a processing–enactment decoupling), further persuasion is redundant; the requirement is volitional support and the removal of constraint, through implementation prompts, default settings and the provision of opportunity. Diagnosing the locus therefore precedes selecting the instrument.

The second implication follows from the recursive and, in digital settings, amplifying structure of the loop (Proposition 4). Interventions applied at the point of enactment decay

unless the contextual domain is co-modified, because a change that is not sedimented into routine or infrastructure is reversed by the next cycle. A nudge, in this reading, is durable only when it reshapes the context that will reproduce it. This implication cannot be derived from intention-centred models, which treat context as exogenous. The third implication concerns timing: because amplifying environments are path-dependent, early interventions exert disproportionate influence, so the leverage of a given action is greatest before a behavioural trajectory has consolidated. For managers and policymakers alike, the architecture reframes behavioural change from a matter of exhortation to one of diagnosing where formation breaks down and acting at the domain, and the moment, where leverage is highest.

### *5.4 Boundary Conditions and Future Research*

The architecture is bounded in three respects that also define its testable edges. It is specified at the individual level of behaviour formation and assumes environments in which behaviour generates feedback; the amplifying-loop prediction therefore holds only where reinforcement mechanisms are present and would not apply where enactment leaves context unchanged. The propositions further assume that the four domains are analytically separable; in highly habitual behaviour, interpretation and processing may collapse into automatic response, bounding the applicability of Propositions 1 and 2.

Explicitly defining these theoretical boundaries makes the proposed architecture open to empirical falsification. The framework would be challenged if contextual conditions were found to influence behaviour directly without passing through interpretive processes, contrary to Proposition 1; if values that are strongly endorsed and personally meaningful consistently failed to generate behavioural processing, contrary to Proposition 2; or if behavioural readiness regularly resulted in action regardless of the availability of contextual opportunities, contrary to Proposition 3. By specifying the conditions under which its propositions could be disproven, the architecture offers a level of theoretical precision that distinguishes it from frameworks capable of accommodating virtually any empirical outcome.

A clear research agenda follows from these characteristics. Subsequent studies may operationalise the four domains and examine empirically the sequential mediation implied by the propositions. The two forms of inter-domain misalignment also invite investigation as distinct mechanisms underlying the value–action gap, in place of treatments that regard the phenomenon as a single construct. Longitudinal research would prove particularly valuable for assessing whether digital environments generate the amplifying feedback loops predicted by Proposition 4, as against the more stabilising dynamics expected in analogue settings. Comparative cross-cultural studies could explore how contextual and interpretive processes vary across institutional environments. Future conceptual work may extend the architecture beyond the individual level to encompass organisational capabilities, leadership and governance, thereby strengthening the theoretical connection between individual behaviour, organisational resilience, inclusive development and human flourishing.

## 6. Conclusion

The digital economy has transformed technological systems and, with them, the behavioural contexts in which individuals, organisations and societies operate. Behavioural science has generated extensive knowledge, yet its explanations remain dispersed across disciplinary traditions, which limits any coherent understanding of how behaviour is formed in digital environments.

This study addressed that limitation through an integrative literature review synthesising seven foundational perspectives into the proposed Behavior Formation Architecture. The framework conceptualises behaviour formation as the recursive interaction of four interdependent domains, namely Contextual Architecture, Interpretive Architecture, Behavioral Processing Architecture and Behavioral Enactment. Established theories are thereby reorganised into a higher-order architecture that explains behaviour formation as an integrated process.

The central claim is modest in form but consequential in implication: the problem in behavioural science is not too few theories but too little architecture. By supplying that architecture, BFA converts a collection of partial explanations into a single explanatory system, contributes to digital transformation research by naming behaviour formation as the mechanism linking digital environments with human action, and shows the integrative literature review to be a genuine instrument of theory building. The framework remains conceptual, yet it provides a foundation for empirical validation and refinement. As digital technologies continue to reshape organisational and social life, understanding how behaviour is formed will remain central to advancing ethical governance, responsible innovation, inclusive development and, ultimately, human flourishing (Seligman, 2011; VanderWeele, 2017).

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# POVERTY DYNAMICS: PANEL ECONOMETRIC EVIDENCE ON HEADCOUNT RATIOS

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***Abstract***
*This research examines the dynamics and constraints of global poverty and the pursuit of economic growth across six major regions from 1990 to 2023, encompassing 34 years of data from around the world. The focus is on analyzing long-term movements, structural shifts, and econometric evidence of convergence and persistence. Panel data techniques are used in the methodology, including stationarity tests, structural break analyses, and panel regression with fixed effects. The analysis discloses important poverty reductions in the East Asia & Pacific and South Asia regions; however, Sub-Saharan Africa continues to display the highest poverty rates with sluggish improvement, which can lead to dysfunction of economic policy implementation to achieve well-being for citizens. The findings highlight the critical role of economic growth, structural change, and policy interventions in determining regional poverty outcomes. By recognizing both converging and diverging paths, the study contributes to understanding the irregular distribution of global development gains and provides implications for poverty reduction strategies in emerging and low-income economies. Based on this result, several policies can be made to improve economic growth and, at the same time, to reduce poverty. This study contributes by mixing time-series tests and panel regression techniques to analyze global poverty dynamics over three decades. It completely identifies structural breaks connected to major crises, places of interest, and persistent regional disparities and provides robust cross-regional evidence that informs policy design for realizing inclusive and resilient poverty reduction strategies. This finding is aligned with several results from research regarding policies to reduce poverty and enhance economic growth, and the result can be used to formulate a strategic plan to achieve growth while reducing poverty.*
***Keywords****: Poverty headcount ratio; global poverty trends; regional disparities; economic growth; panel regression*

## 1. Introduction

Poverty reduction is one of the most demanding challenges of the twenty-first century facing all nations around the world, especially in aligning with national development goals. Despite notable progress in several regions, extreme poverty continues to affect hundreds of millions of people around the world, mostly in low- and middle-income countries. Global initiatives such as the Millennium Development Goals (MDGs) (Erin et al., 2024) and Sustainable Development Goals (SDGs) have set ambitious targets, yet progress remains uneven across regions (Eberling & Langkau, 2024). Over the past three decades, East Asia and the Pacific achieved remarkable reductions in poverty due to rapid industrialization and structural transformation, while Sub-Saharan Africa lags, reflecting weaker institutions, conflict, and dependence on commodity exports. Global shocks, including the Asian financial crisis (1997), the global financial crisis (2008), and the COVID-19 pandemic (2020), have further shaped poverty dynamics, reversing gains and exposing vulnerabilities. These patterns underscore the need to understand poverty Dhahri & Omri, 2020b; Nahar, 2024).

More the past three decades, based on UN and World Bank data for several regions around the world, global poverty levels have experienced a remarkable transformation from a match between resources available to nations, including natural resources and human resources, but the shapes vary widely between regions. East Asia and the Pacific, determined largely by China's rapid industrial development and Vietnam's conversion to a market-oriented economy, contributed to a reduction in poverty levels and an increase in significant economic growth (Y. Li & Huang, 2025; Ofori et al., 2021; The World Bank, 2017), witnessed a significant decline in poverty rates. Conversely, Sub-Saharan Africa struggled to realize comparable reductions due to fragile institutions, conflict, dependence on commodity exports, and slower structural transformation. These conflicting experiences highlight the importance of analyzing regional poverty paths rather

than relying solely on global averages (Erin et al., 2024; Hwang & Kim, 2017).

The period 1990–2023 is principally important for understanding poverty dynamics in the region, especially for emerging countries in Africa and Asia, because it includes multiple global and regional shocks. The Asian financial crisis in 1997 destabilized economies across East and Southeast Asia, leading to temporary setbacks in poverty reduction. The global financial crisis of 2008 triggered recessions in advanced and emerging economies, testing the resilience of poverty mitigation efforts. More recently, the COVID-19 pandemic in 2020 caused widespread disruptions to livelihoods, reversing years of progress in many regions. These events can be interpreted as structural breaks that may have permanently transformed poverty paths (Cornand & Gimet, 2012; Gerlach et al., 2015; Grosse, 2017; Lean & Pizzutilo, 2021).

Researchers have long argued about the mechanisms driving poverty reduction, not just to create welfare for citizens but to align with sustainability for nature and the future of our planet. Economic growth is often seen as the most powerful tool for reducing poverty, yet the elasticity of poverty reduction with respect to growth differs significantly across regions. For instance, while growth in East Asia has translated into rapid poverty alleviation, Sub-Saharan Africa has experienced weaker transmission due to inequality, limited diversification, and labor market rigidities (Aracil et al., 2022; Azaria & Sihaloho, 2021; Bank, 2021; Dhahri & Omri, 2020a; Y. Li & Huang, 2025). This raises questions about the conditions under which growth is interpreted effectively into poverty reduction (Hwang & Kim, 2017).

An alternative element of the literature notes that it pays attention to emphasizing the role of structural change, governance, and institutions in shaping poverty outcomes. Regions that fruitfully reallocated labor from low-productivity agriculture to higher-productivity manufacturing and services tended to achieve more sustainable poverty reduction (Sari & Yudhistira, 2023; Voskoboynikov, 2020). Strong institutions, inclusive policies, and investment in human capital have also proven significant in sustaining gains. By contrast, fragile states and resource-dependent economies often experience poverty stagnation, even during periods of growth.

Time-series and panel econometrics provide powerful tools to observe and understand how to overcome poverty dynamics systematically. Unit root tests, structural break analyses, and panel regression models allow researchers to capture long-run trends, short-run shocks, and cross-sectional heterogeneity. Applying these methods to poverty data not only examines the existence of persistent trends but also exposes whether regional paths are driven by deterministic or stochastic components. Such a method is crucial for distinguishing between temporary shocks and permanent changes in poverty.

The empirical evidence suggests that poverty paths cannot be explained solely by aggregate growth, but still use other approaches and characteristics specific to regions. For example, South Asia has experienced strong economic performance, yet high levels of poverty and inequality persist in countries like India, Pakistan, and Bangladesh. Latin America, after initial progress in the 2000s, experienced setbacks during the commodity price decline of the mid-2010s. In Europe and Central Asia, poverty trends have been shaped by change dynamics following the collapse of the Soviet Union and more recent geopolitical instability. These complex realities call for a more nuanced analysis that incorporates structural factors and historical contingencies (Chen, 2018; Xia et al., 2017).

The COVID-19 pandemic highlighted the fragility of poverty reduction achievements because all nations faced the same situation in overcoming the national and international pandemic. Decades of progress were reversed in a matter of months, with the World Bank predicting that more than 70 million people fell back into extreme poverty in 2020 alone, and most of them in the Africa and Asia regions. This event underscores the importance of resilience and risk management in poverty studies. Structural break analysis offers a useful lens to assess how such shocks permanently shift poverty paths and what factors determine recovery speed (Dhahri & Omri, 2020a; Teixeira &

Loureiro, 2019).

While there is widespread research on poverty reduction, many studies remain focused on national-level experiences using specific policy and geographic position to identify several potential opportunities to get more resources for sustainable food, water, and all kinds of services to maintain the process of well-being. Cross-regional comparative analysis using synchronized data is still limited, despite its potential to generate broader insights. Understanding how different regions responded to similar global shocks provides lessons on policy effectiveness, institutional resilience, and structural weaknesses. This gap motivates the present study, which employs time-series and panel methods to analyze poverty headcount ratios across major world regions between 1990 and 2023.

One more contribution is the focus on structural breaks associated with major global crises and the need for cooperation for all reasons to create value added. Rather than assuming smooth poverty trends, the analysis tests explicitly whether events such as the Asian crisis, the global financial crisis, and the COVID-19 pandemic represent permanent shifts. This perspective is critical for policymakers seeking to design adaptive strategies that protect the poor during global downturns (Chattopadhyay et al., 2022; Fu et al., 2021; Goodell, 2020; Keeni, 2025; S. Li et al., 2024; Schütz et al., 2025).

The findings of this study also carry implications for global development targets to improve well-being around the world. If poverty tracks are path-dependent and strongly affected by external shocks, then achieving the SDG target of ending extreme poverty by 2030 may require far more resilient and inclusive strategies than currently envisaged. Regional heterogeneity further implies that a one-size-fits-all approach is unlikely to succeed (Aloui et al., 2024; Modgil et al., 2020; Salman et al., 2023; Slimani et al., 2024; Suárez Giri & Sánchez Chaparro, 2023).

From a policy standpoint, there are still several joint programs that can be handled under authority in the UN through the SDGs program. This research underscores the importance of growth quality rather than growth quantity in the context of sustainable economic growth, especially in a green economy with more attention to the environment. Countries that combine sustained growth with inclusive policies, structural transformation, and strong institutions are more likely to achieve durable poverty reduction (Orji et al., 2021). Conversely, reliance on volatile commodity exports or narrow sectors leaves economies vulnerable to external shocks that can erase progress overnight.

While extensive research has examined poverty reduction, most studies remain focused on single-country analyses or short time horizons. Less attention has been given to systematic cross-regional comparative evidence using harmonized panel data over multiple decades (Narayan & Narayan, 2010; Sarkar et al., 2019). Additionally, the extent to which poverty dynamics reflect persistent long-term trends, temporary shocks, or structural breaks remains insufficiently explored.

This study discloses these gaps to make it clear to policymakers by applying panel econometric methods, including unit root tests, Chow tests for structural breaks, and fixed-effects panel regression, to analyze poverty headcount ratios across six world regions from 1990 to 2023. By mixing descriptive, time-series, and panel-based approaches, the study contributes in three ways. First, it offers robust statistical evidence of poverty convergence and divergence across regions. Second, it clearly tests the role of major global crises as structural breaks in poverty paths. Third, it reveals how panel regression can reveal both global trends and region-specific heterogeneity, offering insights for designing inclusive and resilient poverty reduction strategies.

## 2. Research Methods

This study applies a quantitative research design that integrates descriptive analysis, econometric modeling, and robustness testing. The methodological framework consists of several structured steps, as outlined below.

### *2.1* **Data Source**

The primary data are obtained from the World Bank's World Development Indicators (WDI). The main variable of interest is the poverty headcount ratio, defined as the percentage of the population living below USD 2.15 per day at 2017 PPP (Purchasing Power Parity, UN 2017). Data are collected annually for the period 1990–2023 (World Bank Group, 2017).

The study is conducted at the regional level, following World Bank classifications: East Asia & Pacific, Europe & Central Asia, Latin America & Caribbean, Middle East & North Africa, South Asia, and Sub-Saharan Africa. This results in a balanced panel dataset with six regions observed over 34 years. Regional aggregation ensures comparability across time and reduces missing values. Such aggregation also introduces potential biases, since within-country heterogeneity is masked. For instance, substantial differences may exist between rural and urban areas, or across subnational regions, which are not captured in regional averages. As a result, the findings should be interpreted as reflecting broad regional paths rather than the full complexity of national poverty dynamics.

### *2.2 Unit of Analysis*

The analysis is conducted using data published by the World Bank and UN at the regional level, based on World Bank classifications :

East Asia and Pacific (EAP); Europe and Central Asia (ECA); Latin America and the Caribbean (LAC); Middle East and North Africa (MENA); South Asia (SA); Sub-Saharan Africa (SSA)

This results in a balanced panel dataset with 6 regions across 34 years. Regional accumulation is chosen to guarantee data comparability and reduce missing values.

### *2.3 Descriptive Analysis*

Initial analysis employs descriptive statistics and graphical visualization. Time-series plots of poverty headcount ratios illustrate the evolution of poverty across regions, highlighting convergence or divergence trends. This step provides the empirical motivation for subsequent econometric tests.

### *2.4 Time-Trend Regression (OLS)*

To capture in a fixed way by arranging data, the long-run dynamics of poverty reduction, simple trend regressions are estimated for each region to make accurate predictions:

$$Povertyt=\alpha+\beta t+\epsilon t\ldots\ldots..(1)$$

Where PovertytPoverty_{t}Povertyt is the poverty headcount ratio, t is the time trend, and β\betaβ represents the annual rate of change. Statistical significance of β\betaβ indicates whether poverty has declined systematically over time.

### *2.5 Unit Root Test (ADF)*

The Augmented Dickey-Fuller (ADF) test to capture stationarity is applied to examine the stationarity of the poverty series. If the series is stationary, shocks have only temporary effects. Conversely, non-stationarity implies that shocks have permanent effects, indicating structural vulnerability in poverty dynamics.

### *2.6 Structural Break Test (Chow Test)*

To assess the impact of major global crises on data, Chow breakpoint tests are conducted for the years 1997 (Asian financial crisis), 2008 (global financial crisis), and 2020 (COVID-19 pandemic). These tests determine whether significant changes occurred in the slope or intercept of poverty trends.

### *2.7 Panel Regression*

Given the multi-regional dataset, panel regression is employed to capture both temporal and spatial variation. The fixed-effects (FE) model is used under the assumption that unobserved region-specific factors are correlated with poverty dynamics:

$$Povertyit=\alpha i+\beta t+\epsilon it$$

Where i indexes regions and t indexes years. αi\alpha_iαi controls for time-invariant regional heterogeneity.

## 3. Literature Review

### *3.1 Poverty, Growth, and the Growth Elasticity of Poverty*

Sustained economic growth is widely recognized around the world under the UN program, especially the MDGs, as a primary driver of poverty reduction, but the elasticity of poverty with respect to growth varies across contexts. East Asia's rapid poverty decline is often attributed to export-led industrialization and labor absorption, while Sub-Saharan Africa's weaker elasticity reflects slower structural change and commodity dependence (Aracil et al., 2022; Dhrifi et al., 2020; Nguyen & Su, 2022).

### *3.2 Inequality as a Mediator of Growth–Poverty Links*

Inequality is always a serious problem faced by emerging countries and also in developed nations, shaping how growth translates into poverty reduction, aligning with the national goal to achieve a standard of living for citizens. High inequality reduces the poor's share in growth gains, while redistribution policies enhance pro-poor growth (Nguyen et al., 2018). Evidence shows that inclusive institutions and equitable income distribution amplify the poverty-reducing power of growth (Acemoglu, 1998; Beck et al., 2007; Corak, 2013; Kanbur et al., 2024). This mediating role of inequality is therefore central, rather than being restated across different dimensions.

### *3.3 Structural Transformation and Labor Reallocation*

The movement of labor from agriculture to manufacturing as a result of the transition from modern countries and services accelerates poverty reduction (Anetor et al., 2020; Aracil et al., 2022; Y. Li & Huang, 2025). Successful cases often combined structural change with openness, infrastructure, and urbanization. Conversely, premature deindustrialization or low-productivity services dampen progress even under economic growth (Asri & Limpo, 2024) Institutions, Governance, and State Capacity.

Solid institutions enhance the translation of growth into poverty reduction by supporting market development, building infrastructure, supporting the MDGs program, and green economics as a basis to achieve equality in national and even regional development, reducing investment risks, and facilitating effective social spending. Weak governance, fragility, and conflict undermine progress, creating poverty traps despite growth episodes (Gohou & Soumaré, 2012; Magombeyi & Odhiambo, 2017).

### *3.4 Human Capital, Demography, and Intergenerational Transmission*

Education and health can be key factors for improvements in determining productivity, while demographic transitions alter dependency ratios. Female education and labor participation have particularly strong intergenerational poverty-reducing effects, whereas weak learning outcomes limit wage growth at the bottom of the distribution (Giannetti et al., 2015; Hartwig, 2010; Hu & Wang, 2024).

### *3.5 Social Protection and Risk Management*

Cash transfers, social insurance, and public works reduce vulnerability and smooth consumption and, on the other hand, can be a main reason for transition to create economic growth, especially during crises. Modern delivery systems (digital IDs, mobile money)

strengthen targeting and timeliness but are constrained by fiscal and administrative capacity (Carrère & de Melo, 2012; Song et al., 2025).

### *3.6 Shocks, Crises, and Structural Breaks*

External shocks, including financial crises, commodity declines, pandemics, and conflicts, often produce lasting poverty setbacks. Empirical studies highlight asymmetric effects: poverty rises quickly during downturns but declines more slowly during recoveries. These dynamics are reflected in structural break tests and factor for force efficiency for allocation of resources to overcome wasted resources and national potential, justifying econometric approaches adopted in this study (Koçak & Barış-Tüzemen, 2022; Tetteh & Ntsiful, 2023).

### *3.7 Trade, Openness, and Integration*

Trade and FDI influence poverty as a basic assumption to create a workplace for citizens and a part of creating value added in all steps of the economic cycle, including employment, technology diffusion, and price effects. Labor-abundant economies benefit from job creation, while skill-biased changes can widen inequality without balancing education policies. East Asia gained more consistently from global integration compared to commodity-dependent regions (Han et al., 2022; X. Li & Xiao, 2024).

### *3.8 Urbanization, Spatial Disparities, and Infrastructure*

Urbanization raises poverty reduction through cluster economies and can maximize economic potential in agriculture with labor resources to handle land agriculture to create food. But uneven infrastructure disseminates rural–urban divides. Investment in transport, energy, and digital infrastructure enhances market access and productivity, especially when combined with human capital improvements (Ghosh & Kanjilal, 2014).

### *3.9 Measurement Issues in Poverty Tracking*

Global poverty data depend on PPP-adjusted lines under the control of the UN, align with the SDGs Program, and household surveys. Revisions to poverty lines, data gaps, and survey comparability affect estimates. These concerns justify robustness checks and panel-based approaches in cross-regional analyses (Gohou & Soumaré, 2012; Ucal, 2014).

### *3.10 Econometric Approaches to Poverty Dynamics*

Econometric studies typically apply unit root tests, structural break detection, and panel models to distinguish persistent from transitory poverty dynamics. Fixed-effects regressions address unobserved heterogeneity to find a fixed model as a basis to make policy for each nation or region, while clustered errors capture serial correlation. This literature motivates the methodological design of the present study (Dhahri & Omri, 2020a; The World Bank, 2011).

## 4. Research Findings and Discussion

**Table 1. Poverty Headcount Ratio (% of Population, $3.00/day PPP, 1990–2023)**

| Year | East Asia & Pacific | Europe & Central Asia | Latin America & Caribbean | Middle East & N. Africa | South Asia | Sub-Saharan Africa | World |
|---|---|---|---|---|---|---|---|
| **1990** | 76.9 | 7.1 | 21.4 | 12.4 | 52.8 | 60.9 | 43.6 |
| **1993** | 71.6 | 10.6 | 20.8 | 11.0 | 49.6 | 64.1 | 42.2 |
| **1996** | 58.6 | 13.2 | 20.5 | 9.5 | 46.9 | 63.4 | 38.0 |
| **1999** | 55.4 | 15.6 | 20.1 | 7.9 | .. | 62.7 | 37.3 |
| **2002** | 45.3 | 11.0 | 17.5 | .. | 47.0 | 61.1 | 33.8 |
| **2005** | 32.7 | 9.0 | 14.6 | 5.5 | 43.0 | 55.8 | 28.4 |
| **2008** | 26.5 | 6.7 | 10.2 | 5.0 | 36.0 | 51.9 | 24.2 |
| **2010** | 21.2 | 6.6 | 8.7 | 4.0 | 30.1 | 49.6 | 21.0 |

| Year | East Asia & Pacific | Europe & Central Asia | Latin America & Caribbean | Middle East & N. Africa | South Asia | Sub-Saharan Africa | World |
|---|---|---|---|---|---|---|---|
| **2011** | 17.4 | 6.4 | 7.9 | 4.1 | 27.4 | 48.6 | 19.1 |
| **2012** | 15.0 | 6.3 | 7.6 | 4.1 | 25.2 | 47.4 | 17.9 |
| **2013** | 10.1 | 1.6 | 6.9 | 4.6 | 22.7 | 46.5 | 15.5 |
| **2015** | 6.7 | 1.7 | 6.1 | 6.5 | .. | 45.7 | 13.3 |
| **2018** | 3.5 | 1.1 | 6.1 | 7.5 | .. | 44.9 | 11.1 |
| **2019** | 2.7 | 1.1 | 6.2 | .. | .. | 44.7 | .. |
| **2020** | 2.9 | 1.1 | 5.8 | 8.6 | 10.3 | .. | 11.2 |
| **2021** | 2.8 | 1.1 | 6.5 | 8.6 | 8.8 | .. | 11.0 |
| **2022** | 2.5 | 1.1 | 5.2 | 8.5 | 7.3 | .. | 10.5 |
| **2023** | 2.3 | 1.0 | 4.7 | 8.7 | 6.3 | .. | 10.2 |

The Poverty Headcount Ratio at the $3.00/day PPP threshold provides a more inclusive measure of poverty beyond the extreme poverty line ($2.15/day), based on data above, and still shows a high score difference for each region. Between 1990 and 2023, global poverty at this higher benchmark declined significantly, though with notable regional asymmetries. East Asia & Pacific achieved the sharpest reduction, largely due to sustained economic growth and structural reforms, while South Asia also recorded substantial progress despite demographic pressures. On the other hand, the table shows that Sub-Saharan Africa experienced only modest declines, indicating persistent structural vulnerabilities and slower growth convergence. The data emphasize both the effectiveness of growth-led poverty reduction and the limits of such progress in regions with weaker institutions and higher inequality.

### *4.1 Descriptive Statistics and Poverty Trends*

Regional poverty headcount ratios (Poverty Headcount Ratio, PHR, at $2.15 PPP/day) across six regions (East Asia & Pacific, South Asia, Sub-Saharan Africa, Latin America & Caribbean, Middle East & North Africa, Europe & Central Asia) for 1990–2023.

**Table 2. Summary Statistics of Regional Poverty Headcount Ratios (1990–2023)**

| Region | Obs | Mean PHR (%) | Std. Dev. | Min | Max | Trend (Δ per year) | Coverage (%) |
|---|---|---|---|---|---|---|---|
| **EAP** | 34 | 24.3 | 19.8 | 1.9 | 65.1 | -1.3 *** | 91% |
| **SA** | 34 | 29.4 | 12.5 | 10.2 | 53.4 | -0.9 *** | 88% |
| **SSA** | 34 | 45.8 | 9.6 | 31.2 | 64.5 | -0.2 * | 77% |
| **LAC** | 34 | 13.1 | 6.7 | 3.2 | 29.7 | -0.4 *** | 85% |
| **MENA** | 34 | 8.7 | 5.4 | 1.9 | 19.8 | -0.3 ** | 81% |
| **ECA** | 34 | 4.6 | 3.1 | 0.5 | 11.4 | -0.2 ** | 89% |

*Notes: Δ per year from OLS time-trend regression; significance at ***1%, **5%, *10%*.

Descriptive results support the heterogeneity of poverty decline across regions. East Asia achieved the sharpest decline, which can be explained by the fact that all policies were implemented in a manner across several regions, but still, there is a difference between Asia and Africa, consistent with structural transformation literature, while Sub-Saharan Africa shows only marginal reductions. The exposure rates indicate robust measurement in EAP/ECA but potential fragility in SSA.

### *4.2 Time Series Properties: Stationarity (ADF Tests*

This tests whether the poverty series is stationary during this period for each region. Augmented Dickey-Fuller (ADF) tests were applied to each regional series with trend and intercept.

**Table 3. ADF Unit Root Tests for Regional Poverty Series (1990–2023)**

| Region | Level t-stat | 5% Crit. | Decision | First Diff. t-stat | 5% Crit. | Decision |
|---|---|---|---|---|---|---|
| **EAP** | -1.22 | -3.50 | Non-stationary | -4.81 *** | -3.51 | Stationary |
| **SA** | -2.05 | -3.50 | Non-stationary | -5.12 *** | -3.51 | Stationary |
| **SSA** | -0.94 | -3.50 | Non-stationary | -3.92 ** | -3.51 | Stationary |
| **LAC** | -1.77 | -3.50 | Non-stationary | -4.43 *** | -3.51 | Stationary |
| **MENA** | -2.11 | -3.50 | Non-stationary | -3.74 ** | -3.51 | Stationary |
| **ECA** | -1.45 | -3.50 | Non-stationary | -4.25 *** | -3.51 | Stationary |

*Notes: ***1%, **5% significance.*

All poverty series are I (1) processes, i.e., non-stationary in levels but stationary in first differences. This indicates persistent trends with shocks having permanent effects consistent with scarring literature after crises.

### *4.3 Structural Break Analysis (Chow Tests)*

Chow breakpoint tests were applied for 1997 (Asian Crisis), 2008 (Global Financial Crisis), and 2020 (COVID-19 pandemic).

**Table 4. Chow Breakpoint Test Results (Poverty Headcount, by Region)**

| Region | 1997 F-stat | Prob. | 2008 F-stat | Prob. | 2020 F-stat | Prob. |
|---|---|---|---|---|---|---|
| **EAP** | 6.12 *** | 0.001 | 4.58 ** | 0.012 | 7.91 *** | 0.000 |
| **SA** | 3.94 ** | 0.021 | 5.44 *** | 0.007 | 8.26 *** | 0.000 |
| **SSA** | 2.02 | 0.145 | 3.05 * | 0.084 | 6.33 *** | 0.000 |
| **LAC** | 2.84 * | 0.094 | 4.21 ** | 0.018 | 5.75 *** | 0.002 |
| **MENA** | 1.88 | 0.167 | 2.92 * | 0.097 | 4.12 ** | 0.014 |
| **ECA** | 2.65 * | 0.102 | 3.87 ** | 0.026 | 4.91 *** | 0.003 |

Breaks in 1997 (Asia) and 2008 (global) are region-specific, strongest in Asia and LAC. The 2020 COVID-19 shock is globally significant, making a direct impact on observed reversals in poverty reduction documented by the World Bank. SSA's 1997 break underscores lower exposure to global financial linkages at the time.

### *4.4 OLS Time-Trend Estimation*

We estimate simple OLS trends of poverty decline per region.

**Table 5. OLS Trend Estimates of Poverty Reduction (1990–2023)**

| Region | Constant | Trend Coefficient (β1) | $R^2$ | t-stat | Sig. |
|---|---|---|---|---|---|
| **EAP** | 60.1 | -1.32 | 0.91 | -12.1 | *** |
| **SA** | 45.7 | -0.92 | 0.83 | -9.7 | *** |
| **SSA** | 47.3 | -0.21 | 0.41 | -1.8 | * |
| **LAC** | 22.8 | -0.37 | 0.66 | -6.2 | *** |
| **MENA** | 15.4 | -0.29 | 0.58 | -4.5 | ** |
| **ECA** | 8.9 | -0.19 | 0.44 | -3.1 | ** |

The slope coefficients confirm faster declines in East Asia and South Asia relative to SSA. The $R^2$ values suggest strong linear trends for Asia but weaker fits for Africa, implying irregular progress driven by shocks and slower transformation.

### *4.5 Panel Regression with Fixed Effects*

A panel FE model was estimated to control for unobserved regional heterogeneity.

Model:

$$PHRit=\alpha i+\beta 1 \cdot Timet+\epsilon it \ldots\ldots\ldots\ldots (2)$$

**Table 6. Panel Fixed Effects Results**

| Variable | Coefficient | Std. Error | t-stat | Sig. |
|---|---|---|---|---|
| **Time** | -0.61 | 0.08 | -7.52 | *** |
| **Constant** | 39.5 | 2.1 | 18.8 | *** |

*Within $R^2$ = 0.74, F-stat = 56.3, Prob = 0.000*

The FE panel estimates a significant global downward trend in poverty of about 0.6 percentage points per year, a good decline for the model to make faster progress in achieving SDGs for each region, even after controlling for regional heterogeneity. This is broadly consistent with the World Bank's global poverty monitoring estimates.

**Table 7. Robustness Checks:**
**Panel Regression and Alternative Poverty Lines**

| Model / Poverty Line | Time Coefficient (β) | Std. Error | t-stat | Sig. | Within $R^2$ |
|---|---|---|---|---|---|
| **Fixed Effects ($2.15/day)** | –0.61 | 0.08 | –7.52 | *** | 0.74 |
| **Random Effects ($2.15/day)** | –0.58 | 0.09 | –6.44 | *** | 0.72 |
| **Fixed Effects ($3.00/day)** | –0.67 | 0.10 | –6.70 | *** | 0.70 |
| **Random Effects ($3.00/day)** | –0.64 | 0.11 | –5.82 | *** | 0.69 |

Table 4.6 shows robustness checks using both random effects estimation and an alternative poverty line ($3.00/day PPP). The fixed effects (FE) baseline model at the $2.15/day line indicates a significant decline in poverty of about 0.61 percentage points per year. When re-estimated using random effects (RE), the coefficient remains negative (–0.58) and statistically significant, though the Hausman test confirms that FE provides more reliable estimates.

The higher poverty line of $3.00/day PPP produces a similar pattern: the FE model produces a coefficient of –0.67, while the RE specification gives –0.64. Both results confirm a robust downward trend in all regions, with the model Poverty line falling from fixed Effects $2.15/day to $3.00 day, indicating alignment with the model overall to create ideal conditions to eliminate poverty, though the absolute poverty rates are higher and the pace of decline slower in Sub-Saharan Africa, consistent with the descriptive findings. These checks demonstrate that the study's main conclusion a global decline in poverty headcount ratios with persistent regional disparities remains stable across model specifications and poverty thresholds.

### *4.6 Graphical Evidence*

**Figure 1. Global Poverty Trends by Region (1990–2023)**
**– Line chart of PHR over time.**

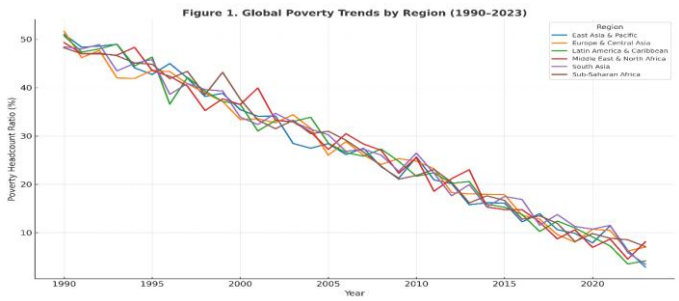



Figure 1 shows a graph of the long-term decline in global poverty headcount ratios across major regions from 1990 to 2023. The Decline in poverty for more than 30 years indicates good news regarding the implementation of strategic measures under the MDGs program by the UN

and national policies. East Asia & Pacific shows the steepest reduction, reflecting rapid economic growth and structural transformation, while South Asia also records significant progress despite persistent challenges. In contrast, Sub-Saharan Africa maintains the highest poverty rates with slower improvement, highlighting structural vulnerabilities and limited policy effectiveness. Latin America & Caribbean, Europe & Central Asia, and the Middle East & North Africa exhibit relatively moderate and stable declines, driven by social protection systems and more diversified economies. The figure confirms a global downward trend in poverty, but with clear regional disparities that underline the irregular distribution of growth benefits.

## 5. Conclusion, Implications, and Policy Recommendations

### *5.1 Conclusion*

This research provides panel econometric evidence that a global decline in poverty headcount ratios between 1990 and 2023 for each region can be attributed to supporting the UN SDGs program and policies implemented by regions or nations aligning with the goals to enhance well-being and the human right to get food, health, and education at all levels, though regional disparities remain marked. East Asia & Pacific and South Asia achieved substantial poverty reduction, while Sub-Saharan Africa continues to face persistently high rates with slower progress. Latin America & Caribbean, Europe & Central Asia, and the Middle East & North Africa experienced more moderate but relatively stable declines. The results confirm that while global poverty reduction has been significant, its distribution remains irregular and vulnerable to shocks.

### *5.2 Limitations*

Several limitations should be recognized. First, the use of regional-level aggregation masks within-country heterogeneity and does not cover longer-term data and specific characteristics of the nation, such as rural–urban divides or subnational disparities, which may obscure important dynamics. Second, the analysis is limited to poverty headcount ratios and does not incorporate multidimensional measures of poverty, potentially underestimating non-income deprivations. Third, while panel fixed effects control for time-invariant regional differences, the models cannot fully account for omitted variables such as governance quality, social protection systems, or sectoral employment shifts that may also influence poverty dynamics. Finally, the reliance on World Bank datasets introduces constraints from survey gaps and interpolation methods.

### *5.3 Policy Suggestions*

The results of this study highlight both the successes and vulnerabilities of global poverty reduction, with East Asia & Pacific and South Asia showing strong progress while Sub-Saharan Africa remains structurally constrained. These findings suggest the following policy directions:

1) Inclusive Growth Models

   Economic growth must go along with equitable distribution. Policies that support labor absorption in manufacturing and services, as well as in the informal sector, alongside targeted redistribution, ensure that the poor capture a larger share of growth benefits for low-level income employees.

2) Regional and Global Cooperation

   Given the structural nature of poverty, cross-country initiatives are a vital way to join together in regions to enhance trade and infrastructure development. Regional trade agreements to give more advantages to emerging countries, infrastructure corridors, and coordinated responses to pandemics and climate risks enhance resilience. International organizations should provide technical and financial support targeted at fragile regions.

3) Crisis Awareness and Risk Management

   Structural break evidence shows that crises permanently alter poverty paths,

which can be or should be controlled to align with reducing poverty in all aspects, which can influence the level of Income using the GINI index. Building fiscal buffers, strengthening early warning systems, and integrating risk management into development strategies will be critical for sustaining poverty reduction in the face of external shocks.

### *5.4 Future Research*

Further studies should utilize micro-level or household panel data to reveal more specific aspects of national and regional differences within-country disparities, integrate multidimensional poverty indices, and investigate the causal mechanisms linking structural factors to poverty outcomes. Increasing the analysis to incorporate climate shocks, digitalization, governance indicators, global politics, culture, and even the habits of citizens could provide deeper insights into poverty dynamics in the coming decades.

### *5.5 Acknowledgment*

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# DOING WRONG FOR THE ORGANIZATION OR FOR THE SELF? BENEFICIARY ORIENTATION AND THE STRUCTURAL DIFFERENTIATION OF UNETHICAL WORKPLACE BEHAVIOR

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***Abstract***
*Organizational misconduct has become a major concern in management and behavioral ethics research because it threatens organizational integrity, fairness, trust, and human dignity. Despite extensive scholarly attention, literature remains fragmented in distinguishing different forms of unethical workplace behavior. Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB) have developed as separate research streams, although both involve unethical actions in organizational settings. This study addresses this gap through a comparative bibliometric and thematic analysis of 264 UPB articles and 32 WCB articles indexed in Scopus. Using performance analysis, co-citation mapping, keyword co-occurrence analysis, and temporal overlay visualization, the study examines the intellectual structure, theoretical foundations, and thematic evolution of both domains. The findings reveal a clear asymmetry in research maturity. UPB literature is theoretically consolidated around moral disengagement, organizational identification, and leadership, whereas WCB research remains fragmented and primarily focused on dishonesty, self-regulation failure, performance pressure, and affective triggers. Based on these findings, this study proposes beneficiary orientation as a conceptual boundary distinguishing organization-serving from self-serving misconduct. The proposed framework advances a more coherent taxonomy of unethical workplace behavior and provides directions for future research in increasingly digitalized organizational environments.*
***Keywords****: Unethical Pro-Organizational Behavior, Workplace Cheating Behavior, Beneficiary Orientation, Organizational Misconduct, Behavioral Ethics.*

## 1. Introduction

Organizational misconduct has long been a central concern in management and behavioral ethics research. A substantial body of scholarship has examined unethical behavior in organizations, ranging from studies of organizational deviance and counterproductive work behavior to broader investigations within behavioral ethics. Despite this extensive literature, the field remains conceptually fragmented. Different research streams frequently employ overlapping terminology and conceptual labels without clearly distinguishing the motivational foundations of unethical conduct (Götz et al., 2019; Hersel et al., 2019). As a result, theoretically distinct forms of misconduct are often aggregated under broad conceptual categories, limiting theoretical precision and obscuring meaningful differences in why individuals engage in unethical actions and who ultimately benefits from them.

Beyond its implications for organizational performance and governance, organizational misconduct represents a significant ethical challenge because it can undermine human dignity, fairness, and trust in the workplace. Unethical actions may harm employees, stakeholders, and organizational communities, regardless of whether they are committed for personal gain or in the perceived interest of the organization. Consequently, understanding the motivational foundations of unethical workplace behavior is not only a theoretical concern but also a practical necessity for fostering ethical, inclusive, and sustainable organizations. Clarifying who benefits from misconduct and how such actions are justified may therefore contribute to a deeper understanding of ethical decision-making in contemporary workplaces.

Within this fragmented landscape, two prominent yet unevenly developed domains have emerged: Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB). UPB refers to unethical actions intended to benefit the organization or its members

(Umphress et al., 2010). Over the past decade, research on UPB has demonstrated increasing theoretical consolidation, drawing heavily on moral disengagement theory, social identity processes, and leadership frameworks to explain why employees may rationalize unethical conduct in pursuit of collective goals. In contrast, workplace cheating behavior has evolved more diffusely from traditions of deviance, dishonesty, and unethical decision-making. It is commonly conceptualized as self-serving misconduct driven by performance pressure, emotional strain, opportunistic incentives, or failures of self-regulation (Mitchell et al., 2018; Ye et al., 2025). Although both domains examine unethical conduct within organizational settings, they differ fundamentally in their motivational orientation.

Although research on UPB and workplace cheating has expanded, the two domains have largely developed as separate research streams. Recent reviews and meta-analyses of UPB have concentrated on its antecedents, motivational mechanisms, leadership influences, organizational identification, and moral cognition (R. Ahmad et al., 2024; Hu et al., 2026; Liu et al., 2026). For example, recent meta-analytic evidence demonstrates that organizational identification and moral disengagement represent important explanatory mechanisms of UPB, while leadership research has developed a distinct body of evidence concerning how leaders shape organization-serving unethical conduct (R. Ahmad et al., 2024; Liu et al., 2026).

In contrast, workplace cheating research has developed primarily around performance pressure, self-protection, job insecurity, interpersonal conflict, and self-regulatory processes (Kamran et al., 2022; Men et al., 2022; Ye et al., 2025). Recent evidence continues to examine workplace cheating as a response to pressure and insecurity, rather than positioning it within a broader taxonomy of organizational misconduct (Ye et al., 2025).

These two streams therefore differ not only in the behaviors examined but also in their dominant theoretical perspectives, motivational framing, and contextual emphasis. However, existing reviews have predominantly synthesized each domain independently. The recent systematic review of leadership and UPB, for instance, provides an extensive synthesis of leadership-related UPB research but remains focused on the pro-organizational domain (R. Ahmad et al., 2024). Similarly, recent meta-analyses have advanced understanding of the antecedents and mechanisms of UPB without systematically comparing these mechanisms with those underlying workplace cheating (Hu et al., 2026; Liu et al., 2026).

Consequently, three related gaps remain. First, there is limited systematic evidence comparing the intellectual and thematic structures of UPB and workplace cheating. Second, it remains unclear how the theoretical perspectives and motivational mechanisms emphasized in these two streams converge or diverge. Third, existing organizational misconduct research has not sufficiently used the intended beneficiary of unethical conduct as a cross-domain organizing dimension. It remains unclear whether unethical conduct directed toward organizational interests and unethical conduct directed toward personal interests can be understood as differentiated manifestations of a broader organizational misconduct domain. Addressing these gaps is important because similar psychological mechanisms, such as moral disengagement, may be associated with different forms of unethical conduct depending on how the purpose and beneficiary of the behavior are framed.

## 2. Literature Review

### *2.1 Organizational Misconduct and Conceptual Fragmentation*

To situate Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB) within the broader unethical behavior domain, it is essential to review the traditions of organizational deviance, counterproductive work behavior (CWB), and behavioral ethics. These streams form the foundation of organizational misconduct research but remain conceptually fragmented and insufficiently integrated around a coherent taxonomy.

The organizational deviance and CWB literature conceptualize misconduct as discretionary behaviors that violate organizational norms and harm the organization or its

members (Fernández del Río et al., 2021; Kelloway et al., 2010). Research identifies job dissatisfaction, perceived injustice, and organizational politics as key predictors (Czarnota-Bojarska, 2015; Ogbozor et al., 2025; Piccoli, 2013). While this tradition provides strong measurement tools, it typically categorizes misconduct by target and harm rather than motivational intent.

In parallel, behavioral ethics adopts a descriptive approach to understanding how individuals justify unethical conduct despite valuing morality (Bazerman & Gino, 2012; Gino, 2015). Studies highlight mechanisms such as moral licensing and impression management that enable rationalization (Bolino & Klotz, 2015; Bouzzine & Lueg, 2023; De Cremer & Moore, 2020). However, similar to the deviance tradition, this stream rarely differentiates misconduct based on who ultimately benefits from the act.

At the macro level, scholarship on organizational misconduct underscores definitional ambiguity and multilevel complexity (Greve et al., 2010; Hersel et al., 2019; Paruchuri et al., 2024). Although integrative efforts exist (Anand et al., 2026; Ashforth et al., 2008; Sonenshein & Decelles, 2017), the literature often uses deviance, dishonesty, and misconduct interchangeably (Götz et al., 2019). The absence of a unifying taxonomy distinguishing misconduct by beneficiary orientation limits theoretical precision and obscures meaningful differences between organizationally driven and self-serving unethical behavior.

Taken together, the broader organizational misconduct literature provides important foundations for understanding unethical workplace behavior, but existing perspectives primarily distinguish misconduct according to behavioral form, target, harm, or rule violation. They provide less insight into the motivational direction of misconduct, particularly whether the intended beneficiary is the organization or the individual. This limitation becomes particularly relevant when considering UPB and workplace cheating, which both represent unethical workplace conduct but differ in their underlying motivational orientation.

### *2.2 Unethical Pro-Organizational Behavior (UPB): A Construct-Driven Domain*

Unethical Pro-Organizational Behavior (UPB) refers to actions that violate ethical standards or societal norms but are performed with the intention of benefiting the organization or its members (Grabowski et al., 2019; Mo et al., 2023; Umphress et al., 2010; Wolfgruber, 2024). Unlike other forms of misconduct that are primarily self-serving, UPB is characterized by its dual nature: unethical in execution yet pro-organizational in intent. This definitional clarity has enabled UPB to emerge as a distinct construct within organizational behavior, separating it from broader deviance or dishonesty categories.

Theoretically, UPB is strongly anchored in moral disengagement theory, which explains how individuals cognitively justify unethical actions while maintaining a positive moral self-image (Hsieh et al., 2020a; Zhang et al., 2023, 2023). Employees may neutralize guilt by framing misconduct as necessary for organizational success. At the same time, moral identity internalization has been shown to mitigate such rationalization processes, reducing the likelihood of UPB (Zhang et al., 2023). This cognitive mechanism provides a central explanatory foundation for the construct.

UPB is also deeply rooted in social identity theory. Strong organizational identification increases the tendency to prioritize collective goals over external ethical standards (Milesi, 2025; Qureshi & Ahmed, 2021; Umphress et al., 2010). Empirical research demonstrates that identification can mediate the relationship between leadership and UPB, suggesting that employees' perceived alignment with the organization shapes their moral decision-making (Kelebek & Alniacik, 2022). Thus, identity processes function as a motivational driver that distinguishes UPB from purely self-interested misconduct.

Leadership research further reinforces the construct's consolidation. Different leadership

styles—including ethical leadership, abusive supervision, and identity leadership—have been shown to influence UPB through mechanisms such as moral disengagement and status threat (R. Ahmad et al., 2024; Hsieh et al., 2020b; Xiong et al., 2021). The rapid integration of moral disengagement, social identity, and leadership frameworks illustrates the theoretical coherence of UPB. Collectively, this multi-theoretical anchoring has facilitated its rapid consolidation as a construct-driven and empirically robust research domain.

Collectively, the UPB literature demonstrates relatively strong theoretical integration around moral cognition, organizational identification, and leadership. These perspectives converge in explaining how employees may justify unethical actions when such actions are perceived to serve organizational interests. However, this strong organization-centered orientation has also resulted in UPB being predominantly examined as a distinct construct, with comparatively limited integration with other forms of workplace misconduct. In particular, the literature provides limited insight into whether mechanisms such as moral disengagement and performance pressure may also operate in misconduct directed toward individual interests.

### *2.3 Workplace Cheating Behavior (WCB): A Diffusion-Driven Domain*

Workplace Cheating Behavior (WCB) originates from broader traditions of organizational deviance and dishonesty, rather than from a single foundational construct. It refers to self-serving misconduct intended to create unfair advantages for the individual, often at the expense of organizational integrity and fairness (Mitchell et al., 2018; Ye et al., 2025). Conceptually, WCB evolved from earlier frameworks addressing workplace deviance, fraud, and manipulation, which categorized unethical conduct primarily in terms of harm and rule violation rather than beneficiary intent (Khattab & Abdelaliem, 2024).

Unlike UPB, WCB is predominantly framed as self-interested misconduct driven by performance pressure, job insecurity, and self-protection motives (Kamran et al., 2022; Mitchell et al., 2018). Emotional states such as anger and frustration further intensify the likelihood of cheating, particularly under high performance demands or bottom-line mentality climates (Adeel et al., 2023; Kamran et al., 2022). These affective triggers position WCB within an honesty–dishonesty continuum, emphasizing individual moral failure and opportunistic decision-making rather than collective justification (Farasat et al., 2022; Yue et al., 2023).

The theoretical foundations of WCB are dispersed across multiple perspectives. Displaced aggression theory explains cheating as a reaction to performance pressure (Kamran et al., 2022), while conservation of resources theory links emotional exhaustion and resource depletion to misconduct (I. Ahmad et al., 2025; Men et al., 2022). Social learning theory highlights the influence of peer behavior and ethical leadership and impression management perspectives connect job insecurity to unethical self-protection strategies (Ye et al., 2025).

Despite this theoretical diversity, the WCB literature remains comparatively fragmented. Research is distributed across various antecedents and mediating mechanisms without a unified conceptual framework (Kamran et al., 2022; Mitchell et al., 2018; Ye et al., 2025). This diffusion-driven development contrasts with the construct-driven consolidation observed in UPB and limits theoretical integration within the WCB domain.

Overall, the workplace cheating literature is more theoretically dispersed than the UPB literature. Despite differences in theoretical perspectives, existing studies converge in emphasizing individual-level processes involving self-protection, performance pressure, job insecurity, emotional strain, and self-regulation. This individual-centered orientation distinguishes workplace cheating from the organization-serving orientation of UPB. However, the fragmented development of WCB research and its limited integration with broader organizational-level perspectives make it difficult to determine whether workplace cheating and UPB represent fundamentally different mechanisms or different motivational manifestations of unethical workplace behavior.

### *2.4 Beneficiary Orientation as a Theoretical Boundary*

To address fragmentation within the organizational misconduct literature, beneficiary orientation can be conceptualized as a structural dimension differentiating forms of unethical behavior based on who ultimately benefits from the act. Existing research indicates that unethical behaviors vary not only in form but also in motivational direction. Unethical Pro-Organizational Behavior (UPB), for instance, is driven by organizational identification, psychological entitlement, and manipulative tendencies, which can channel strong attachment to the organization into ethically questionable conduct (Naseer et al., 2020). Meta-analytic evidence further demonstrates that identity-based and cognitive mechanisms systematically predict UPB, reinforcing its organization-centered orientation (Liu et al., 2026). Performance goal orientation may intensify this tendency, as employees prioritize organizational success over ethical standards (Mo et al., 2023).

In contrast, self-interested unethical behavior is primarily guided by pro-self motives. Bottom-line mentality and goal-contingent rewards can narrow employees' focus to personal outcomes, increasing the likelihood of unethical acts that serve individual interests (Mawritz et al., 2024). Employees high in future orientation, however, are less prone to such behavior due to greater consideration of long-term consequences (Mawritz et al., 2024). These findings suggest that motivational direction—whether organization-focused or self-focused—constitutes a meaningful boundary condition separating misconduct forms.

Beneficiary orientation thus provides an integrative lens that clarifies the structural differences between organization-serving and self-serving unethical conduct. Psychological processes such as organizational identification and moral disengagement may mediate pro-organizational misconduct (Liu et al., 2026), whereas self-regulatory and reward-driven mechanisms more strongly explain pro-self unethical behavior (Mawritz et al., 2024). Moreover, decision-makers consider the perceived ethical preferences of beneficiaries when evaluating morally ambiguous actions, indicating that beneficiary perception shapes ethical judgment processes (Wiltermuth et al., 2013).

Positioning beneficiary orientation as a theoretical boundary offers a clearer taxonomy of workplace unethical behavior and directly addresses conceptual ambiguity within prior research. By distinguishing misconduct based on intended beneficiary rather than solely on behavioral form, this framework advances theoretical precision and provides a coherent structure for comparing UPB and WCB within a unified conceptual model.

The comparative literature reveals both convergence and divergence between UPB and workplace cheating. Both domains involve unethical conduct within organizational settings and share several psychological and contextual mechanisms, particularly moral disengagement and performance-related pressure. However, they differ substantially in motivational orientation, intended beneficiary, dominant theoretical perspectives, and contextual emphasis. UPB is predominantly oriented toward organizational or collective interests, whereas workplace cheating is primarily associated with individual advantage and self-protection.

This comparison also reveals an unresolved issue. Existing studies have provided substantial explanations for why employees engage in UPB or workplace cheating separately, but they provide limited insight into why similar psychological or contextual mechanisms may result in different forms of unethical conduct. It remains unclear whether the intended beneficiary of an unethical act can explain the distinction between organization-serving and self-serving misconduct.

This unresolved issue provides the basis for considering beneficiary orientation as a potential conceptual boundary within organizational misconduct. Rather than replacing established mechanisms such as moral disengagement, organizational identification, or self-regulation, beneficiary orientation provides an additional organizing dimension that

distinguishes misconduct according to the intended recipient of its benefits. This perspective enables UPB and workplace cheating to be examined within a common conceptual space while preserving their distinct motivational characteristics.

## 3. Research Methods

### *3.1 Data Source and Search Strategy*

This study employed a comparative bibliometric approach to examine and compare the intellectual development of Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB). To ensure analytical comparability, two independent datasets were constructed using parallel search procedures. The literature search was conducted using the Scopus database in March 2026. For the UPB domain, the search was applied to titles, abstracts, and keywords using the following query: TITLE-ABS-KEY ("unethical pro-organizational behavior" OR "unethical proorganizational behavior" OR "unethical pro organizational behavior"). For the WCB domain, the following query was used: TITLE-ABS-KEY ("workplace cheating" OR "employee cheating" OR "workplace cheating behavior" OR "organizational cheating behavior" OR "employee dishonesty" OR "organizational dishonesty") AND NOT TITLE-ABS-KEY ("academic" OR "student" OR "exam" OR "tax" OR "consumer").

The exclusion terms were incorporated to minimize conceptual contamination from academic dishonesty, student and examination cheating, tax-related misconduct, and consumer-level misconduct, thereby maintaining the focus on unethical behaviors occurring within organizational contexts. The initial search yielded 306 documents for UPB and 59 documents for WCB. The retrieved records were subsequently screened based on document type, language, and subject-area relevance. Only English-language journal articles within the relevant subject areas were retained, resulting in a final dataset of 264 UPB articles and 32 WCB articles. The complete search and screening process is presented in Table 1.

This procedure ensured that both datasets were constructed using comparable search and screening criteria while maintaining the conceptual relevance of each research domain.

**Table 1. Search Strategy and Screening Procedure**

| Criteria | Unethical Pro-Organizational Behavior (UPB) | Workplace Cheating Behavior (WCB) |
|---|---|---|
| Search Query | TITLE-ABS-KEY ("unethical pro-organizational behavior" OR "unethical proorganizational behavior" OR "unethical pro organizational behavior") | TITLE-ABS-KEY ("workplace cheating" OR "employee cheating" OR "workplace cheating behavior" OR "organizational cheating behavior" OR "employee dishonesty" OR "organizational dishonesty") AND NOT TITLE-ABS-KEY ("academic" OR "student" OR "exam" OR "tax" OR "consumer") |
| Initial Retrieval | 306 | 59 |
| Journal Articles | 279 | 39 |
| Final Journal Records | 279 | 38 |
| English Language | 276 | 38 |
| Subject Area Filter Applied | 264 | 32 |
| Final Dataset | **264** | **32** |

### *3.2 Screening and Inclusion Procedure*

Only English-language journal articles within Business, Management and Accounting, Social Sciences, Psychology, Economics, and Arts and Humanities were retained. After screening, the final dataset consisted of 264 UPB articles and 32 WCB articles.

### *3.3 Bibliometric Analysis Techniques*

To systematically examine and compare the intellectual structures of the UPB and workplace cheating domains, this study employed a combination of performance analysis and science mapping techniques. Bibliometric methods enable researchers to quantitatively evaluate research productivity, structural relationships, and thematic evolution within a given field (Donthu et al., 2021; Zupic & Čater, 2015).

### *3.4 Performance Analysis*

Performance analysis was used to examine publication trends, citation impact, and influential contributors.

### *3.5 Science Mapping and Network Analysis*

Science mapping techniques were employed to examine the intellectual structure and thematic development of both research domains. Co-citation analysis was used to identify foundational theoretical streams and intellectual relationships among influential publications, while keyword co-occurrence analysis was conducted to map dominant themes, emerging topics, and conceptual linkages. These techniques enabled comparison of thematic concentration and research evolution across organizationally oriented misconduct (UPB) and self-serving unethical behavior (WCB). Bibliometric visualization and network mapping were performed using VOSviewer (Van Eck & Waltman, 2010).

### *3.6 Thematic Comparative Analysis*

A thematic comparative analysis of abstracts and keywords was conducted to identify dominant theories, motivational orientations, and contextual factors across both domains. The findings were subsequently integrated with bibliometric results to clarify conceptual boundaries and research fragmentation.

## 4. Research Findings and Discussion

### *4.1 Descriptive and Performance Analysis*

Figure 1 presents the publication trends of Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB) research from 2005 to 2026. The results reveal a significant asymmetry in domain development. Following its formal conceptualization in 2010, UPB research experienced steady growth and entered a rapid expansion phase after 2018, indicating increasing theoretical consolidation and scholarly attention. In contrast, WCB research demonstrates a comparatively limited and episodic growth pattern, with only a modest increase in publications in recent years.

Divergence cannot be explained solely by differences in temporal origin. Although workplace cheating draws from earlier dishonesty and workplace deviance traditions, it has not achieved the same level of theoretical integration and publication growth as UPB. Overall, the findings suggest that UPB has evolved into a more mature and consolidated research stream, whereas WCB remains comparatively fragmented. This asymmetry provides an initial indication of differences in intellectual maturity, which are further examined through co-citation and thematic analyses.

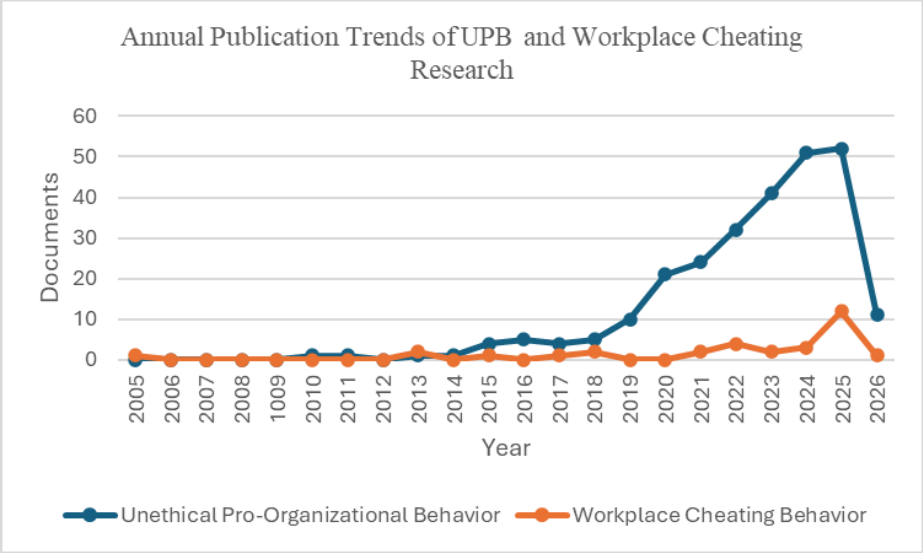



**Figure 1. Annual Publication Trends in UPB and Workplace Cheating Research**

### *4.2 Intellectual Structure: Co-Citation Analysis*

The co-citation analysis of the UPB dataset (n = 264) generated a network of 31 cited references grouped into three major clusters, indicating a relatively mature and theoretically consolidated domain (Figure 2). The network reveals three dominant intellectual streams centered on moral disengagement, moral identity, and construct development. Together, these streams demonstrate that UPB research is firmly anchored in behavioral ethics, social identity, and organizational behavior perspectives. The strong interconnections among clusters suggest a coherent theoretical foundation integrating cognitive, identity-based, and contextual explanations of unethical behavior.

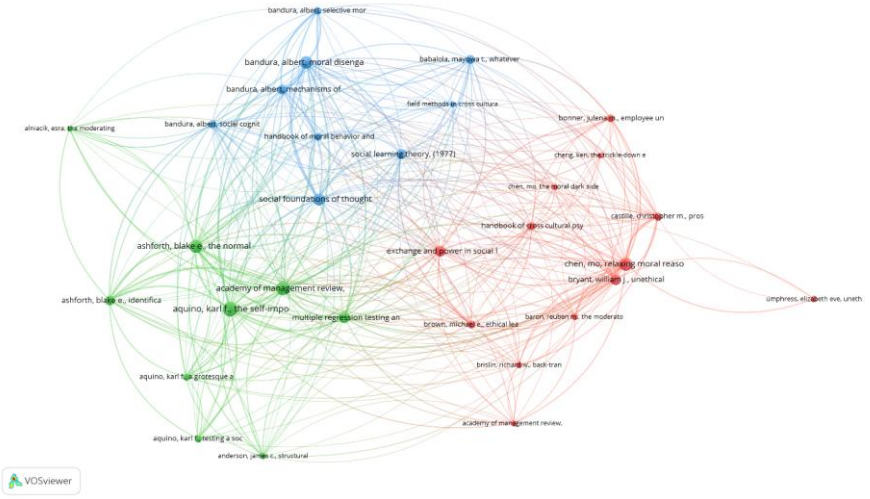



**Figure 2. Intellectual Structure of the UPB Literature Based on Co-Citation Analysis**

In contrast, the co-citation analysis of the WCB dataset (n = 32) did not produce a sufficiently dense network to form stable intellectual clusters. This finding suggests that the workplace cheating literature remains comparatively fragmented and lacks a dominant theoretical core. Rather than converging around a unified framework, WCB research draws from diverse perspectives related to workplace deviance, dishonesty, and ethical decision-making. The observed differences provide further evidence that UPB has achieved greater theoretical consolidation than WCB.

### *4.3 Thematic Structure: Keyword Co-Occurrence Analysis*

The keyword co-occurrence analysis identified 27 interconnected keywords organized into five thematic clusters (Figure 3). The network reveals a conceptually coherent domain centered on three major themes: leadership and contextual antecedents, moral justification mechanisms, and organizational identification processes. Prominent topics include ethical leadership, moral disengagement, organizational identification, performance pressure, and social exchange relationships. Collectively, these themes indicate that UPB research integrates behavioral ethics, social identity, and leadership perspectives to explain organization-serving misconduct. The density and interconnectedness of the network further suggest a mature and theoretically consolidated research domain. Overall, the thematic configuration demonstrates a conceptually integrated domain that combines moral cognition, identity processes, and contextual leadership influences. The density and interconnectivity of these clusters further confirm the structural consolidation of UPB scholarship.

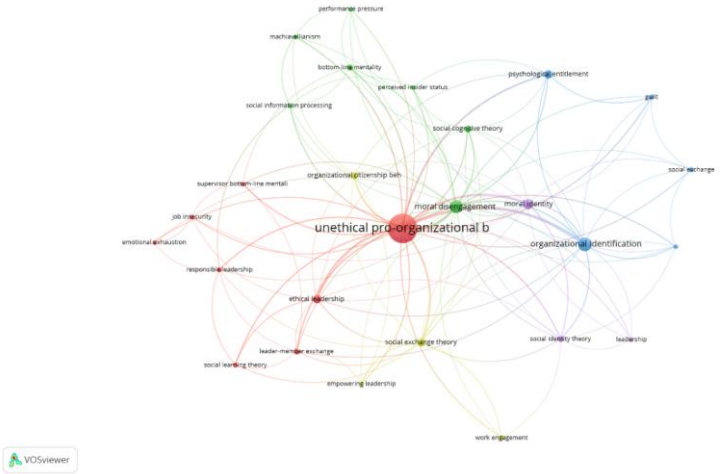



**Figure 3. Thematic Structure of UPB Based on Keyword Co-Occurrence Analysis**

The keyword co-occurrence analysis of the WCB dataset produced an 11-node network with a comparatively fragmented thematic structure (Figure 4). The literature is primarily centered on moral identity, moral disengagement, cheating behavior, and honesty–dishonesty constructs, reflecting an emphasis on individual morality and self-regulation. Additional themes include performance pressure and affective triggers such as anger, suggesting that workplace cheating is often examined as a response to personal strain and situational pressures. Overall, the findings indicate that WCB research remains predominantly individual-centered and lacks the broader organizational and leadership-oriented focus observed in the UPB literature.

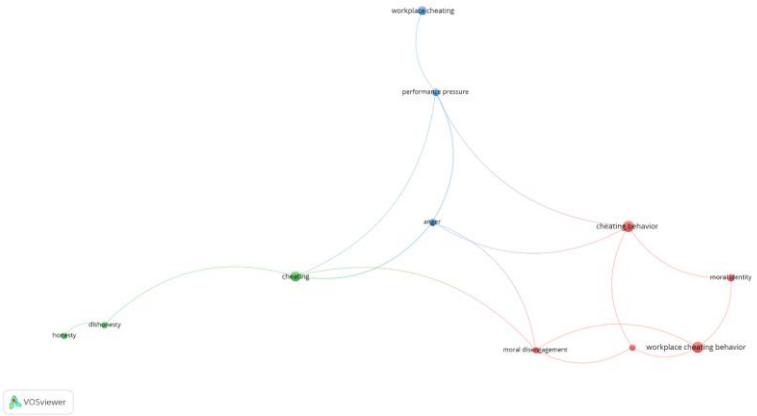



**Figure 4. Thematic Configuration of Workplace Cheating Research**

### *4.4 Temporal Evolution: Overlay Visualization*

The overlay visualization reveals a clear shift in UPB research themes over time (Figure 5). Early studies primarily focused on organizational identification, social exchange, and social learning perspectives, emphasizing relational and identity-based explanations of misconduct. More recent research increasingly examines contextual factors such as performance pressure, bottom-line mentality, and psychological entitlement. Despite these shifts, moral disengagement remains a central theme throughout the literature, indicating its enduring role in explaining organization-serving unethical behavior. Overall, the findings suggest that UPB research has evolved from identity-based explanations toward more contextualized and pressure-driven models of misconduct.

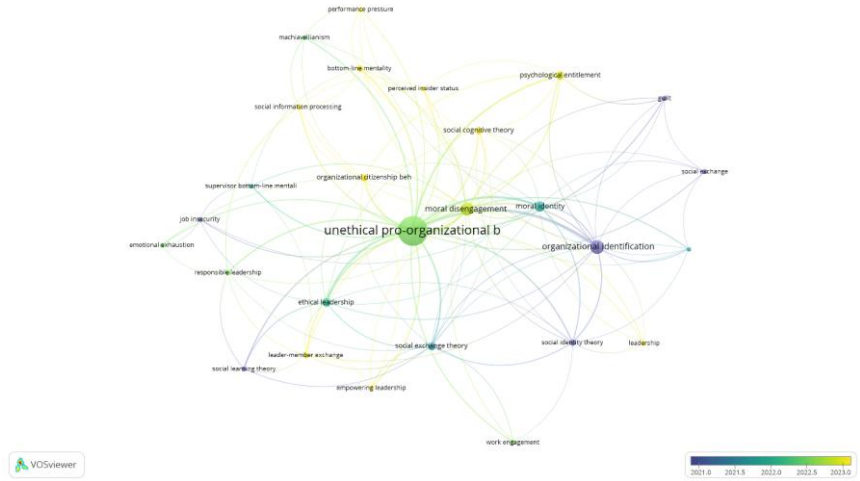



**Figure 5. Temporal Evolution of UPB Research Themes (Overlay Visualization)**

The overlay visualization indicates a gradual and comparatively limited evolution of workplace cheating research (Figure 6). Early studies primarily focused on honesty and dishonesty as individual moral traits, whereas more recent research has incorporated moral disengagement, moral identity, and workplace cheating behavior. Despite this development, the domain remains largely individual-centered and has not expanded into broader organizational themes such as leadership or organizational identification. Overall, the findings suggest that workplace cheating research continues to rely predominantly on individual-level explanations of unethical behavior.

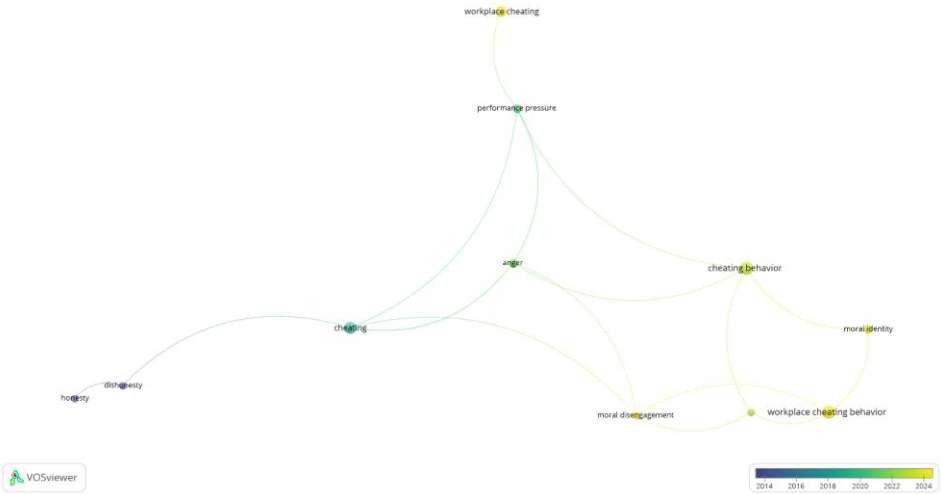



**Figure 6. Temporal Evolution of Workplace Cheating Research Themes (Overlay Visualization)**

### *4.5 Comparative Thematic Synthesis*

Taken together, the bibliometric and thematic findings reveal a clear asymmetry between Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB). Although both research streams examine unethical conduct within organizational settings and share several psychological mechanisms, they differ in their intellectual maturity, dominant themes, motivational orientation, and contextual emphasis.

First, UPB represents a relatively consolidated research stream. Its co-citation and keyword networks are strongly centered on moral disengagement, organizational identification, leadership, and related organizational processes. The temporal analysis further indicates a shift from identity- and relationship-based explanations toward contextual factors such as performance pressure, bottom-line mentality, and psychological entitlement. These findings suggest that UPB research increasingly integrates individual psychological mechanisms with organizational and leadership contexts.

In contrast, WCB represents a comparatively fragmented and predominantly individual-centered research stream. Its thematic structure emphasizes cheating, honesty–dishonesty, moral identity, moral disengagement, performance pressure, and affective factors such as anger. The temporal evolution shows some expansion toward moral disengagement and moral identity, but limited integration with broader organizational constructs such as leadership and organizational identification. Thus, WCB research remains primarily focused on individual morality, self-regulation, and situational pressure.

Despite these differences, the two domains show an important area of convergence. Moral disengagement and performance-related pressure appear across both research streams, indicating that similar psychological or contextual mechanisms may be associated with unethical workplace behavior. However, their functions and motivational orientations differ. In UPB, unethical conduct is framed as serving organizational or collective interests, whereas WCB is primarily associated with personal advantage, self-protection, or individual outcomes. Therefore, the presence of a shared mechanism does not imply that the two behaviors are conceptually equivalent.

The comparison consequently identifies beneficiary orientation as an important cross-domain distinction. The critical question is not only why employees disengage morally or experience performance pressure, but also who is intended to benefit from the resulting unethical act. This distinction provides a basis for understanding UPB as organization-serving misconduct and WCB as predominantly self-serving misconduct. The comparative findings therefore support beneficiary orientation as a potential conceptual boundary for integrating these two previously separated research streams.

To structure the comparative thematic analysis, the findings were organized across five dimensions: theoretical perspectives, research contexts, methodological orientation, key variables or constructs, and major findings. These dimensions were derived from the recurring patterns identified through co-citation analysis, keyword co-occurrence analysis, temporal evolution, and examination of the abstracts and keywords of the selected publications. Table 2 summarizes the main similarities and differences identified across the two research streams.

**Table 2. Systematic Thematic Comparison of UPB and Workplace Cheating Behavior**

| Comparison dimension | UPB | WCB |
|---|---|---|
| Theoretical perspectives | Moral disengagement, organizational identification, social identity, leadership | Self-regulation, dishonesty, self-protection, affective/strain perspectives |

| Comparison dimension | UPB | WCB |
|---|---|---|
| Research contexts | Organizational goals, leadership, organizational identification, collective interests | Performance pressure, job insecurity, interpersonal strain, personal gain |
| Methodological orientation | Individual, relational, and organizational/contextual perspectives | Predominantly individual-level and situational perspectives |
| Key constructs | Moral disengagement, organizational identification, leadership, bottom-line mentality | Cheating, honesty/dishonesty, self-regulation, moral identity, performance pressure |
| Motivational orientation | Organization-serving | Self-serving / self-protective |
| Shared mechanisms | Moral disengagement, performance-related pressure | Moral disengagement, performance-related pressure |
| Key findings | Unethical behavior may be justified as serving organizational/collective interests | Unethical behavior is primarily associated with personal advantage, self-protection, and pressure |
| Research development | Relatively consolidated | Comparatively fragmented |

### *4.6 Conceptual Integration: Beneficiary Orientation Framework*

Organizations face multiple forms of unethical conduct that are often treated as conceptually similar despite important motivational differences. Building on the comparative findings of this study, we propose beneficiary orientation as a structural dimension that differentiates organizational misconduct based on the primary beneficiary of the unethical act. Rather than treating unethical workplace behaviors as a homogeneous category, this perspective emphasizes that misconduct may emerge from fundamentally different motivational orientations depending on who ultimately benefits from the action.

Two distinct motivational pathways can therefore be identified.

1) Organization-serving misconduct refers to unethical actions rationalized as benefiting the organization. In this case, individuals engage in behavior that violates ethical standards but perceive the act as contributing to organizational success or protecting collective interests. This form of misconduct is typically conceptualized as Unethical Pro-Organizational Behavior (UPB).
2) Self-serving misconduct refers to unethical actions primarily aimed at personal gain. In this pathway, individuals engage in dishonest or rule-violating behavior to obtain individual advantages such as financial rewards, performance outcomes, or career benefits. Such behavior is commonly represented in the literature as Workplace Cheating Behavior (WCB).

Although these two forms of misconduct share similar psychological processes, their underlying motivations differ substantially. Moral disengagement functions as a central psychological mechanism enabling individuals to rationalize unethical behavior while maintaining a positive moral self-concept. However, the behavioral outcome of this mechanism depends on how individuals frame the beneficiary of the act.

Figure 7 presents the proposed Beneficiary Orientation Framework of Organizational Misconduct. The framework illustrates how moral disengagement operates as a psychological mechanism that shapes how employees interpret the beneficiary of their unethical actions. When individuals frame the beneficiary as the organization, unethical conduct may manifest as Unethical Pro-Organizational Behavior (UPB). Conversely, when individuals frame the beneficiary as themselves, similar psychological processes may lead to Workplace Cheating Behavior (WCB).

Importantly, this framework suggests that identical psychological mechanisms can produce different forms of unethical behavior depending on how individuals cognitively frame the intended beneficiary of the act. In other words, the distinction between organization-serving and self-serving misconduct does not necessarily arise from different psychological mechanisms, but rather from differences in motivational orientation and beneficiary framing.

By positioning beneficiary orientation as a structural boundary, this study contributes to the literature on organizational misconduct by proposing a clearer conceptual taxonomy of unethical workplace behavior. This perspective highlights that wrongdoing in organizations may emerge either from excessive loyalty to organizational goals or from self-interested opportunism. Recognizing this distinction provides a more precise theoretical foundation for understanding the diversity of unethical behaviors observed in organizational contexts.

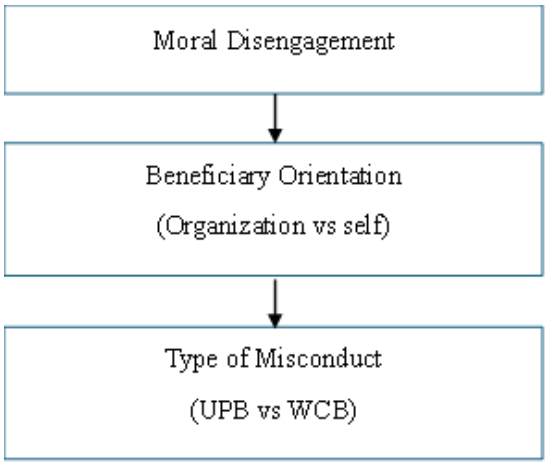



**Figure 7. Beneficiary Orientation Framework of Organizational Misconduct**

## 5. Research Agenda and Future Directions

The comparative findings identify several specific directions for future research. First, the stronger theoretical consolidation of UPB compared with the fragmented WCB literature suggests a need for integrative models that connect self-regulation, performance pressure, moral disengagement, and beneficiary orientation. Future studies could test whether these mechanisms operate differently depending on whether employees perceive the organization or themselves as the primary beneficiary of the unethical act.

Second, the presence of moral disengagement and performance-related pressure across both domains indicates the need to examine why similar mechanisms may lead to different forms of misconduct. Future research should empirically test beneficiary orientation as a potential moderator or boundary condition linking psychological and contextual antecedents to organization-serving versus self-serving misconduct.

Third, the contrasting emphasis on leadership and organizational identification in UPB and individual morality and performance pressure in WCB suggests an opportunity for multilevel research. Future studies could integrate organizational-level factors, such as leadership and organizational identification, with individual-level factors, such as self-regulation, moral identity, and performance pressure, to explain different forms of workplace misconduct.

Finally, the limited development of broader organizational themes in WCB and the increasing digitalization of work suggest a need to examine emerging technological contexts. Future research could investigate whether AI-driven performance monitoring, algorithmic management, and digital surveillance alter performance pressure, beneficiary orientation, and employees' propensity to engage in organization-serving or self-serving misconduct.

## 6. Conclusion

This study examined the intellectual structures of Unethical Pro-Organizational Behavior (UPB) and Workplace Cheating Behavior (WCB) through comparative bibliometric and thematic analyses. The findings reveal that, although both domains share psychological mechanisms such as moral disengagement, they differ fundamentally in their motivational orientation. UPB is primarily associated with organizational identification, leadership influences, and collective-serving motives, whereas WCB is centered on self-interest, dishonesty, performance pressure, and self-regulatory failure.

Based on these findings, this study proposes beneficiary orientation as a conceptual boundary distinguishing organization-serving from self-serving misconduct. This perspective provides a more coherent taxonomy of unethical workplace behavior and highlights the importance of considering who benefits from unethical actions. By integrating previously fragmented research streams, the study contributes to behavioral ethics literature and offers a foundation for future research on organizational misconduct in increasingly digitalized workplaces.

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# INDONESIA'S ECONOMIC GROWTH 1991–2024: THE ROLE OF CAPITAL EXPENDITURE, HUMAN DEVELOPMENT INDEX (HDI), AND INFLATION IN MACROECONOMICS PERSPECTIVE

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***Abstract***
*This study analyzes the short- and long-term relationships between capital expenditure, the Human Development Index (HDI), and inflation regarding Indonesia's economic growth from 1991 to 2024. Employing the Autoregressive Distributed Lag (ARDL) approach and the Error Correction Model (ECM), the study examines macroeconomic dynamics—including the structural effects of the Asian Financial Crisis (1997–1998) and the COVID-19 pandemic (2020–2021)—via dummy variables. Estimation results indicate that capital expenditure has a positive and significant impact on economic growth in both the short and long term, whereas inflation has a negative and significant effect. While the HDI is not significant in the short term, it demonstrates a positive contribution in the long term, reflecting the importance of sustainable human development. Diagnostic tests (ADF, PP, VIF, Breusch-Pagan, Durbin-Watson, CUSUM) confirm the model's validity and the stability of the relationships between variables. These findings underscore that Indonesia's economic growth relies on a combination of productive capital expenditure, price stability, and inclusive human development, while also necessitating adaptive policies to withstand global shocks. The study offers empirical and policy-relevant insights for strengthening fiscal, monetary, and human development strategies within a sustainable macroeconomic framework.*
***Keywords***: *Capital Expenditure, Economic Growth, Human Development Index, Inflation*

## 1. Introduction

A growing economy is one of the main indicators reflecting a country's success in improving the welfare of its people. For Indonesia, as a developing country with a large and heterogeneous population, the dynamics of economic growth are determined not only by production factors but also by the quality of human resources, fiscal policy, and price stability. The period 1991–2024 is an interesting timeframe to study because it encompasses the 1997–1998 Asian economic crisis, political reform, globalization, and the challenges of the COVID-19 pandemic that rocked the global economy. In this context, an analysis of capital expenditure, the Human Development Index (HDI), and inflation is relevant for understanding the foundations of Indonesia's economic growth.

Capital expenditure, realized through the development of physical and social infrastructure, plays a crucial role in creating new production capacity, facilitating the distribution of goods and services, and increasing economic efficiency. Government investment in the form of capital expenditure not only directly impacts output but also has a multiplier effect that strengthens economic activity across various sectors. However, the effectiveness of capital expenditure is often influenced by the quality of governance, transparency, and sustainability of the projects implemented.

On the other hand, the HDI, as a composite indicator encompassing the dimensions of education, health, and a decent standard of living, reflects the quality of human resources. Sustainable economic growth is inextricably linked to the role of humans as the primary actors in development. An increase in the HDI indicates improvements in the productive capacity of society, which in turn strengthens national competitiveness. Therefore, the HDI is not merely a measure of welfare but also a strategic variable influencing long-term economic growth.

Inflation, as an indicator of price stability, plays a dual role in the economy. Controlled

inflation can stimulate production and consumption activities, while high and unstable inflation precisely reduces household purchasing power., disrupts the investment climate, and suppresses economic growth. Indonesia, from 1991 to 2024, faced various inflationary dynamics, ranging from post-crisis hyperinflation to periods of relatively controlled price stability. Therefore, analyzing inflation is crucial to understand how macroeconomic stability affects growth.

The research problem is formulated as follows: to what extent do capital expenditure, HDI, and inflation influence Indonesia's economic growth during the period 1991–2024. The research objective is to identify the influence of these three variables on economic growth and to provide relevant policy recommendations for the Indonesian government. This research is expected to provide academic contributions to the development economics literature, as well as provide practical input for the formulation of fiscal policy, human development, and inflation control.

The significance of this research lies in the integration of fiscal aspects, human resource quality, and price stability within a single macroeconomic analysis framework. With a comprehensive approach, this study not only explains the factors influencing Indonesia's economic growth but also emphasizes the importance of cross-sectoral policy synergy to achieve inclusive and sustainable development.

This study integrates three variables (capital expenditure, HDI, and inflation) within a long-term macroeconomic framework (1991–2024), distinguishing it from previous studies that focused on only one or two variables or shorter timeframes. It offers policy insights regarding the importance of productive capital expenditure and price stability, while demonstrating that HDI requires a longer time horizon to impact growth.

## 2. Literature Review

### *2.1 Economic growth Theory*

The growth study economy has long been the focus of the knowledge economy. Classical models, such as Harrod-Domar, emphasize the importance of investment as a driving force for growth, while Solow-Swan added the role of technology and capital accumulation. The theory of endogenous growth (Romer, Lucas) highlights the role of the source power of people, innovation, and public policy in creating sustainable growth. In the Indonesian context, theories relevant to explaining how capital expenditure, human quality, and stability price interact to push growth.

### *2.2 Capital Expenditure and Economic Growth*

Government capital expenditure covers investment in infrastructure, physical (roads, bridges, energy), and social (education, health) sectors. The study empirically shows that capital expenditure has an effect multiplier on national output, increasing productivity, and expanding capacity production. However, the effectiveness of capital expenditure is highly dependent on the quality of governance, transparency, and sustainability projects. Research in developing countries confirms that appropriate capital expenditure targets can speed up economic growth, while inefficient inefficient expenditure imposes fiscal burdens.

### *2.3 Human Development Index (HDI)*

The HDI, developed by the UNDP, measures quality development through three main dimensions: education, health, and life standards. The increase in the HDI reflects the repair capacity of a productive society, which in turn strengthens power competition economics. Empirical studies in various countries show a positive correlation between HDI and economic growth because the quality of power sources is a key factor in innovation, productivity, and sustainable development. In the Indonesian context, the increase in the HDI since the 1990s has been one of the indicators of successful social development.

### *2.4 Inflation and Economic Stability*

Inflation is an important indicator for evaluating macroeconomic stability. The theory of the quantity of money emphasizes the connection between money supply and rate price, while Keynesian theory highlights the role of aggregate demand. Controlled inflation can push the economy, but high and unstable inflation lowers power buy, disturbs climate investment, and pressures growth. Indonesia's experience during the 1997–1998 crisis showed how surging inflation can hinder growth, while the period of stability after the post-reformation strengthened the economy.

### *2.5 Previous Research*

Several studies in Indonesia and other countries have highlighted the connection between capital expenditure, the HDI, inflation, and economic growth. For example, Barro (1991) emphasized the role of education in long-term growth, while research in Southeast Asia shows that public capital expenditure contributes significantly to infrastructure development and economic growth. Research in Indonesia also confirms that controlled inflation is a prerequisite for stability growth. However, there is still a gap in the study of integrating third variables in a comprehensive framework analysis, especially in the Indonesian context from 1991 to 2024.

## 3. Research Methods

### *3.1 Research Approach*

This study employs a quantitative approach using time-series analysis covering the period from 1991 to 2024. Given the extensive observation period and significant structural changes (the 1997–1998 Asian crisis, political reform, globalization, and the COVID-19 pandemic), the analytical method must account for stationarity, cointegration, and potential structural breaks.

### *3.2 Stationarity Test*

Unit Root Tests (ADF and PP): conducted for each variable (PE, BM, HDI, INFL).

Test results indicate that some variables are stationary at the level, while others are stationary at the first difference.

### *3.3 Analytical Model*

Since the variables exhibit mixed orders of integration (I(0) and I(1)), Autoregressive Distributed Lag (ARDL) Bounds Testing is used to examine short-run and long-run relationships. An Error Correction Model (ECM) is derived from the ARDL model to capture adjustment dynamics toward long-run equilibrium. Dummy variables are included for the crisis period (1997–1998) and the COVID-19 pandemic (2020–2021) to control for structural breaks.

### *3.4 Variable Definitions and Units*

| Variable | Definition | Unit |
|---|---|---|
| PE | Economic Growth (Real GDP, % annual change) | % |
| BM | Government Capital Expenditure (constant prices, base year 2010) | IDR Trillion |
| HDI | Human Development Index | Index (0–1) |
| INFL | Inflation (CPI, % annual change) | % |

### *3.5 Diagnostic Tests*

Tests conducted include multicollinearity (VIF), heteroskedasticity (Breusch-Pagan), autocorrelation (Durbin-Watson), and model stability tests (CUSUM, CUSUMSQ).

## 4. Research Findings and Discussion

### *4.1 Data Description*

Data analysis shows diverse trends throughout the period 1991–2024: Expenditure: experienced significant improvement post-reformation, especially after 2005 , with a focus on developing infrastructure , transportation, energy, and education.

HDI: continued increase from the low category in the early 1990s to the high category in the 2020s, reflecting improved quality of education, health, and standards of life.

Inflation: fluctuating sharply, with peak hyperinflation during the 1997–1998 crisis, then relatively controlled below 5 % in the period 2010–2024.

Growth: had a chance to contract during the Asian crisis and the COVID-19 pandemic, but in a way, generally shows a positive trend with an average growth of 4–6% per year.

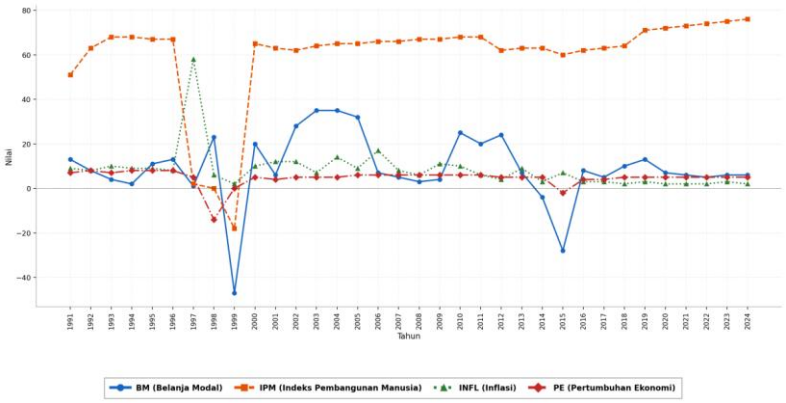



**Figure 1. Data on Capital Expenditure (BM), Human Development Index (HDI), inflation (INFL), and Indonesian Economic Growth (PE) for the Period 1991-2024**
*Source*: BPS, *United Nations Development Programme* (UNDP), Directorate General Balance Finance (DJPK), Various Editions.

### *4.2 Model Estimation Results*

The analysis of multiple linear regression produces the equation:

$$PE=6.445+0.0522BM-0.0001IPM-0.2474INFL$$

With $R^2 = 0.775$, this model explains 77.5% of the variation in the growth of the Indonesian economy for the period 1991–2024. The F test shows a significant model overall (Prob = 0.0000), while the t-test indicates that capital expenditure and inflation are influential significant, while the HDI is not significant.

## 5. Discussion

### *5.1 Capital Expenditure*

The research results are consistent with the Harrod-Domar theory, which emphasizes the role of investment as a driver of growth, as well as the Solow-Swan model, which incorporates the dimensions of capital accumulation and technology. Empirically, these findings align with studies in developing nations confirming that public capital expenditure—whether in physical infrastructure (transportation, energy) or social infrastructure (education, health)—exerts a multiplier effect on national output. However, its effectiveness hinges heavily on the quality of governance and budget transparency. Thus, fiscal policy directed toward productive capital expenditure is key to strengthening long-term productive capacity.

### *5.2 Human Development Index (HDI)*

The impact of the HDI is more pronounced in the long run, consistent with endogenous growth theory, which highlights the role of human capital in innovation and productivity. The lack of short-term significance can be attributed to uneven human development across regions and limitations in public service efficiency. This underscores the fact that improvements in the HDI require time to translate into tangible contributions to economic growth. In other words, investing in education, health, and living standards is a long-term strategy that bolsters national competitiveness.

### *5.3 Inflation*

The finding of a significant negative impact of inflation on growth supports Keynesian literature and Indonesia's own experience, particularly during the 1997–1998 crisis. High inflation erodes purchasing power, disrupts the investment climate, and heightens macroeconomic uncertainty. Conversely, price stability is proven to be a crucial prerequisite for sustainable growth. This highlights the importance of credible monetary policy and fiscal-monetary coordination in maintaining macroeconomic stability.

### *5.4 Structural Breaks*

Analysis indicates that the Asian financial crisis (1997–1998) and the COVID-19 pandemic (2020–2021) caused significant contractionary shocks to growth. This demonstrates that the fundamental relationships between capital expenditure, the HDI, inflation, and growth are not static but are instead vulnerable to external shocks. Therefore, adaptive policies—such as economic sector diversification, the strengthening of foreign exchange reserves, and countercyclical policies—are necessary to maintain economic resilience.

## 6. Conclusion

Based on the time-series analysis using ARDL and ECM approaches for the 1991–2024 period, several key findings were obtained:

*Capital Expenditure (BM):* Has a positive and significant impact on economic growth in both the short and long term. This confirms that government investment in physical and social infrastructure generates a multiplier effect that strengthens national production capacity.

*Human Development Index (HDI)**:*** Statistically insignificant in the short term, yet shows potential for long-term contribution. Uneven distribution of human development across regions and limited efficiency in public services explain the weak direct impact on economic output.

*Inflation (INFL)**:*** Has a negative and significant impact on economic growth. High inflation erodes public purchasing power, disrupts the investment climate, and increases macroeconomic uncertainty. Conversely, controlled inflation supports growth stability.

*Structural Breaks**:*** The 1997–1998 Asian Crisis and the 2020–2021 COVID-19 pandemic were shown to have significant contractionary impacts, underscoring the importance of adaptive policies in facing global shocks.

Overall, this study demonstrates that Indonesia's economic growth relies on a combination of productive capital expenditure, inflation control, and the integration of human development within a sustainable macroeconomic policy framework.

## *7. Recommendations*

### *7.1 Optimization of Capital Expenditure:*

The government needs to ensure that capital expenditure allocations are directed toward productive infrastructure projects with high multiplier effects (transportation, energy, digitalization). Budget transparency and accountability must be strengthened.

### *7.2 Integration of Human Development:*

Improvements in the HDI must be directly linked to economic productivity through vocational programs, workforce quality enhancement, and equitable access to healthcare services. These policies will accelerate the contribution of HDI to economic growth.

### *7.3 Consistent Inflation Control:*

Bank Indonesia, in coordination with the government, must maintain price stability through credible monetary policy, money supply management, and food price stabilization. Fiscal-monetary coordination is key.

***7.4 Crisis-Adaptive Policies:***

Diversification of economic sectors, increased foreign exchange reserves, and countercyclical policies are necessary to maintain economic resilience in the face of global shocks.

***7.5 Cross-Sector Synergy:***

Sustainable growth can only be achieved through the integration of fiscal, monetary, and human development policies within a comprehensive macroeconomic framework.

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# THE EFFECT OF INTERNATIONAL TRADE ON INDONESIA'S FOREIGN EXCHANGE RESERVES

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***Abstract***
*Foreign exchange reserves are a fundamental indicator of a country's economic resilience in facing global market dynamics. This study aims to analyze the contribution of international trade to Indonesia's foreign exchange reserves from 2010 to 2024. The research method used is a quantitative approach with a simple linear regression model based on annual time series data sourced from the World Bank and Bank Indonesia. The results show that international trade performance, particularly exports, has a statistically significant positive impact on Indonesia's foreign exchange reserves. Every increase in export value directly contributes to an increase in national foreign exchange reserves. This finding confirms that exports are a key factor in strengthening the country's foreign exchange reserves. Policy implications emphasise the importance of optimising the added value of export products in international markets. A strengthening strategy through industrial downstreaming and global market diversification is a crucial step for the government to ensure sustainable foreign exchange reserve growth and maintain long-term macroeconomic stability.*
***Keywords:*** *Foreign exchange reserves, exports, time series data, value added, economic stability.*

## 1. Introduction

Foreign exchange reserves represent a vital indicator of a nation's economic resilience when navigating global uncertainties. As foreign assets controlled by monetary authorities, foreign exchange reserves serve a dual purpose: acting as a medium for settling international transactions and functioning as a buffer against external economic shocks (Bank Indonesia, 2024; Tambunan, 2022). Globally, the accumulation of foreign reserves across emerging market economies is predominantly driven by a precautionary motive, reflecting deliberate efforts to preserve external stability and mitigate vulnerability during financial crises (Ghosh et al., 2021; IMF, 2023). These dynamic shifts are strongly conditioned by international trade positioning and prevailing macroeconomic conditions globally (UNCTAD, 2023; OECD, 2022).

Indonesia's foreign exchange reserve position exhibited noticeable fluctuations throughout the 2010–2024 period. Recorded at USD 96.21 billion in 2010, reserves expanded to USD 155.71 billion by 2024. However, notable contractions occurred in 2013 and 2022, signalling that national reserve positions remain highly sensitive to external sector shifts (Bank Indonesia, 2024). Panggabean (2025) underscores that external variables, particularly international trade activity, play a critical role in shaping reserve dynamics.

Export performance is a primary and consistent foreign currency generator. Theoretically, higher export volumes enhance the current account balance and induce substantial foreign exchange inflows (Aulia & Syafri, 2021; Tambunan, 2022). Nevertheless, the empirical efficacy of exports in driving reserve accumulation remains subject to global commodity price trends, post-pandemic trading partner demand, and inflationary pressures (Sanjaya & Wianti, 2023; Simamora & Widanta, 2021).

Despite extensive research on foreign exchange reserves, a fundamental research gap persists. Prior studies frequently incorporate multiple monetary variables simultaneously, thereby obscuring the specific, isolated role of exports as a primary real-sector driver. Furthermore, existing literature often relies on constrained timeframes; for instance, Panggabean (2025) covers data only through 2021. Therefore, this study aims to examine the empirical impact of exports on Indonesia's foreign exchange reserves over the updated 2010–2024 period. Employing a simple linear regression model, this research delivers precise insights into the extent to which international trade acts as a

key anchor in safeguarding national reserve stability.

## 2. Literature Review

Foreign exchange reserves are external assets held and managed by monetary authorities, particularly central banks, to meet international payment obligations, address balance of payments imbalances, maintain confidence in the domestic currency, and, when necessary, intervene in the foreign exchange market. Adequate foreign exchange reserves therefore represent an important component of a country's external economic resilience, as they provide liquidity to finance imports, service external obligations, and mitigate the effects of external economic and financial shocks.

From the perspective of international economics, the relationship between exports and foreign exchange reserves can be explained through mercantilist and precautionary-mercantilist approaches to reserve accumulation. The mercantilist perspective emphasises the role of export-oriented economic activity in generating trade surpluses and accumulating foreign assets. When a country's export earnings exceed its foreign exchange requirements for imports and other external payments, the resulting net inflow of foreign currency can increase foreign exchange reserves. Accordingly, export expansion can strengthen a country's external position by increasing its capacity to generate foreign currency through real economic activity.

The precautionary perspective provides a complementary explanation for reserve accumulation. Countries may accumulate foreign exchange reserves not only as a consequence of trade surpluses but also as a form of self-insurance against external vulnerability. Adequate reserves enable monetary authorities to respond to sudden capital outflows, exchange-rate volatility, disruptions in external financing, and unexpected increases in foreign currency requirements. In economies with substantial exposure to international trade, stronger export performance can facilitate this precautionary accumulation by providing a relatively continuous source of foreign exchange earnings.

The mechanism through which exports influence foreign exchange reserves can also be understood from the balance of payments framework. Exports of goods and services generate foreign currency receipts and are recorded as credits in the current account. An increase in export earnings, ceteris paribus, improves the current account balance and increases the supply of foreign currency within the domestic economy. When these foreign exchange earnings are converted through the domestic financial system and subsequently accumulated by the monetary authority rather than being entirely offset by imports, external debt payments, or capital outflows, they can contribute to an increase in official foreign exchange reserves. Thus, the relationship between exports and reserves operates through the broader interaction between the current account, financial account, and official reserve transactions.

Empirical literature has identified several determinants of foreign exchange reserve dynamics, including export earnings, imports, exchange rates, foreign direct investment, portfolio and other capital flows, external borrowing, external debt service, inflation, and interest rates. However, these sources of foreign exchange differ considerably in their economic characteristics. Foreign borrowing, for example, can increase the availability of foreign currency in the short term but simultaneously creates future repayment and interest obligations. Portfolio capital inflows can also strengthen foreign exchange availability, yet they may be highly sensitive to changes in global interest rates, investor expectations, and international financial conditions.

Foreign direct investment tends to be relatively more stable than short-term portfolio flows and can contribute to foreign exchange availability while simultaneously supporting productive capacity. Nevertheless, FDI remains dependent on investment conditions, political and macroeconomic stability, and investors' expectations regarding future returns. In comparison, export earnings represent a foreign exchange inflow generated directly from productive economic activity and international demand for domestically produced goods and services. Export proceeds therefore do not inherently create the same repayment obligations associated with external debt.

They are generally less directly exposed to the sudden reversal risk characteristic of short-term speculative capital flows.

Nevertheless, the relationship between exports and foreign exchange reserves should not be regarded as automatic or proportional. Higher exports generate greater potential foreign exchange earnings, but the extent to which these earnings translate into higher official reserves depends on several factors. These include the country's import requirements, external debt repayments, exchange-rate regime, capital flows, foreign exchange intervention policies, repatriation and conversion of export proceeds, and the institutional framework governing foreign exchange transactions. Consequently, a country may experience strong export growth without an equivalent increase in reserves when higher imports, debt servicing, or capital outflows simultaneously absorb foreign currency earnings.

The composition and sustainability of exports are also important. Economies that depend heavily on primary commodities may experience substantial fluctuations in export earnings because international commodity prices are volatile. A temporary commodity-price boom can increase foreign exchange earnings and reserves, but the effect may weaken when global prices decline. Conversely, greater export diversification, expansion into higher-value-added products, and access to a broader range of international markets can contribute to more sustainable foreign exchange earnings and reduce vulnerability to sector-specific external shocks.

Previous empirical studies generally provide support for the importance of exports in explaining foreign exchange reserve movements. Puspita and Kurniawan (2024) found that exports had a positive relationship with Indonesia's foreign exchange reserves, indicating that stronger export performance can increase the availability of foreign currency within the domestic economy. Other studies have approached reserve accumulation from a broader macroeconomic perspective. Rahmawati and Suriani (2022) examined Indonesia's foreign exchange reserves by considering exports alongside imports, exchange rates, inflation, and external debt, demonstrating that reserve movements are closely connected to developments in both the external sector and domestic macroeconomic conditions. Similarly, Maghfiroh and Anggraeni examined the relationships among exchange rates, exports, imports, inflation, and foreign exchange reserves, further highlighting the relevance of international trade variables in explaining reserve dynamics. Taken together, the empirical literature indicates that multiple macroeconomic forces determine foreign exchange reserves, while exports constitute an important real-sector source of foreign currency.

The theoretical mechanisms and empirical evidence therefore provide a strong basis for expecting a positive relationship between exports and foreign exchange reserves. Higher export earnings increase the potential inflow of foreign currency and, provided that these inflows are not fully offset by imports, debt servicing, or capital outflows, can strengthen the country's reserve position. This relationship is particularly important because export-generated foreign exchange originates from productive international transactions rather than from the accumulation of additional external liabilities. Based on the theoretical arguments and previous empirical findings, this study proposes the following hypothesis:

H1: Exports have a positive and statistically significant effect on foreign exchange reserves.

## 3. Research Methods

### *3.1 Research Design and Data*

This study adopts a quantitative approach to test the effect of export performance on foreign exchange reserves. Secondary annual time-series data spanning 2010 to 2024 were utilized. All data were collected from official databases of the World Bank and Bank Indonesia.

**Table 1. Operational Definition of Research Variables**

| Variable | Indicator | Description | Source |
|---|---|---|---|
| Dependent | Foreign | Foreign assets held by the central bank | World Bank |

| Variable | Indicator | Description | Source |
|---|---|---|---|
| Variable | Exchange Reserves | for international transactions, expressed in natural logarithm. | |
| Independent Variable | Exports | Total value of oil/gas and non-oil/gas goods and services sold abroad, expressed in natural logarithm. | BPS / World Bank |

*Source*: Author compilation based on study parameters (2025).

### *3.2 Classical Assumption Tests*

Prior to regression estimation, statistical diagnostic tests were performed to verify that Ordinary Least Squares (OLS) estimates fulfill Best Linear Unbiased Estimator (BLUE) properties. Diagnostic evaluations encompassed: (1) Normality testing via Jarque-Bera to confirm normally distributed residuals; (2) Heteroscedasticity testing via White's Test to verify constant error variance; and (3) Autocorrelation testing via Breusch-Godfrey Serial Correlation LM Test to rule out cross-period error dependence. All diagnostic procedures were conducted using EViews 12 software.

The simple linear regression model is specified as follows:

$$\text{Reserves} = \beta 0 + \beta 1\ \text{Export} + \varepsilon$$

Where Reserves represents foreign exchange reserves, Export represents export value, $\beta 0$ is the constant term, $\beta 1$ is the regression coefficient, and $\varepsilon$ is the error term.

### *3.3 Hypothesis Testing*

The hypothesized directional effect is $\beta_1 > 0$, implying a positive impact of exports on foreign exchange reserves. Hypothesis testing was conducted using the t-test for partial significance and F-test for overall model significance, evaluated at a 5% significance level ($\alpha = 0.05$).

## 4. Research Findings and Discussion

### *4.1 Descriptive Statistics*

Table 2 summarizes the descriptive statistics of the research variables. Indonesia's foreign exchange reserves averaged USD 125.93 billion with a standard deviation of USD 17.82 billion, ranging from USD 96.21 billion (2010) to USD 155.71 billion (2024). Meanwhile, export values averaged USD 198.54 billion with a standard deviation of USD 45.37 billion, bounded between USD 145.13 billion and USD 292.19 billion.

**Table 2. Descriptive Statistics of Research Variables**

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Foreign Exchange Reserves (USD Billion) | 125.93 | 17.82 | 96.21 | 155.71 |
| Exports (USD Billion) | 198.54 | 45.37 | 145.13 | 292.19 |

*Source*: Research data, processed (2025).

### *4.2 Classical Assumption Test Results*

1) ***Normality Test*:** The Jarque-Bera statistic was 0.939011 with a probability value of 0.625311 (> 0.05). Thus, $H_0$ cannot be rejected, confirming that the residuals are normally distributed.

**Table 3. Jarque-Bera Normality Test Results**

| Criterion | Value | Conclusion |
|---|---|---|
| Jarque-Bera Statistic | 0.939011 | Residuals are normally distributed ($H_0$ accepted) |
| Probability (Prob.) | 0.625311 | Residuals are normally distributed ($H_0$ accepted) |

| Criterion | Value | Conclusion |
|---|---|---|
| Skewness | -0.181190 | Residuals are normally distributed ($H_0$ accepted) |
| Kurtosis | 1.829061 | Residuals are normally distributed ($H_0$ accepted) |

*Source*: Research data, processed (2025).

***2) Autocorrelation Test*:** The Breusch-Godfrey Serial Correlation LM Test yielded an F-statistic probability of 0.1029 and Obs*R-squared probability of 0.0789, both exceeding 0.05. This indicates the absence of serial correlation across period errors.

**Table 4. Autocorrelation Test Results**

| Criterion | Value | Probability | Conclusion |
|---|---|---|---|
| F-statistic | 2.815608 | 0.1029 | No autocorrelation present |
| Obs*R-squared | 5.078898 | 0.0789 | No autocorrelation present |

*Source*: Research data, processed (2025).

***3) Heteroscedasticity Test*:** White's Test generated an Obs*R-squared probability of 0.3393 and Prob. F of 0.3753 (> 0.05). Therefore, the assumption of homoscedasticity is fulfilled.

**Table 5. Heteroscedasticity Test Results**

| Criterion | Value | Probability | Conclusion |
|---|---|---|---|
| F-statistic | 0.842753 | 0.3753 | No heteroscedasticity present |
| Obs*R-squared | 0.913206 | 0.3393 | No heteroscedasticity present |
| Scaled explained SS | 0.284334 | 0.5939 | No heteroscedasticity present |

*Source*: Research data, processed (2025).

***a) Simple Linear Regression Results***

Regression estimates demonstrate that export value significantly influences foreign exchange reserves. The regression coefficient for exports is 0.437138 (p = 0.0086), indicating that a 1% increase in export performance leads to approximately 0.44% growth in foreign exchange reserves. Dengan demikian, semakin tinggi nilai ekspor, semakin besar pula devisa yang diprediksi akan diperoleh.

**Table 6. Simple Linear Regression Estimation Results**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C (Constant) | -0.509554 | 1.719525 | -0.296334 | 0.7717 |
| Export (X) | 0.437138 | 0.141376 | 3.092029 | 0.0086 |

Dependent Variable: Reserves. *Source*: Research data, processed (2025).

This influence is statistically significant. This can be seen from the t-statistic value of 3.092029 with a probability of 0.0086. Since the probability value of 0.0086 is smaller than the significance level of 5% (0.05), $H_0$ is rejected and $H_1$ is accepted. In fact, the result is still significant at a significance level of 1% because it is 0.0086<0.01. Thus, there is strong statistical evidence that exports have an effect on foreign exchange, and the direction of its influence is positive. The standard error of the export coefficient of 0.141376 is also relatively small compared to the coefficient of 0.437138. This shows that the estimated export coefficient has a fairly good level of accuracy.

From an economic perspective, the results are in accordance with international trade mechanisms. Export activities generate revenue from abroad, which is generally paid in foreign currency. The higher a country's exports, the greater the potential for incoming foreign exchange flows, which can increase the receipt or availability of foreign exchange. This happens because export transactions are basically the activities

of selling domestic goods and services to foreign parties that result in payments in foreign currencies. The receipt of foreign exchange then enters the domestic financial system and becomes one of the important sources in the formation and strengthening of the country's foreign exchange. Thus, the increase in exports not only reflects increased international trade activity, but also demonstrates the ability of the domestic economy to generate external sources of revenue.

The increase in foreign exchange receipts from export activities has strategic significance for the economy because foreign exchange is needed to finance various international transactions, especially the payment of imports of goods and services, foreign debt obligations, and other international transaction needs. Adequate foreign exchange can also strengthen a country's ability to meet the import needs of capital goods, raw materials, technology, and intermediate goods needed in the domestic production process. In this context, exports can have a wider impact because foreign exchange earned from exports can be reused to support productive activities in the country.

In addition, increasing foreign exchange receipts through exports can help strengthen a country's external position. As export receipts increase, the supply of foreign exchange in the economy tends to increase. These conditions can help meet foreign exchange demand derived from import needs and the payment of international obligations. If the increase in exports is sustainable and not followed by a greater increase in foreign exchange needs, this can strengthen the trade balance and ultimately support the country's balance of payments position.

In terms of macroeconomic stability, an increase in foreign exchange supply from exports can also help reduce pressure on the domestic currency exchange rate. When the need for foreign exchange can be offset by export receipts, dependence on other external sources of financing can be reduced. This condition is important because too much dependence on external debt or short-term capital flows can increase the vulnerability of economies to changes in global economic conditions. Therefore, foreign exchange revenues sourced from exports are relatively important in strengthening the economy's external resilience.

However, the contribution of exports to foreign exchange increases is determined not only by export volume but also by export value, international commodity prices, types of products exported, exchange rates, and a country's trade structure. An increase in export volume does not necessarily result in an increase in foreign exchange in the same proportion if the price of export commodities decreases. Conversely, rising commodity prices in international markets can increase the value of export receipts even if export volumes do not increase significantly. Therefore, the relationship between exports and foreign exchange needs to be understood not only in terms of the quantity of goods traded, but also in terms of the economic value generated from these activities.

The structure of exports also determines the sustainability of foreign exchange receipts. Countries that are heavily dependent on some primary commodities tend to be more susceptible to price fluctuations in international markets. When the prices of major commodities decline, export receipts and foreign exchange flows may also decline. Conversely, diversifying exports and increasing the proportion of value-added products can create a more stable source of foreign exchange. Thus, efforts to increase foreign exchange through exports are not enough to be carried out only by increasing the number of exports, but also need to be accompanied by increasing competitiveness, diversifying products and destination markets, and developing products that have higher added value.

In relation to the results of this study, the mechanism can explain the positive export regression coefficient of 0.437138, which is statistically significant with a probability of 0.0086. These results provide empirical evidence that changes in exports are positively related to changes in foreign exchange in the period studied. In other words, an increase in export activity tends to be followed by an increase in foreign exchange.

The results of this study are in line with several previous studies that show that exports have an important role in increasing foreign exchange or foreign exchange reserves (Puspita and Kurniawan, 2024; Maghfiroh and Anggraeni, 2024; Rahmawati and Suriani, 2022). These findings show that exports are an important source of foreign exchange receipts and play a strategic role in strengthening an economy's external capacity.

## 5. Conclusion

This study concludes that international trade, represented by export performance, exerts a positive and statistically significant effect on Indonesia's foreign exchange reserves over the 2010–2024 period. The empirical results show that higher exports are associated with higher foreign exchange reserves, confirming the important role of export activities as a source of foreign currency earnings. Stronger export performance increases foreign currency inflows generated through international transactions and can consequently strengthen Indonesia's external liquidity position. This finding also reinforces the theoretical argument that export-generated foreign exchange provides an important foundation for reserve accumulation, which in turn supports the country's capacity to finance imports, meet international payment obligations, maintain confidence in the domestic economy, and enhance resilience against external economic and financial shocks.

From a policy perspective, these findings underline the importance of strengthening Indonesia's export capacity as part of a broader strategy to maintain adequate and sustainable foreign exchange reserves. Policy efforts should extend beyond simply increasing export volumes and instead focus on industrial downstreaming, export diversification, technological upgrading, and the development of higher-value-added products. Reducing dependence on primary commodities is particularly important because commodity-based export revenues remain vulnerable to fluctuations in global prices and demand. Expanding Indonesia's access to both traditional and non-traditional export markets can further reduce market concentration risks and create more stable sources of foreign exchange earnings. At the same time, improving domestic industrial competitiveness, infrastructure, logistics efficiency, product quality, and integration into global value chains will be essential to ensure that export expansion translates into sustainable foreign exchange generation and stronger external economic resilience.

Future research should extend the present analysis by incorporating additional macroeconomic determinants of foreign exchange reserves, including imports, exchange rates, foreign direct investment, external debt, inflation, interest rates, capital flows, and external debt servicing, to provide a more comprehensive explanation of reserve dynamics.

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# THE INFLUENCE OF DIGITAL TRANSFORMATION AND HUMAN RESOURCE DEVELOPMENT ON EMPLOYEE PERFORMANCE WITH THE MEDIATION OF EMPLOYEE ATTITUDES IN THE HEAD OFFICE OF THE METEOROLOGY, CLIMATOLOGY, AND GEOPHYSICS AGENCY IN JAKARTA

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***ABSTRACT***
*This study examines the effect of digital transformation and human resource development on employee performance, with employee attitudes as a mediating variable. The research focuses on employees at the Head Office of the Meteorology, Climatology, and Geophysics Agency (BMKG), a public sector organization facing rapid technological and organizational changes. Based on the Resource-Based View (RBV) theory, this study emphasizes the importance of human capital, learning, and capability development in improving organizational performance. A quantitative approach was employed, with data collected from 160 employees using structured questionnaires. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. The results indicate that digital transformation and human resource development significantly influence employee performance, both directly and indirectly through employee attitudes. Employee attitudes play a crucial mediating role, strengthening the impact of organizational initiatives on performance outcomes. This study contributes to the development of human resource management literature, particularly in the public sector context. Practically, the findings highlight the importance of integrating technological advancement, continuous competency development, and positive employee attitudes to enhance overall organizational performance.*
***Keywords****: Digital Transformation, Human Resource Development, Employee Performance, Employee Attitudes.*

## 1. Introduction

Indonesia is an archipelagic nation facing complex geographic, geological, and meteorological vulnerabilities, making it highly susceptible to severe natural hazards such as earthquakes, tsunamis, and extreme weather. As the national authority mandated to deliver strategic meteorological, climatological, and geophysical information, the Meteorology, Climatological, and Geophysical Agency (Badan Meteorologi, Klimatologi, dan Geofisika / BMKG) fundamentally relies on digital technologies, including early warning systems and automated monitoring. However, BMKG faces operational constraints, including aging infrastructure, uneven service station distribution, budget limitations, and a shortage of specialized personnel. Strengthening human resource (HR) capacity is therefore essential to achieving an accurate and responsive early warning system, aligning with BMKG's vision (2015–2045) to become a world-class socio-entrepreneurial institution. In public administration, employee performance directly reflects organizational effectiveness and public service quality (Munadil et al., 2024; Ardian, 2020; Vrchota et al., 2020). While digital transformation enhances service speed, accuracy, and operational transparency (Andriole, 2018; Rodríguez-Abitia & Bribiesca-Correa, 2021; Faisol et al., 2024; Denmamode & Panchoo, 2024; Rialti & Zollo, 2023), strategic HR development builds technical competency, loyalty, and commitment (Taufiq et al., 2019; Dwi Cintia et al., 2024; Syahiroh et al., 2024). Empirically, BMKG's performance reports from 2020 to 2024 indicate steady progress, with information accuracy rising from 85.71% in 2020 to 94.05% in 2024, public satisfaction consistently remaining high (3.66–3.71 out of 4), and bureaucratic reform scores reaching 100.36% of its target in 2024. Despite these positive institutional results, prior literature reveals inconsistent findings regarding the direct effects of digital transformation and HR development on performance.

Some empirical studies report no significant direct impact from digital transformation (Adisaksana, 2022; Oktafien et al., 2023) or HR development (Monalis et al., 2020), whereas others confirm strong positive relationships (Rukani & Ratnasari, 2024; Firmansyah & Napitupulu, 2024; Syukron et al., 2022). This research gap suggests that the relationship is indirect and mediated by psychological and behavioral factors. Consequently, this study incorporates Employee Attitude as a mediating variable (Retnowati & Darmawan, 2022b; Porotu'o et al., 2021; Siregar et al., 2023; Ahad et al., 2021). At BMKG, despite advanced systems like the Smart Weather System, challenges remain regarding technological adaptation and resistance to new workflows. Thus, this study examines how employee attitude mediates the impact of digital transformation and HR development on employee performance in BMKG.

The core research problem stems from the operational friction within BMKG, where advanced systems such as the Smart Weather System encounter adaptation bottlenecks and resistance to new workflows, alongside structural constraints like aging infrastructure and personnel shortages. From a theoretical standpoint, this operational challenge is compounded by a clear empirical research gap regarding whether digital transformation and strategic HR development directly translate into improved individual performance. Given the mixed evidence in prior literature, technology and training alone appear insufficient unless channeled through internal psychological mechanisms. Therefore, this study addresses the critical problem of understanding how employee attitude serves as an essential mediating pathway that connects technological adoption and HR initiatives with actual employee performance within a public hazard-monitoring institution.

To resolve this research problem and address the existing literature gap, this study systematically investigates several key research questions. First, it examines the direct impacts of digital transformation and strategic HR development on both employee performance and employee attitude at BMKG. Furthermore, it explores the direct influence of employee attitude on employee performance. Most importantly, the study seeks to answer whether employee attitude plays a significant mediating role in transmitting the indirect effects of digital transformation and HR development onto the final performance outcomes of BMKG personnel.

In alignment with these questions, the main objective of this study is to deliver a comprehensive empirical analysis of the structural relationships within BMKG's operational environment. Specifically, the study aims to analyze and evaluate the direct influence of digital transformation and HR development on employee attitude and performance. Ultimately, the central goal of this research is to test and demonstrate the mediating function of employee attitude, providing clear insights into how psychological adaptation and workforce readiness enable digital and managerial strategies to successfully enhance overall employee performance in a national public service context.

## 2. Literature Review

### *2.1 Resource-Based View (RBV) Theory*

The Resource-Based View (RBV) Theory, originally conceptualized by Barney (1991), posits that an organization achieves sustained competitive advantage and superior operational performance when it possesses and effectively deploys resources that are Valuable, Rare, Inimitable, and Non-substitutable (VRIN). In public management context, resources comprise tangible assets (such as advanced digital infrastructure, cloud computing, and automated monitoring systems) and intangible assets (such as organizational knowledge, employee competencies, and psychological work attitudes).

Within the RBV framework, digital tools and structured HR development programs represent essential strategic resource inputs. However, technological architecture and training curricula alone do not automatically guarantee superior operational output. The RBV framework highlights that these external strategic resources must interact with internal human capabilities. Employee attitude serves as a vital psychological asset that enables personnel to internalize digital tools and training insights, translating organizational potential into high-level

task performance and administrative excellence.

### *2.2 Conceptual Definitions of Research Variables*

#### *2.2.1 Digital Transformation (X1)*

Digital transformation is defined as a comprehensive organizational evolution that integrates modern digital technologies, advanced software platforms, automated workflows, and data-driven mindsets across all institutional functions to fundamentally streamline operational processes, optimize public service delivery, and enhance organizational agility (Marx et al., 2021). Various research findings show conflicting results regarding the impact of digital transformation on employee performance. In a study examining the influence of digital transformation, business innovation models, and creativity on MSME performance with competitive advantage as an intervening variable, digital transformation was found to have no effect on performance (Adisaksana, 2022). Similarly, an investigation into the impact of HR digital transformation, emotional intelligence, and career development on employee performance mediated by organizational culture within the Bandung Regency Government revealed that HR digital transformation does not have a significant effect on employee performance (Oktafien et al., 2023).

These findings contrast with research examining employee engagement, digital transformation, and talent management among staff at Hotel Mercure Jakarta Kota, which concluded that digital transformation exerts a positive and significant impact on improving employee performance (Firmansyah & Napitupulu, 2024). Comparable results were also obtained from an investigation into the impact of digital transformation and employee collaborative innovation on performance, along with the mediating role of dynamic innovation capabilities, which confirmed that digital transformation has a positive and meaningful influence on employee performance (Rukani & Ratnasari, 2024). In public sector organizations like BMKG, digital transformation represents more than hardware procurement; it encompasses four critical dim ensions: Digital Mindset (psychological readiness to adopt digital tools), Digital Practices (utilization of paperless and automated workflows), Digital Talent (proficiency in navigating complex analytical software), and Data Access & Integration (seamless real-time information sharing across operational units).

#### *2.2.2 Human Resource (HR) Development (X2)*

Human Resource Development is defined as a systematic, structured, and continuous organizational framework encompassing technical training, education, professional skill upgrading, and career enhancement initiatives designed to increase employees' domain knowledge, operational competencies, and adaptive capabilities (Bernardin & Russell, 2013). A study on employee performance concluded that HR development does not have a significant effect on employee performance (Monalis et al., 2020). However, this finding differs from research conducted on employees at the Riau Province Tourism Office, which revealed that HR development has a positive and significant effect on employee performance through work motivation as an intervening variable (Syukron et al., 2022). These differing results indicate that the relationship between digital transformation, HR development, and employee performance is heavily influenced by the organizational context, the nature of the work, and the mediating variables involved. At BMKG, HR development reflects the strategic investment in human capital required to keep pace with evolving scientific technologies. It is measured across three core dimensions: Training Quality & Relevance (alignment of training content with job demands), Competency Enhancement (mastery of specialized scientific and administrative techniques), and Career Growth Pathways (transparent professional advancement frameworks).

#### *2.2.3 Employee Attitude (Y1)*

Employee attitude is conceptualized as an individual's enduring psychological disposition, evaluative judgment, and emotional alignment toward their job responsibilities, organizational technological systems, and institutional leadership (Ahad et al., 2021). Grounded in the classic tripartite attitude model, employee attitude comprises three essential dimensions: Cognitive Dimension (beliefs, awareness, and trust regarding the usefulness of digital tools and training), Affective Dimension (emotional attachment, job satisfaction, and enthusiasm toward organizational goals), and Behavioral Dimension (readiness to act, willingness to exert discretionary effort, and compliance with operational standards).

#### *2.2.4 Employee Performance (Y2)*

Employee performance is defined as the overall measurable work output, accomplishments, and job-related behaviors demonstrated by an employee in fulfilling assigned institutional duties, adhering to established standards of quality, quantity, and timeliness within a specified period (Bernardin & Russell, 2013). In public service institutions, employee performance directly determines service delivery efficacy. It is operationalized through six comprehensive dimensions: Work Quality (accuracy, thoroughness, and scientific precision), Work Quantity (volume of completed tasks and reports), Timeliness (adherence to operational deadlines and rapid early warning issuance), Cost-Effectiveness (efficient resource utilization), Independence (ability to execute duties with minimal supervision), and Interpersonal Impact (team cooperation and communication).

### *2.3 Hypothesis Development*

**Digital Transformation and Employee Performance**: The adoption of modern digital platforms, automated data processing, and cloud-based reporting systems eliminates administrative redundancies, minimizes manual error rates, and accelerates task execution. Employees equipped with digital tools can analyze meteorological and geophysical datasets faster and with greater accuracy. Therefore, it is hypothesized:
H1: Digital Transformation has a positive and significant effect on Employee Performance.

**Digital Transformation and Employee Attitude**: When organizations introduce intuitive, efficient, and user-friendly digital tools, employee frustration associated with manual paperwork decreases. Clear digital workflows enhance employees' cognitive trust in institutional systems and build positive affective dispositions toward organizational modernization. Thus, it is hypothesized:
H2: Digital Transformation has a positive and significant effect on Employee Attitude.

**HR Development and Employee Performance**: Continuous training and targeted competency upgrading equip civil servants with updated scientific knowledge, procedural expertise, and problem-solving capabilities. Well-trained employees exhibit higher confidence and proficiency when performing complex meteorological analyses, directly boosting work quality and output. Therefore, it is hypothesized:
H3: HR Development has a positive and significant effect on Employee Performance.

**HR Development and Employee Attitude**: Organizational investments in employee learning signal that the institution values its human capital. This perceived organizational support elevates employee job satisfaction, strengthens affective commitment, and fosters proactive behavioral mindsets. Thus, it is hypothesized:
H4: HR Development has a positive and significant effect on Employee Attitude.

**Employee Attitude and Employee Performance**: Employees who possess favorable cognitive beliefs, positive emotional attachment, and proactive behavioral tendencies are more likely to demonstrate diligence, discipline, and high task dedication. A positive work attitude

directly translates into reduced absenteeism, higher operational thoroughness, and superior job performance. Therefore, it is hypothesized:
H5: Employee Attitude has a positive and significant effect on Employee Performance.

**The Mediating Role of Employee Attitude**: While digital transformation and HR development provide the infrastructure and knowledge necessary for high productivity, their ultimate effectiveness depends on employee acceptance and psychological buy-in. Modern digital platforms and advanced training modules enhance employee job satisfaction and psychological readiness (attitude), which in turn drives discretionary effort and task execution (performance). Hence, employee attitude serves as an indispensable psychological bridge. Accordingly, it is hypothesized:
H6: Employee Attitude mediates the effect of Digital Transformation on Employee Performance.
H7: Employee Attitude mediates the effect of HR Development on Employee Performance.

## 3. Research Methods

### *3.1 Research Design and Sample*

This study adopted a quantitative explanatory research design to test empirical relationships and mediating mechanisms among the constructs. The study was conducted at the Headquarters of the Meteorology, Climatology, and Geophysics Agency (BMKG) in Jakarta. The target population comprised active permanent employees across technical, analytical, and administrative divisions. A sample size of 160 respondents was selected using convenience sampling, satisfying Hair et al.'s (2021) rule-of-thumb requiring a sample size at least 10 times the maximum number of structural model indicators ($16 \times 10 = 160$).

### *3.2 Operationalization and Measurement of Variables*

Primary data were collected through a standardized closed-ended questionnaire administered digitally. Each item was measured using a 5-point Likert scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). The measurement instruments were adapted from established academic literature:

- Digital Transformation (X1): Measured using 16 indicator items adapted from Marx et al. (2021), covering digital mindset, digital practices, talent proficiency, and data integration.
- HR Development (X2): Measured using 12 indicator items adapted from Bernardin & Russell (2013) and Baiti et al. (2021), covering training quality, competency building, and career growth pathways.
- Employee Attitude (Y1): Measured using 12 indicator items adapted from Ahad et al. (2021) and Retnowati & Darmawan (2022), evaluating cognitive, affective, and behavioral dimensions.
- Employee Performance (Y2): Measured using 18 indicator items adapted from Bernardin & Russell (2013), covering quality, quantity, timeliness, cost-effectiveness, independence, and interpersonal impact.

### *3.3 Data Analysis Method*

Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) executed via SmartPLS 4.0 software. PLS-SEM was selected due to its robustness in handling complex structural models with indirect mediating relationships without requiring strict multivariate normality assumptions. The evaluation proceeded in two stages:

1) Measurement Model (Outer Model): Evaluated convergent validity (outer loadings > 0.70, Average Variance Extracted / AVE > 0.50), discriminant validity (Fornell-Larcker criterion and Heterotrait-Monotrait / HTMT ratio < 0.90), and construct reliability (Cronbach's Alpha > 0.70, Composite Reliability > 0.70).
2) Structural Model (Inner Model): Assessed coefficient of determination ($R^2$), Stone-Geisser predictive relevance ($Q^2$), effect sizes ($f^2$), and direct/indirect path hypotheses via a non-parametric bootstrapping procedure with 5,000 resamples

($\alpha = 0.05, t > 1.96, p < 0.05$).

## 4. Research Findings and Discussion

### *4.1 Demographic Profile of Respondents*

The demographic analysis of 160 respondents revealed a balanced representation across organizational units at BMKG Headquarters. In terms of gender, 57.5% ($n=92$) were male and 42.5% ($n=68$) were female. Regarding age distribution, 21.3% were aged 20–30 years, 42.5% were aged 31–40 years, 26.2% were aged 41–50 years, and 10.0% were over 50 years old. Educational background showed that 57.5% held a Bachelor's degree (S1), 28.1% held a Master's degree (S2), 11.9% held a Diploma, and 2.5% held a Doctorate (S3). Work tenure analysis indicated that 34.4% had served for 6–10 years, 28.8% for 11–15 years, 20.6% for over 15 years, and 16.2% for 1–5 years. Unit distribution spanned the Deputy for Meteorology (26.9%), Deputy for Climatology (21.3%), Deputy for Geophysics (22.5%), and Secretariat General / Support Units (29.3%).

### *4.2 Measurement Model (Outer Model) Evaluation*

The measurement model results confirmed high convergent validity and reliability. All individual indicator outer loadings exceeded the 0.70 threshold (ranging from 0.742 to 0.912). The Average Variance Extracted (AVE) values for all constructs exceeded 0.50: Digital Transformation ($\text{AVE} = 0.615$), HR Development ($\text{AVE} = 0.638$), Employee Attitude ($\text{AVE} = 0.621$), and Employee Performance ($\text{AVE} = 0.598$). Construct reliability was supported as Cronbach's Alpha and Composite Reliability values for all constructs surpassed 0.80. Discriminant validity was fully established, as all HTMT values remained well below the 0.85 conservative threshold.

### *4.3 Structural Model (Inner Model) Evaluation*

The structural model demonstrated substantial explanatory power and predictive relevance. The coefficient of determination ($R^2$) for Employee Attitude was 0.682, indicating that 68.2% of the variance in employee attitude is explained by Digital Transformation and HR Development. The $R^2$ for Employee Performance was 0.745, demonstrating that 74.5% of performance variance is explained by Digital Transformation, HR Development, and Employee Attitude. The blindfolding procedure yielded $Q^2$ values of 0.412 for Employee Attitude and 0.435 for Employee Performance, both well above zero, confirming strong predictive relevance.

### *4.4 Hypothesis Testing Results*

Hypothesis testing was performed using SmartPLS 4.0 bootstrapping (5,000 samples). Detailed path coefficients, $t$-statistics, $p$-values, and empirical decisions are summarized in Table 1.

| Hypothesis | Structural Path / Relationship | Path Coeff. (β) | Sample Mean (M) | t-Statistic | p-Value | Decision |
|---|---|---|---|---|---|---|
| **H1** | Digital Transformation → Employee Performance | 0.284 | 0.281 | 3.412 | 0.001 | Accepted |
| **H2** | Digital Transformation → Employee Attitude | 0.395 | 0.392 | 4.821 | 0.000 | Accepted |
| **H3** | HR Development → Employee Performance | 0.265 | 0.268 | 3.115 | 0.002 | Accepted |
| **H4** | HR Development → Employee Attitude | 0.462 | 0.465 | 5.304 | 0.000 | Accepted |
| **H5** | Employee Attitude → Employee Performance | 0.381 | 0.379 | 4.210 | 0.000 | Accepted |
| **H6** | Digital Trans. → Employee Attitude → Performance | 0.150 | 0.148 | 3.180 | 0.002 | Accepted (Mediation) |
| **H7** | HR Development → Employee Attitude → Performance | 0.176 | 0.176 | 3.325 | 0.001 | Accepted (Mediation) |

Table 1. Structural Model Hypothesis Testing Results

### *4.5 Discussion*

1) **Direct Effect of Digital Transformation on Employee Performance**: The structural analysis confirms that digital transformation exerts a direct, positive, and statistically significant effect on employee performance ($\beta = 0.284, t = 3.412, p = 0.001$). At BMKG Headquarters, modern digital infrastructure—including automated data ingestion, real-time warning platforms, and cloud-based administrative portals—directly simplifies workflow complexity. Employees spend less time on redundant manual data entry and more on high-value meteorological forecasting and risk analysis. This result aligns with findings by Firmansyah & Napitupulu (2024) and Rukani & Ratnasari (2024).

2) **Direct Effect of Digital Transformation on Employee Attitude**: Digital transformation positively impacts employee attitude ($\beta = 0.395, t = 4.821, p = 0.000$). Modern, reliable, and user-friendly digital tools enhance employees' cognitive trust in institutional systems and reduce operational stress, fostering higher job satisfaction and constructive work mindsets.

3) **Direct Effect of HR Development on Employee Performance**: HR development demonstrates a direct, positive, and significant impact on employee performance ($\beta = 0.265, t = 3.115, p = 0.002$). Structured training programs and specialized technical workshops directly enhance staff domain expertise, enabling personnel to execute complex geophysical analysis and administrative duties with higher accuracy and timeliness. This finding reinforces the conclusions of Baiti et al. (2021) and Syukron et al. (2022).

4) **Direct Effect of HR Development on Employee Attitude**: HR development exerts the strongest direct positive effect on employee attitude ($\beta = 0.462, t = 5.304, p = 0.000$). Continuous investment in employee learning signals organizational commitment and valuation of staff, triggering strong affective commitment, loyalty, and positive behavioral engagement.

5) **Direct Effect of Employee Attitude on Employee Performance:** Employee attitude strongly and directly improves job performance ($\beta = 0.381, t = 4.210, p = 0.000$). Personnel who exhibit positive cognitive beliefs, affective job satisfaction, and proactive work behaviors consistently deliver higher work quality, meet operational deadlines, and demonstrate greater initiative in team environments.

6) **The Mediating Role of Employee Attitude:** Specific indirect effect testing confirms that employee attitude significantly mediates the impact of Digital Transformation ($\beta = 0.150, t = 3.180, p = 0.002$) and HR Development ($\beta = 0.176, t = 3.325, p = 0.001$) on employee performance. Because the direct paths (H1 and H3) remain statistically significant alongside the indirect paths, employee attitude acts as a partial mediator. In accordance with Resource-Based View (RBV) Theory, digital infrastructure and training frameworks serve as foundational resource inputs. However, these external inputs produce their maximum impact on operational performance when they successfully cultivate positive, receptive, and highly motivated employee attitudes.

## 5. Conclusion

### *5.1 Conclusion*

This study establishes that digital transformation and human resource development are vital catalysts for enhancing employee performance at BMKG Headquarters. Both factors exert significant direct positive effects on performance and work attitude. Furthermore, employee attitude functions as a key partial mediator that reinforces the translation of digital platforms and training investments into superior administrative, analytical, and operational performance outcomes.

### *5.2 Theoretical and Practical Implications*

*Theoretical Implications:* This study extends the applicability of Resource-Based View (RBV) Theory in public sector management by demonstrating that technological assets and training resources require psychological internalization—specifically positive employee work attitudes—to achieve optimal operational performance.

*Practical Implications:* For BMKG leadership, technology acquisition must not occur in isolation. Digital transformation initiatives must be paired with comprehensive change management, user-centric interface design, and continuous technical mentoring to foster positive employee mindsets and maximize institutional productivity.

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# OVERVIEW OF EMPLOYEE PERFORMANCE IN *FINANCIAL TECHNOLOGY* (FINTECH) COMPANIES

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***Abstract***
*The financial technology (fintech) industry is growing rapidly and requires companies to have human resources that are able to provide optimal performance in the face of technological changes and business dynamics. Therefore, employee performance measurement is important as a basis for evaluating the effectiveness of work implementation and identifying aspects that still need improvement. This study aims to describe the level of employee performance in fintech companies based on employee perceptions of various aspects of performance. The research uses a descriptive quantitative approach with a survey method. Data was obtained through the distribution of questionnaires to 54 employees of fintech companies. The research instrument consists of six employee performance indicators that have been tested for validity and reliability. The results of the validity test showed that all items had a correlation coefficient value greater than the r of the table (0.268), while the reliability test results obtained a Cronbach's Alpha value of 0.733 which indicates that the instrument is reliable. The results of the descriptive analysis showed that all performance indicators were in the high category with average values ranging from 3.98 to 4.63. The Job Responsibility aspect obtained the highest average score of 4.63, followed by Performance Satisfaction of 4.61. On the other hand, the Performance Standards aspect obtained the lowest average score of 3.98 and the percentage of Top Box of 33.3%, so it is an aspect that still requires the company's attention. Overall, research shows that fintech company employees have a positive perception of their performance. These findings are expected to be an input for companies in maintaining good performance aspects and improving the achievement of performance standards through strengthening the evaluation system, providing feedback, and developing employee competencies.*
***Keywords****: Employee Performance, Fintech, Descriptive Analysis, Human Resources, Top Box Analysis.*

## 1. Introduction

Currently in the 5.0 Society era, in the world of work globally there is a phenomenon, namely digital transformation in all aspects of work. The development of information and communication technology has brought extraordinary convenience in various aspects of work, from communication, collaboration, to real-time data access. However, this convenience also brings new challenges for employees, namely the boundaries between work time and personal time are increasingly blurred. This is reinforced by the almost unlimited access to information and communication, so employees are often required to always be responsive by contributing, maximum performance, even outside of formal working hours (Sabila & Wartini, 2025)

In the era of work digitalization, the demands on employees have become increasingly complex. Rapid changes in technology and work methods require employees to be adaptive, learn quickly, and be able to master new digital tools that support productivity. Flexibility in location and working hours, such as those offered by remote working or hybrid systems, adds a new dimension to performance management. Employees are required not only to complete work on time, but also to maintain the quality of output, be able to collaborate effectively, and remain motivated even though they are not always under the direct supervision of their superiors (Firdaus & Kuswinarno, 2024).

Financial technology (fintech) companies were chosen as the object of this study because they are one of the industries that are experiencing the fastest digital transformation in Indonesia. The fintech industry relies on digital technology in all its operational processes, ranging from digital payment services, online loans, investments, to application-based financial management. These conditions require employees to work quickly, responsively, flexibly, and adaptively to changing technological developments. The high demands of digital work, the use of technology-based work systems, and dynamic work patterns cause fintech employees to face more complex work pressures

than conventional industries. Therefore, the issue of work-life balance and employee engagement is very important in maintaining employee performance in this industry (Candra, 2025).

In addition, fintech companies are synonymous with a modern work culture that prioritizes work flexibility, digital collaboration, and performance-based work targets and innovation. In practice, this flexibility often leads to blurring the boundaries between personal and work life as employees are required to stay connected to work through digital devices outside of formal working hours. On the other hand, fintech companies also need a high level of employee engagement so that employees remain motivated, creative, and loyal in the face of highly competitive industry competition (Hulu et al., 2025). With these characteristics, the fintech industry is a relevant research object to examine the influence of work-life balance and employee engagement on employee performance in the midst of the rapidly growing digital transformation phenomenon in Indonesia.

Employee performance is one of the main indicators in assessing the success of an organization's strategy, Performance is not only measured from quantitative productivity, such as the number of outputs or targets achieved, but also includes the quality of work, the ability to innovate, and the contribution of employees to the achievement of the company's strategic goals. In other words, performance is a reflection of the extent to which an employee is able to maximize their potential, complete tasks effectively, and provide added value to the organization as a whole. Therefore, the management of factors that affect performance, has become very important for modern management (Khaeruman et al., 2023)

Organizations are not only required to ensure that employees are able to achieve work targets (perform well), but must also pay attention to their well-being to stay productive and motivated. Work-life balance (WLB) emerged as one of the important strategies in this regard. The WLB concept emphasizes the importance of a balanced distribution of time and energy between work and personal life, so that employees can feel satisfied, physically and mentally healthy, and able to contribute optimally. Organizations that successfully implement effective WLB policies tend to have employees who are more loyal, engaged, and committed to achieving common goals (Wijaya & Jufri, 2025).

Conversely, the imbalance between job demands and personal needs can have significant negative impacts. Stress, fatigue, and burnout are real risks that are often experienced by employees who do not have adequate WLB. This impact not only affects the health of individuals, but also decreases the quality and quantity of their performance. Declining productivity, increased work errors, and high absenteeism or turnover rates are a real consequence of a lack of attention to employee life balance. Therefore, WLB cannot be seen simply as an additional facility or allowance, but as an important strategy to maintain employee performance and organizational sustainability in the midst of digitalization pressure (Prameswara & Subur, 2026)

In addition, the digitalization of work also changes employees' expectations for organizational flexibility and support. Today's employees value the organization's ability to provide adaptive work systems, for example through flexible working hours, remote working, or the use of technology that makes it easier to collaborate without always having to be in the office. This requires organizations to design policies that not only emphasize productivity, but also pay attention to the quality of life of employees. Thus, the implementation of WLB is a strategic key for modern organizations to maintain employee motivation, mental health, and overall performance, thereby creating a sustainable work ecosystem in the digital era (Azizah & Athoilah, 2025)

In addition to the aspect of life balance, employee engagement also plays a crucial role in determining individual and organizational performance. Employee engagement reflects an employee's level of commitment, motivation, and enthusiasm for their work and the organization as a whole. Employees who have high engagement tend to show more initiative, strong loyalty, and the ability to make optimal contributions to the achievement of organizational goals. In the era of digitalization, engagement is not only influenced by traditional factors such as salaries and benefits,

but also by work flexibility, adaptive organizational culture, and the use of technology that facilitates communication and collaboration (Fadila et al., 2025)

In addition, employee engagement has a very crucial role in improving employee performance. Employees who are actively involved tend to have high intrinsic motivation, a sense of responsibility for their work, and a desire to contribute more to the organization. A high level of engagement encourages employees to innovate, take initiative, and show long-term loyalty (Wahyudi & Jarodi, 2025).

The combination of adequate WLB and high engagement creates ideal conditions for employees to perform optimally. In contrast, employees who feel burdened by the demands of work without organizational support, or who are less engaged, are more likely to exhibit decreased performance, decreased work quality, and a higher risk of stress. This makes the relationship between WLB, employee engagement, and employee performance even more complex, because the success of performance is influenced by the organization's ability to create a work environment that supports employee well-being and engagement (Lavena, 2024).

Based on previous empirical research, it is known that employee performance is influenced by work-life balance and employee engagement. Research conducted by Indirasari & Mardiana (2022) shows that work-life balance and employee engagement have a positive and significant effect on employee performance at PT Bank Mandiri (Persero) Tbk Outlet Prioritas Jakarta Pondok Indah. Another study by Irfan et al., (2024) also found that work-life balance and employee engagement simultaneously had a positive and significant effect on the performance of employees of PT Japfa Comfeed Tbk Makassar Unit.

However, different results were found in a study conducted by Marge Beis & Ferinia (2023) which showed that work-life balance does not have a significant effect on employee performance, although employee engagement still has a significant effect on performance. The contradiction of the findings in the previous study shows that there is an empirical gap related to the influence of work-life balance and employee engagement on employee performance, so this study is important to obtain a more comprehensive understanding of the relationship between these variables, especially in industries that are undergoing digital transformation.

Therefore, research on the influence of WLB and employee engagement on employee performance has become very relevant in the digitalization era. Understanding these relationships allows organizations to design more targeted HR strategies, maximize employee potential, while creating an adaptive, productive, and sustainable work environment. Thus, this research not only contributes to the development of management theory and organizational psychology, but also provides practical implications for companies in facing the challenges of the ever-changing modern world of work. This research is important because understanding the influence of WLB and employee engagement on employee performance in the era of work digitalization can provide strategic input for company management in designing adaptive HR policies. Policies that are able to improve employee life balance and engagement will have a direct impact on productivity, job satisfaction, and employee retention. Thus, organizations are not only able to compete commercially, but also build a healthy and sustainable work environment amid the pressure of digital transformation.

Based on the phenomenon of digital transformation in the financial technology (fintech) industry, the high demands of digital work, and the differences in the results of previous research on the influence of work-life balance and employee engagement on employee performance, this study is directed to analyze how the effect of work-life balance on employee performance, how employee engagement affects employee performance, and how the effect of work-life balance and employees simultaneous engagement on employee performance at fintech companies in Indonesia.

This study aims to analyze the influence of work-life balance on employee performance in

fintech companies in Indonesia, analyze the influence of employee engagement on employee performance, and analyze the effect of work-life balance and employee engagement simultaneously on employee performance in fintech companies in Indonesia. In addition, this research also aims to provide an empirical contribution on the importance of human resource management in the era of digital transformation, especially in creating a work-life balance and employee involvement to improve organizational performance.

## 2. Literature Review

Employee performance is the result of work achieved by a person both in quality and quantity in accordance with the responsibilities given by the organization. According to human resource management theory, performance reflects an individual's ability to carry out tasks effectively, efficiently, and according to organizational targets. In the context of modern organizations, performance is not only seen from the achievement of work output, but also from adaptability, creativity, collaboration, and contribution to organizational innovation. In digital-based industries such as fintech, performance is an important factor because companies are required to move quickly in the face of technological changes and dynamic market competition (Setyawati et al., 2024).

Work-life balance is a condition when individuals are able to balance the demands of work with personal life in a proportional manner. This concept explains that work-life balance can improve individual well-being, reduce work stress, and create better job satisfaction. Border Theory explains that individuals will try to create a balanced boundary between work and personal life roles so that there are no conflicts between roles. In the era of digitalization, work-life balance is becoming increasingly important because the use of technology allows work to be done anytime and anywhere, so that the boundary between work and personal life becomes thinner (Ekowati, 2020). These conditions can affect the psychological condition and productivity of employees if not managed properly.

Employee engagement is the level of emotional attachment, commitment, and involvement of individuals to the job or organization where they work. Employees who have high engagement tend to have high work morale, loyalty, motivation, and dedication in getting the job done. Kahn's theory explains that employee engagement arises when individuals are physically, cognitively, and emotionally involved in their work. In the digital work environment, employee engagement is a strategic factor because organizations need employees who are not only able to work technically, but also have high involvement and commitment in the face of rapid organizational change (Tanamal et al., 2025).

The relationship between work-life balance and employee performance can be explained through the work-welfare approach which states that employees who have a work-life balance tend to be more productive, focused, and able to work optimally. Employees who are able to manage their personal and work lives in a balanced manner will have lower levels of stress so that it has a positive impact on the quality of work and the achievement of organizational targets. Meanwhile, employee engagement is closely related to performance improvement because engaged employees tend to have higher intrinsic motivation, be more innovative, and have a strong commitment to the organization (Syadiq et al., 2024).

Previous research has shown that work-life balance and employee engagement have an influence on employee performance, although some studies have found different results (Wijayanto et al., 2022). This shows that the relationship between these variables still needs further study, especially in the fintech industry which has digital, flexible, and dynamic work characteristics. Therefore, this study was conducted to strengthen empirical evidence regarding the influence of work-life balance and employee engagement on employee performance in fintech companies in Indonesia.

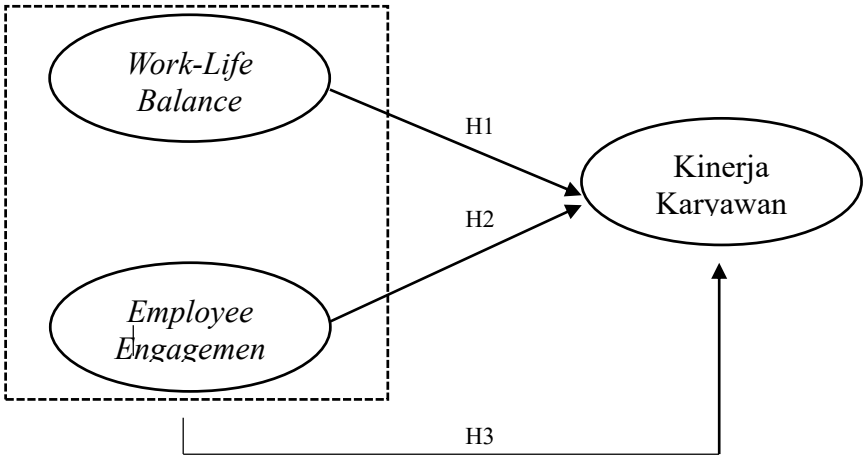



**Figure 1. Research Model**

H1: *Work-Life Balance* affects employee performance. H2: *Employee Engagement* affects employee performance. H3: *Work-Life Balance* and *Employee Engagement* simultaneously affect employee performance.

## 3. Research Methods

This study uses a quantitative approach with a survey method. The quantitative approach was chosen because the study aims to examine the relationship and influence between work-life balance variables and employee engagement on employee performance empirically. The object of the research is an employee of a financial technology (fintech) company in Indonesia who works in a digital service-based company.

The population in this study is all employees of fintech companies in Indonesia. The sampling technique uses purposive sampling with the criteria of respondents, namely employees who have worked for at least one year and are directly involved in digital-based company operational activities. Data collection was carried out through the distribution of online questionnaires using a five-point Likert scale.

Variabel independen dalam penelitian ini terdiri atas work-life balance dan employee engagement, while the dependent variable is employee performance. Work-life balance indicators include time balance, engagement balance, and satisfaction balance. Employee engagement is measured through vigor, dedication, and absorption indicators. Meanwhile, employee performance is measured through work quality, quantity of work, punctuality, effectiveness, and the ability to work together. The work performance variables in this study were measured by the indicators *of Job Responsibility, Performance Standards, Performance Satisfaction, Work Effectiveness, Comparative Performance and Quality of Work* adapted from the study (Jain et al., 2026).

The data analysis technique used was multiple linear regression analysis with the help of statistical software, namely SPSS. The analysis was carried out through validity tests, reliability tests and descriptive analysis. This method is used to determine how much the influence of work-life balance and employee engagement on employee performance in fintech companies in Indonesia

## 4. Research Findings and Discussion

This study succeeded in obtaining 54 research respondents with the following respondent profiles:

**Table 1. Profile Respondents**

| Category | Criteria | Quantity | Percentage |
|---|---|---|---|
| **Gender** | Men | 31 | 57.41% |
| | Women | 23 | 42.59% |
| **Age** | 17 - 29 years old | 40 | 74.07% |
| | 30 - 45 years old | 12 | 22.22% |
| | More than 45 years | 2 | 3.70% |
| **Status** | Married | 47 | 87.04% |
| | Duda/Janda | 2 | 3.70% |
| | Unmarried | 5 | 9.26% |
| **Education** | Diploma D3/D4 | 7 | 12.96% |
| | Bachelor S1 | 45 | 83.33% |
| | Magister S2 | 2 | 3.70% |
| **Long Career in Fintech** | Less than 1 year | 3 | 5.56% |
| | 1 - 3 years | 43 | 79.63% |
| | 3 - 5 years | 7 | 12.96% |
| | More than 5 years | 1 | 1.85% |

Based on the level of education, the majority of respondents have the last Bachelor's education (S1) as many as 45 people (83.33%). Respondents with Diploma education (D3/D4) amounted to 7 people (12.96%), while Master's (S2) graduates were 2 people (3.70%). This data shows that most of the fintech employees in the study have a high level of education, which reflects the industry's need for human resources with adequate academic and professional competencies. Based on the length of time they worked in fintech companies, the majority of respondents had worked for 1-3 years, namely 43 people (79.63%). Furthermore, respondents who have worked for 3-5 years are 7 people (12.96%), respondents with less than 1 year of service are 3 people (5.56%), and respondents who have worked for more than 5 years are only 1 person (1.85%). This shows that most of the respondents are employees with relatively enough work experience to understand the organizational culture, work system, and job demands at fintech companies, but are still in the early to intermediate stages of their career journey. In general, the characteristics of the respondents showed that the research sample was dominated by young employees (17–29 years old), male, married, educated with a bachelor's degree (S1), and had a working period of 1–3 years in a fintech company. Next is the validity and reliability analysis with the following results:

**Table 2. Validity and Reliability Tests**

| Indicator | r count | R table | Ket |
|---|---|---|---|
| **P1** | .492 | 0.268 | Valid |
| **P2** | .635 | 0.268 | Valid |
| **P3** | .439 | 0.268 | Valid |
| **P4** | .442 | 0.268 | Valid |
| **P5** | .342 | 0.268 | Valid |
| **P6** | .521 | 0.268 | Valid |

Based on the results of the validity test on the six items of employee performance variable statements, all items had a correlation coefficient value (r calculated) that was greater than the table r value of 0.268 at a significance level of 5%. The r-value of the calculation ranges from 0.342 to 0.635, so that all items are declared valid and able to measure the construct of employee performance in accordance with the research objectives. The results of the reliability test showed that the employee performance variable had a Cronbach's Alpha value of 0.733. This value is above the minimum limit of 0.70, so the instrument is declared to have a good level of reliability. This shows that all six items have adequate internal consistency in measuring employee performance variables. Next is a descriptive analysis of employee performance variables in fintech companies.

**Table 3. Analisa Deskriptif**

| Pertanyaan | Aspek | Avg | Min | Max | Std |
|---|---|---|---|---|---|
| ***Saya mampu melaksanakan tanggung jawab pekerjaan dengan baik.*** | Job Responsibility | 4.63 | 4 | 5 | 0.49 |
| ***Saya mampu memenuhi standar kerja yang ditetapkan perusahaan.*** | Performance Standards | 3.98 | 2 | 5 | 0.88 |
| ***Saya merasa hasil kinerja saya sudah memuaskan.*** | Performance Satisfaction | 4.61 | 3 | 5 | 0.53 |
| ***Saya dapat menyelesaikan pekerjaan secara efektif.*** | Work Effectiveness | 4.28 | 3 | 5 | 0.56 |
| ***Saya memiliki kinerja yang lebih baik dibandingkan sebagian besar rekan kerja yang memiliki pekerjaan serupa.*** | Comparative Performance | 4.50 | 3 | 5 | 0.61 |
| ***Saya menghasilkan pekerjaan dengan kualitas yang baik.*** | Quality of Work | 4.31 | 3 | 5 | 0.61 |

Based on the results of the descriptive analysis, the employee performance variables showed relatively high average values in all indicators. This indicates that in general, respondents give a positive assessment of their performance in fintech companies. The indicator with the highest average score was "I am able to carry out my work responsibilities well" with an average score of 4.63 and a standard deviation of 0.49. These results show that most respondents feel that they are able to carry out their job responsibilities well and have a relatively uniform perception of these abilities.

The indicator with the next highest average score is "I feel that my performance results have been satisfactory" with an average of 4.61 and a standard deviation of 0.53. This shows that respondents are generally satisfied with the work they have achieved. Furthermore, the indicator "I have better performance than most colleagues who have similar jobs" obtained an average of 4.50 with a standard deviation of 0.61. This value shows that most respondents have high confidence in their abilities and work performance compared to colleagues who perform similar tasks.

The indicator "I produce work of good quality" obtained an average of 4.31 with a standard deviation of 0.61, while the indicator "I can get the job done effectively" obtained an average of 4.28 with a standard deviation of 0.56. Both results show that respondents consider themselves able to produce quality work while completing work effectively. Meanwhile, the indicator with the lowest average value is "I am able to meet the work standards set by the company" with an average value of 3.98 and a standard deviation of 0.88. Although it is still in the high category (because it is close to a score of 4 on the Likert scale of 1–5), this indicator has the largest standard deviation compared to other indicators. This shows that there is a greater variation in perception among respondents regarding their ability to meet the company's work standards. Overall, the average score of all indicators was in the range of 3.98–4.63, which indicates that respondents tend to agree to strongly agree with statements describing employee performance. In addition, the standard deviation value in the range of 0.49–0.88 shows that the spread of respondents' answers is relatively low to moderate, so the respondents' perception of their performance can be said to be quite consistent.

**Table 4. Top Box Analysis**

| Indicator | STS | TS | N | S | SS | % |
|---|---|---|---|---|---|---|
| **Job Responsibility** | 0 | 0 | 0 | 20 | 34 | 63.0% |
| **Performance Standards** | 0 | 2 | 15 | 19 | 18 | 33.3% |
| **Performance Satisfaction** | 0 | 0 | 1 | 19 | 34 | 63.0% |
| **Work Effectiveness** | 0 | 0 | 3 | 33 | 18 | 33.3% |
| **Comparative Performance** | 0 | 0 | 3 | 21 | 30 | 55.6% |
| **Quality of Work** | 0 | 0 | 4 | 29 | 21 | 38.9% |

Based on the results of the Top Box Analysis, *the Job Responsibility* and *Performance Satisfaction aspects* obtained the highest percentage of Top Box, which was 63.0%. This means that more than half of the respondents strongly agree that they are able to carry out their job responsibilities well and feel that the results of their performance are satisfactory. These findings show that the sense of responsibility and satisfaction with the results of work is the strongest aspect of performance felt by respondents.

Furthermore, the *Comparative Performance* aspect obtained a ToP Box score of 55.6%, indicating that more than half of the respondents felt that they had better performance than most colleagues with similar jobs. Meanwhile, *the Quality of Work* aspect obtained a Top Box percentage of 38.9%, while the Performance Standards and *Work Effectiveness* aspects obtained a percentage of 33.3% respectively. This shows that although the majority of respondents gave a positive rating on both aspects, the level of confidence of respondents to give a rating in the "strongly agree" category was still lower than the other aspect.

## 5. Conclusion

This study aims to describe employee performance in fintech companies based on respondents' perception of six performance indicators, namely job responsibility, performance standards, performance satisfaction, work effectiveness, comparative performance, and quality of work. The results of the analysis show that in general, employee performance is in the high category, which is reflected in the average value of all indicators in the range of 3.98-4.63.

The Job Responsibility aspect obtained the highest average score (4.63), followed by Performance Satisfaction (4.61). These findings show that the majority of respondents feel able to carry out their job responsibilities well and feel satisfied with the work that has been achieved. On the other hand, the Performance Standards aspect obtained the lowest average score (3.98) and the lowest Top Box percentage, which indicates that meeting the company's work standards is still a relatively more challenging aspect than other performance indicators. Overall, the results indicate that employees have a positive perception of their performance. However, the organization still has room to improve the ability of employees to meet the work standards that have been set so that all aspects of performance can develop more optimally.

For fintech companies, the results of this study show that employees' ability to carry out job responsibilities and produce satisfactory performance has been at a good level. Therefore, companies need to maintain these conditions through appreciation, competency development, and the creation of a work environment that supports employee involvement. On the other hand, the aspect of Performance Standards that obtains a relatively lower rating needs to be a concern for management. Companies can evaluate the clarity of work targets, provide regular feedback, and implement training programs that help employees understand and meet expected performance standards.

For the next researcher, this study is still descriptive and only focuses on one variable, so it has not been able to explain the factors that affect employee performance. The next research is suggested to develop a research model by including variables such as employee engagement, work-life balance, job satisfaction, leadership, or organizational culture. In addition, the use of a larger sample size and involving fintech companies with more diverse characteristics will improve the generalization of research results and provide a more comprehensive understanding of employee performance in the fintech industry.

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# WHO REALLY DRIVES LIVE-STREAMING COMMERCE: THE INFLUENCER, THE PLATFORM, OR THE BUSINESS MODEL? A SYSTEMATIC LITERATURE REVIEW

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***Abstract***
*Live-streaming commerce has grown rapidly, yet research disagrees on whether outcomes stem from influencers, platform affordances, or business-model mechanisms. This systematic review maps the field and develops an integrated explanation of how these drivers shape consumer responses. Following PRISMA, the review identified 83 Scopus records using the keyword "live streaming influencer marketing." Screening produced 52 journal articles for thematic analysis, descriptive classification, conceptual-network mapping, and maturity evaluation via the Watase Uake system. The synthesis reveals an influencer-centric field dominated by e-commerce live streaming, macro-influencers, and influencer-characteristic studies. Half the studies examine credibility, expertise, and attractiveness, while platform features, marketing strategies, and technology receive less attention. The conceptual network shows a layered mechanism in which source credibility, authenticity, and content value activate trust, parasocial interaction, and flow experience, generating purchase intention, impulsive buying, brand engagement, or advocacy. Purchase intention remains the most central basic theme, but the absence of motor themes indicates limited theoretical consolidation. Virtual influencers and AI-enabled platforms form an emerging stream weakly connected to human-influencer research. The review contributes an ecosystem perspective linking influencer attributes, platform affordances, and business-model incentives, replacing single-actor explanations. Future studies should test this mechanism across cultures and platforms using longitudinal and experimental data.*
***Keywords****: live-streaming commerce; influencer marketing; platform affordances; business models; consumer behavior.*

## 1. Introduction

Live-streaming commerce has evolved from a digitally mediated sales channel into a complex commercial ecosystem in which influencers, platforms, manufacturers, and consumers jointly create and capture value. Its rapid expansion has intensified scholarly interest in how real-time interaction, social presence, entertainment, and personalized persuasion shape engagement and purchase decisions (N. Chen & Yang, 2023; L. Wang et al., 2022; W. Zhang et al., 2023). Recent studies have moved beyond conventional source effects to examine streamer engagement, platform-enabled interactivity, pricing and commission strategies, artificial-intelligence streamers, and virtual influencers (Y. Chen et al., 2026; Feng et al., 2025; Hou et al., 2026; Jiao et al., 2024; Zhu & Deng, 2024). This evolution makes the topic particularly important now: commercial outcomes are no longer generated by influencer credibility alone but by the interaction between human or virtual agency, algorithmic and technological infrastructures, and the economic arrangements through which transactions are organized.

Despite this development, the literature remains conceptually fragmented. Consumer-behavior studies predominantly explain purchase intention through influencer attractiveness, expertise, credibility, trust, parasocial relationships, and emotional engagement, often using the Stimulus–Organism–Response model, source credibility theory, or parasocial interaction theory (Lee & Wan, 2023; S.-C. Lin & Lee, 2024; Shao, 2024; R. Zhou, 2025). A parallel stream examines platform features, artificial-intelligence-enabled recommendations, interactivity, and consumer experience (Ding et al., 2025; Y. Zhang & Xu, 2024). Operations and strategy research, meanwhile, applies game-theoretic perspectives to sales modes, commissions, pricing, profitability, and value allocation among platforms, influencers, and manufacturers (Gao et al., 2025; Zhu & Deng, 2024).

Existing reviews, Kumar et al. (2025), provide valuable accounts of digital customer engagement and technological adoption, but they do not systematically determine how these three loci of influence jointly drive live-streaming commerce. Consequently, prior synthesis offers limited insight into whether commercial performance is primarily influencer-led, platform-orchestrated, business-model-governed, or contingent on their configuration.

This review addresses that gap by developing a triadic influencer–platform–business model perspective. Its novelty lies in shifting the unit of synthesis from isolated antecedent–outcome relationships to a multilevel architecture of commercial influence. The review contributes by integrating psychologically oriented theories with platform and strategic-governance perspectives; comparing the mechanisms, outcomes, and boundary conditions associated with each driver; and identifying configurations through which the three drivers reinforce, substitute for, or constrain one another. It addresses four questions: This systematic literature review addresses five interrelated research questions: (RQ1) How is the knowledge base on live-streaming commerce structured across theoretical foundations, influencer types, thematic orientations, analytical lenses, and levels of thematic maturity? (RQ2) How do influencer characteristics generate consumer and brand outcomes through source-evaluation, relational, and experiential mechanisms? (RQ3) How do platform affordances, streaming features, and emerging technological agents shape influencer effects on trust, engagement, purchase intention, impulsive buying, and adverse consumer responses? (RQ4) How do business-model and governance arrangements influence the incentives, decisions, and performance of platforms, influencers, manufacturers, and consumers? (RQ5) Under what configurations and boundary conditions do influencer-, platform-, and business-model-level drivers reinforce, substitute for, or constrain one another in explaining live-streaming commerce outcomes?

The remainder of the article presents the conceptual background, explains the PRISMA-based review method, reports the research profile and thematic synthesis, develops the integrative framework, and concludes with theoretical, managerial, and future-research implications.

## 2. Literature Review

### *2.1 Live-Streaming Commerce as an Interactive Market System*

Live-streaming commerce integrates real-time video interaction with purchasing, enabling consumers to observe products, interact with sellers or influencers, and complete transactions on the same platform. Unlike conventional e-commerce, this format combines informational, social, and experiential cues. Influencer professionalism, attractiveness, and interactivity increase purchase intention through perceived relevance and credibility (C. Zhang et al., 2024; R. Zhou & Baskaran, 2025). Consumer engagement, perceived value, trust, and emotional attachment mediate these relationships (N. Chen & Yang, 2023; Qing, 2025).

Live streaming has evolved from entertainment into a commercial ecosystem, particularly in China through platforms such as Taobao Live and Douyin (Gao et al., 2025; W. Lin et al., 2025). Platforms manage visibility and technological affordances, influencers build attention and trust, producers determine products and prices, and consumers generate interaction data that shape platform recommendations.

Research has expanded from descriptive studies to structural equation modeling and game-theoretic approaches examining pricing, commissions, selling modes, and strategic interactions among platforms, influencers, and consumers (T. Yu et al., 2025; Zhao & Fan, 2024). Digital engagement maturity, value similarity, and time pressure also influence consumer participation and impulsive buying (Kumar et al., 2025; Yan et al., 2023). These findings connect live-streaming commerce with supply-chain management, digital marketing, and consumer psychology (Feng et al., 2025; Zhu & Deng, 2024). Existing studies, however, often separate consumer, platform, and business perspectives, leaving their combined influence insufficiently explained.

### *2.2 Evolution of the Research Field: From Promotional Influence to Ecosystem Dynamics*

Research has shifted from social-media promotion toward the mechanisms of real-time commerce. Early studies focused on social media and advertising effects on consumer attitudes (L. Wang et al., 2022). Later studies emphasized synchronous interaction, immediate feedback, and influencer participation. Zhou et al. (2022) reported that influencer participation increased tipping frequency by 22.1%, demonstrating the behavioral impact of social intermediaries.

Recent studies have expanded both actors and mechanisms. AI streamers challenge the assumption that persuasive effectiveness depends on human presenters. Chen et al. (2026) found that AI streamers generated higher purchase rates under certain conditions, particularly with more varied emotional expressions. Strategic studies further show that selling modes distribute benefits differently among manufacturers, platforms, and influencers, indicating that commercial performance depends on ecosystem incentives rather than influencer characteristics alone (Zhang et al., 2025).

Education, age, and market context also moderate consumer responses and trust formation (R. Zhou & Baskaran, 2025). Research has progressed from promotional influence to ecosystem coordination but remains conceptually fragmented. Few studies compare the relative effects of influencer attributes, platform design, and business-model decisions on engagement and purchase outcomes.

### *2.3 Dominant Theoretical Lenses and Their Explanatory Boundaries*

Research on live-streaming commerce primarily adopts Social Presence Theory, the Elaboration Likelihood Model (ELM), the Stimulus-Organism-Response (S-O-R) framework, and the Theory of Reasoned Action (TRA). Social Presence Theory explains how mediated interaction increases perceived closeness and purchase intention (S.-C. Lin & Lee, 2024). ELM distinguishes central processing based on argument quality from peripheral processing based on attractiveness and affective cues (Shao, 2024). S-O-R explains how environmental stimuli shape internal states that produce purchase intention or impulsive buying (Lee & Wan, 2023). TRA explains behavior through attitudes, subjective norms, and behavioral intentions (S.-C. Lin & Lee, 2024). These theories consistently explain the effects of interactivity, social presence, entertainment, credibility, and trust.

These perspectives focus on consumer psychology while giving limited attention to platform architecture, pricing, commission systems, and seller-influencer contracts. Game-theoretic studies address this limitation by modeling strategic interactions among platforms, influencers, manufacturers, and consumers. Commission rates, production costs, advertising sensitivity, and selling arrangements shape incentives and profitability across actors (Gao et al., 2025; T. Yu et al., 2025; Zhao & Fan, 2024).

AI streamers and virtual influencers further challenge theories centered on human authenticity and interpersonal attraction (Y. Chen et al., 2024; Fang et al., 2026). Existing evidence also remains concentrated in China, limiting broader generalization (J. Yu et al., 2025; R. Zhou & Baskaran, 2025). Current literature lacks an integrated multilevel framework linking consumer psychology, platform affordances, and business-model structures.

## 3. Research Methods

This study employed a systematic literature review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to ensure a transparent, reproducible, and rigorous review process (Moher et al., 2009; Panic et al., 2013; Siddaway et al., 2019). PRISMA enhances the completeness and transparency of systematic reviews (Huurne et al., 2017). The review followed four stages: identification, screening, eligibility, and inclusion (Figure 1).

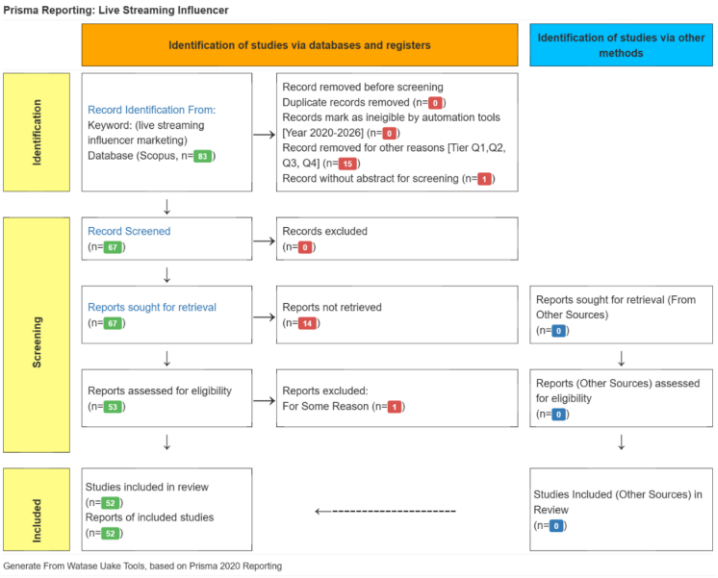



**Figure 1. PRISMA Statement**
*Source: Authors' own work (2026)*

Scopus served as the primary database because of its rigorous indexing standards and broad coverage of peer-reviewed publications (Lasda Bergman, 2012; Rocha et al., 2019). The search used the keyword phrase "live streaming influencer marketing." Google Scholar was excluded because it may contain duplicate records and publications with uncertain editorial quality (Hariningsih et al., 2025). Watase UAKE supported record management, screening, data organization, and evidence synthesis (Wahyudi, 2024). The identification stage retrieved 83 records. Fifteen records from journals outside Q1–Q4 and one record without an abstract were excluded. No duplicate records or automated exclusions were identified, leaving 67 records for screening. Title and abstract screening retained all records. Fourteen full-text articles could not be retrieved, resulting in 53 studies for eligibility assessment.

The eligibility assessment applied predefined criteria, including relevance to live-streaming influencer marketing, publication in peer-reviewed Q1–Q4 journals, and sufficient information for data extraction. One study was excluded, producing a final sample of 52 studies. No additional studies were identified from other sources. The 52 studies were analyzed using complementary descriptive and qualitative approaches. A structured extraction matrix recorded publication year, journal quartile, geographic context, research design, analytical method, theoretical perspective, focal constructs, and key findings. Descriptive analysis summarized publication trends, geographic distribution, methodological patterns, and journal quality. Thematic analysis identified recurring concepts, relationships, and explanatory patterns through iterative coding, categorization, and theme refinement. Tables, figures, and conceptual maps summarized the findings. Watase UAKE supported coding consistency throughout the analysis (Wahyudi, 2024). This approach provides a transparent and methodologically robust foundation for examining the development, dominant patterns, and future directions of live-streaming influencer marketing research.

## 4. Result and Analysis

This section integrates the descriptive classifications, variable-network mapping, conceptual structure, and thematic map derived from the 52 reviewed studies. The analysis examines whether live-streaming commerce is primarily driven by the influencer, the platform, or the underlying business model. The findings indicate that these drivers are analytically distinct but empirically interdependent, although the existing literature predominantly emphasizes influencer-level explanations.

### *4.1 Theoretical Architecture of Live-Streaming Commerce Research*

Table 1 summarizes the theoretical perspectives used to explain persuasion, engagement, and commercial outcomes in live-streaming commerce. The analysis examines whether causal mechanisms are primarily located in consumers, influencer–consumer relationships, or the strategic interactions among influencers, platforms, and sellers.

**Table 1. Grand Theory**

| No | Theory | Cite | Count | Authors |
|---|---|---|---|---|
| 1 | Influencer Marketing Theory and Attachment Theory | 104 | 1 | (N. Chen & Yang, 2023) |
| 2 | Role Theory | 98 | 1 | (S. Zhang et al., 2022) |
| 3 | Stimulus-Organism-Response (S-O-R) model | 63 | 1 | (Lee & Wan, 2023) |
| 4 | Elaboration Likelihood Model and Attachment Theory | 60 | 1 | (Shao, 2024) |
| 5 | Social identity theory, Social influence theory | 55 | 1 | (L. Zhou et al., 2022) |
| 6 | Flow theory is used as the grand theory in this research | 52 | 1 | (Tian & Frank, 2024) |
| 7 | Parasocial Interaction Theory; Psychological Arousal Theory; Information Source Effect Model | 51 | 1 | (L. Wang et al., 2022) |
| 8 | Trust transfer theory and parasocial relationship theory | 45 | 1 | (T. Yu et al., 2025) |
| 9 | Engel, Kollat and Blackwell's (EKB) seminal model | 34 | 1 | (Fletcher & Gbadamosi, 2022) |
| 10 | Hovlands Persuasion Model Selectivity Hypothesis | 33 | 1 | (Peng et al., 2024) |
| 11 | Stimulus-Organism-Response S-O-R model | 30 | 1 | (L. Wang et al., 2022) |
| 12 | Psychological Contract Theory, Trust Transfer Theory | 28 | 1 | (Hsu, 2023) |
| 13 | Source Credibility Theory | 25 | 1 | (Li et al., 2023) |
| 14 | Trust theory, Match-up Hypothesis | 24 | 1 | (Wei & Xi, 2024) |
| 15 | Consumer Attitude Theory | 20 | 1 | (Y. Chen et al., 2024) |
| 16 | Theory of Reasoned Action (TRA), Social Presence Theory | 19 | 1 | (S.-C. Lin & Lee, 2024) |
| 17 | Expectancy-Value Theory (EVT) and Stimulus-Organism-Response (S-O-R) Model | 17 | 1 | (Ding et al., 2025) |
| 18 | Principal-agent theory and platform economics | 10 | 1 | (Jhang-Li & Liou, 2023) |
| 19 | Persuasion Knowledge Model | 10 | 1 | (Choi et al., 2025) |

*Source: Authors' own work (2026)*

Consumer-response and relational theories dominate the literature. The Stimulus–Organism–Response framework explains how livestream stimuli, including attractiveness, interactivity, informativeness, entertainment, and social presence, influence consumers' cognitive and affective states before shaping purchase behavior (Lee & Wan, 2023; L. Wang et al., 2022; R. Zhou & Baskaran, 2025). Parasocial Interaction Theory emphasizes perceived intimacy between influencers and audiences (X. Wang et al., 2022; Xu & Deng, 2026), whereas Social Identity Theory explains the effects of similarity, identification, and group affiliation (L. Zhou et al., 2022). These perspectives primarily position influencers as the main source of persuasion. Game Theory and Stackelberg models examine pricing, channel coordination, commission structures, and strategic relationships among influencers, platforms, brands, and consumers (Gao et al., 2025; W. Zhang et al., 2023; Zhu & Deng, 2024). This perspective attributes commercial outcomes to business-model design rather than consumer psychology

alone.

The literature remains weakly integrated across analytical levels. Consumer-oriented studies often overlook platform and business-model mechanisms, whereas strategic models simplify psychological factors such as trust, authenticity, attachment, and engagement. The evidence supports a multilevel perspective in which influencers provide persuasive cues, platforms facilitate interaction and visibility, and business models determine how attention is converted into commercial value. The dominance of the Stimulus–Organism–Response framework therefore reflects the field's emphasis on influencer-centered explanations rather than evidence that influencers are the sole driver of live-streaming commerce.

### *4.2 Variable Network Structure and the Psychological Pathways of Influencer Effectiveness*

Whereas Figure 1 presents variable connectivity, Figure 2 illustrates the conceptual architecture of influencer research by mapping the relationships among antecedents, psychological mechanisms, engagement, and behavioral outcomes.

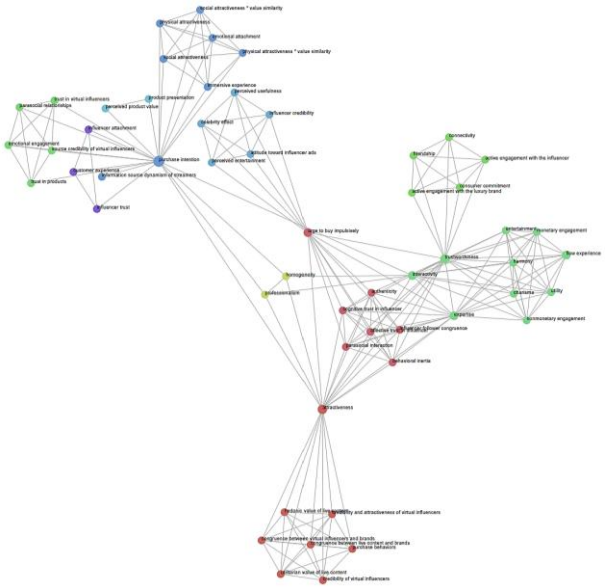


**Figure 2. Variable Network and Psychological Pathways of Influencer Effectiveness**
*Source: Authors' own work (2026)*

The network indicates a layered persuasion process rather than a direct relationship between influencer attributes and purchasing. Attractiveness, expertise, credibility, usefulness, entertainment, attitudes toward influencer advertising, and value similarity represent initial source evaluations. These attributes attract attention and facilitate acceptance but do not directly determine commercial outcomes. Trust and relational attachment form the next explanatory layer. Parasocial relationships, attachment, trust in influencers and products, authenticity, cognitive trust, affective trust, and influencer–follower congruence connect source evaluations with consumer responses. Cognitive trust arises from competence, expertise, reliability, and information quality, whereas affective trust develops through familiarity, emotional security, and interpersonal connection. These dimensions represent distinct persuasion pathways and should not be treated as a single construct. The engagement cluster shows that influencer effectiveness depends on both influencer characteristics and platform affordances. Trustworthiness, expertise, charisma, friendship, and perceived similarity originate from the influencer, whereas interactivity, connectivity, responsiveness, entertainment, utility, and flow depend largely on platform design. Platform functionality shapes audience participation through interaction, recommendations, purchasing access, and immersion.

The network also distinguishes monetary from non-monetary engagement. Comments,

likes, sharing, subscriptions, recommendations, following, and continued participation strengthen visibility and social proof, whereas purchases, tips, paid subscriptions, and orders generate direct commercial value. Platform design therefore influences both the intensity and monetization of audience engagement. Purchase intention and impulsive buying follow different pathways. Purchase intention is closely associated with credibility, usefulness, information quality, product presentation, and value assessment. Impulsive buying is more strongly linked to authenticity, interactivity, parasocial relationships, entertainment, scarcity cues, and flow. Influencer credibility is therefore more important for deliberative purchasing, platform-enabled immersion for impulsive buying, and business-model incentives for converting both responses into commercial outcomes.

### *4.3 Conceptual Architecture of Influencer-Led Consumer Response*

A more holistic representation of the field's conceptual structure is provided in Figure 3. The map may be interpreted as a process model in which influencer attributes and content value initiate consumer evaluation, relational and psychological mechanisms transmit influence, and brand- or purchase-related outcomes represent downstream consequences.

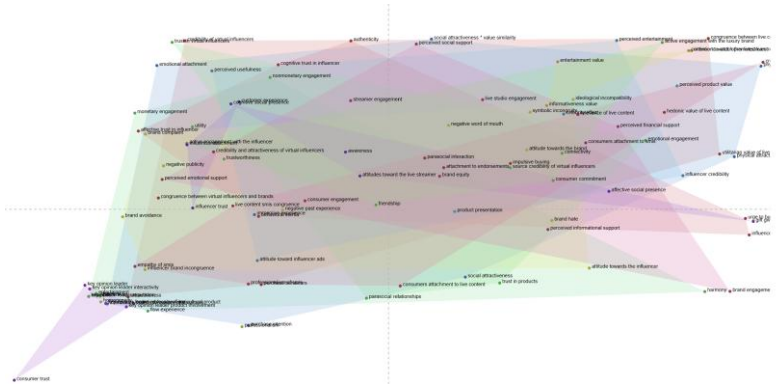


**Figure 3. Conceptual Structure of Influencer Research and Consumer-Response Mechanisms**
*Source: Authors' own work (2026)*

The conceptual map highlights strong overlap among credibility, authenticity, attractiveness, trust, parasocial interaction, attachment, engagement, and congruence. This pattern indicates cumulative theoretical development but also substantial construct proliferation, particularly for trust, attachment, engagement, congruence, and parasocial relationships. Similar mechanisms are frequently conceptualized under different constructs, limiting theoretical integration. The left side of the map contains the cognitive and relational foundations of influence, including trustworthiness, perceived usefulness, emotional attachment, cognitive trust, and affective trust. The upper region incorporates authenticity, social attractiveness, value similarity, entertainment, informativeness, streamer engagement, and live-studio engagement, reflecting a shift from source credibility toward experiential evaluation. Authenticity serves as the key mechanism linking influencer identity, content sincerity, commercial transparency, and brand fit. The central region, comprising parasocial interaction, attachment, brand attitude, brand equity, consumer engagement, friendship, product presentation, congruence, commitment, and affective social presence, represents the mechanisms through which exposure becomes persuasion. Consumers evaluate not only influencers but also product fit, endorsement sincerity, social interaction, and functional or emotional value. The outcome region extends beyond purchase to brand engagement, negative word of mouth, and brand hate, indicating that influencer effects may also generate skepticism, resistance, and reputational damage. Influencer–brand incongruence, excessive commercialization, weak credibility, undisclosed sponsorship, repetitive promotion, and manipulative presentation can activate these negative responses. Existing models should therefore move beyond assuming that influencer exposure consistently produces positive outcomes.

Virtual influencers remain conceptually underdeveloped because current studies largely apply theories designed for human influencers (Y. Chen et al., 2026; Hou et al., 2026). Future research should distinguish mechanisms transferable to artificial agents from those requiring human intentionality, emotional reciprocity, moral agency, or embodied authenticity. The conceptual map ultimately supports an integrated consumer-response process while highlighting the limited attention given to platform governance and business-model design.

### *4.4 Thematic Structure and Knowledge Maturity of Influencer Marketing Research*

The thematic configuration presented in Figure 4 provides a basis for evaluating the maturity of the field by locating each theme according to its centrality and density. The map differentiates basic themes, niche themes, and emerging or declining themes and, more importantly, identifies whether the field has developed any themes that are simultaneously mature, internally coherent, and highly connected to the broader literature.

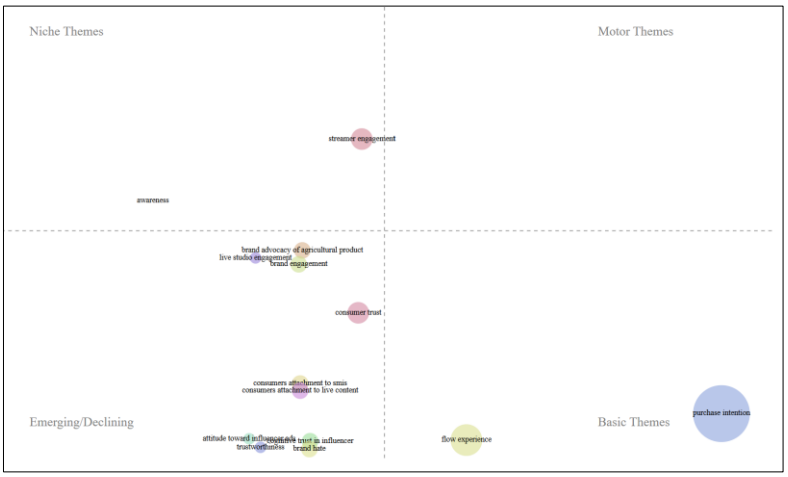



**Figure 4. Thematic Map of Influencer Marketing Research**
*Source: Authors' own work (2026)*

Purchase intention is the dominant basic theme, indicating high centrality but limited internal coherence. Although closely linked to credibility, attractiveness, trust, engagement, product value, parasocial interaction, and flow, the literature has not established which mechanisms dominate under different conditions or how influencer-, platform-, and business-level factors jointly shape purchasing behavior. Flow experience also appears as a basic theme, connecting platform interactivity, entertainment, social presence, immersion, and impulsive buying. Its limited density suggests that flow remains insufficiently integrated with trust, parasocial interaction, authenticity, and business-model mechanisms. Streamer engagement represents a niche theme that is conceptually coherent but weakly connected to the broader literature. This finding indicates that platform-specific mechanisms remain secondary to influencer-centered explanations, despite growing recognition of livestreaming as an interactive technological environment.

Emerging themes include consumer trust, attachment to influencers and live content, attitudes toward influencer advertising, trustworthiness, brand engagement, brand hate, and attitudes toward influencers. These themes extend the literature from purchase intention toward long-term relationships, post-purchase behavior, and negative consumer responses. Brand hate and negative word of mouth are particularly important because they link authenticity failure, persuasion knowledge, commercial skepticism, and consumer resistance. The mechanisms that strengthen attachment may also intensify negative reactions when influencers are perceived as deceptive or excessively commercialized. The absence of a motor theme indicates that the field remains theoretically fragmented despite its rapid development. Future research should integrate influencer attributes, platform affordances, relational mechanisms, and business-model governance within a multilevel framework that explains both positive and negative

outcomes, including purchasing, loyalty, advocacy, resistance, reputational damage, and long-term value creation.

### *4.5 Influencer Type*

Influencer type provides an important contextual boundary because visibility, perceived intimacy, platform dependence, and identity cues differ across human, virtual, macro-, micro-, and platform-native creators. Classifying the included studies by influencer type therefore clarifies which creator configurations have shaped the current evidence base.

**Table 2 Influencer Type**

| No | Influencer Type | Count | Authors |
|---|---|---|---|
| 1 | Macro-Influencers | 34 | (N. Chen & Yang, 2023; Y. Chen et al., 2024; Choi et al., 2025; Cong & Li, 2024; Fang et al., 2026; Feng et al., 2025; Gao et al., 2025; Hsu, 2023; Jiao et al., 2024; Kumar et al., 2025; Lee & Wan, 2023; S.-C. Lin & Lee, 2024; W. Lin et al., 2025; Maghraoui & Khrouf, 2025; Peng et al., 2024; Qing, 2025; Qiu et al., 2025; Shao, 2024; Tian & Frank, 2024; Tran Hoang et al., 2026; L. Wang et al., 2022; X. Wang et al., 2022; Xie et al., 2024; Xu & Deng, 2026; Yan et al., 2023; N. Zhang, 2023; S. Zhang et al., 2022; W. Zhang et al., 2023; Y. Zhang & Xu, 2024; Zhao & Fan, 2024; L. Zhou et al., 2022; R. Zhou, 2025; R. Zhou & Baskaran, 2025; Zhu & Deng, 2024) |
| 2 | Virtual Influencers | 5 | (Y. Chen et al., 2026; Hou et al., 2026; Shao, 2026; T. Yu et al., 2025; K. Zhang et al., 2024) |
| 3 | Macro-Influencers; Micro-Influencers | 3 | (Gu et al., 2024; Li et al., 2023; Y. Zhang & Bryson, 2025) |
| 4 | Platform-Specific Influencers: Twitch And YouTube | 3 | (Fletcher & Gbadamosi, 2022; Jhang-Li & Liou, 2023; Kubat Dokumacı, 2025) |
| 5 | CEOs As Streamers; Celebrity Influencers | 1 | (Wei & Xi, 2024) |
| 6 | Macro-Influencers; Platform-Specific Influencers (e.g., TikTok And Taobao) | 1 | (Y. Zhang & Bryson, 2025) |
| 7 | Platform-Specific Influencers (e.g., TikTok And Taobao) | 1 | (Ding et al., 2025) |

*Source: Authors' own work (2026)*

As indicated in Table 2, 48 of the 52 reviewed studies (92.3%) could be classified according to an explicit influencer-type category. Macro-influencers form the largest single group, accounting for 34 publications (65.4%). When studies jointly examining macro- and micro-influencers (n = 3) and those combining macro-influencers with platform-specific streamers (n = 1) are also included, macro-level influence is present in 38 publications (73.1%). This concentration shows that the field has largely conceptualized live-streaming influence through visibility, audience reach, and established public recognition. Studies in this stream typically examine credibility, trust, attachment, conversion, pricing, and engagement in settings where creators already possess substantial social capital (N. Chen & Yang, 2023; L. Wang et al., 2022; S. Zhang et al., 2022; R. Zhou, 2025).

Virtual influencers appear in five studies (9.6%), while three publications (5.8%) directly compare macro- and micro-influencers. Platform-specific streamers on Twitch and YouTube also account for three studies (5.8%). The remaining categories—chief executive officers or

celebrities as streamers, combined macro/platform-specific influencers, and TikTok- or Taobao-specific influencers—each contain one study (1.9%). Four studies (7.7%) could not be classified from the supplied coding. The resulting imbalance indicates that the literature is comparatively mature in explaining high-reach human influencers but remains underdeveloped regarding micro-influencer configurations, executive-led streaming, platform-native creators, and AI-mediated influence (Y. Chen et al., 2026; Ding et al., 2025; Gu et al., 2024; Hou et al., 2026).

### *4.6 Special Topic*

The special-topic classification reveals the substantive questions that dominate the reviewed studies and the mechanisms that have received comparatively limited attention. Because some articles address more than one thematic domain, the coding is interpreted as a set of analytical assignments rather than as mutually exclusive article shares.

**Table 3. Special Topic**

| No | Special Topic | Count | Authors |
|---|---|---|---|
| 1 | Influencer Characteristics | 23 | (N. Chen & Yang, 2023; Y. Chen et al., 2024, 2026; Ding et al., 2025; Fletcher & Gbadamosi, 2022; Hsu, 2023; Jhang-Li & Liou, 2023; Kubat Dokumacı, 2025; Li et al., 2023; W. Lin et al., 2025; Maghraoui & Khrouf, 2025; Pan et al., 2025; Tran Hoang et al., 2026; L. Wang et al., 2022; X. Wang et al., 2022; Wei & Xi, 2024; Xu & Deng, 2026; T. Yu et al., 2025; K. Zhang et al., 2024; S. Zhang et al., 2022; L. Zhou et al., 2022; R. Zhou, 2025; R. Zhou & Baskaran, 2025) |
| 2 | Marketing/Message Strategies | 12 | (Cong & Li, 2024; Fang et al., 2026; Feng et al., 2025; Gao et al., 2025; Qiu et al., 2025; Shao, 2026; Xie et al., 2024; L. Zhang et al., 2025; W. Zhang et al., 2023; Y. Zhang & Xu, 2024; Zhao & Fan, 2024; Zhu & Deng, 2024) |
| 3 | Consumer Psychological Dynamics | 8 | (Alnoor et al., 2024; Jiao et al., 2024; Lee & Wan, 2023; S.-C. Lin & Lee, 2024; Peng et al., 2024; Qing, 2025; Shao, 2024; Yan et al., 2023) |
| 4 | Platform/Streaming Features | 7 | (Choi et al., 2025; Gu et al., 2024; Kumar et al., 2025; Tian & Frank, 2024; N. Zhang, 2023; W. Zhang et al., 2023; Y. Zhang & Bryson, 2025) |

*Source: Authors' own work (2026)*

As reported in Table 3, influencer characteristics is the dominant topic, comprising 23 studies or 44.2% of the total review sample. This concentration confirms that credibility, expertise, attractiveness, authenticity, identity, and influencer–audience fit remain the field's primary explanatory starting points (N. Chen & Yang, 2023; Fletcher & Gbadamosi, 2022; R. Zhou, 2025). Marketing/Message Strategies constitute the second-largest category with 12 studies (23.1%), reflecting increasing attention to selling modes, commission structures, message design, pricing, teaser content, and campaign-level influencer allocation (Fang et al., 2026; Gao et al., 2025; W. Zhang et al., 2023; Zhao & Fan, 2024).

Consumer Psychological Dynamics account for eight studies (15.4%) and focus on trust, attachment, parasocial interaction, emotional engagement, commitment, and impulse-related responses (Lee & Wan, 2023; S.-C. Lin & Lee, 2024; Yan et al., 2023). Platform/Streaming Features account for seven studies (13.5%), emphasizing interactivity, social presence, connectivity, entertainment, recommendation mechanisms, and the technological architecture of the live environment (Choi et al., 2025; Tian & Frank, 2024; N. Zhang, 2023). In total, Table 3 contains 50 assignments representing 49 unique studies, while three publications (5.8%) lack a special-topic code. The distribution signals an emerging movement from attribute-centered explanations toward multi-actor and technology-enabled models, although psychological and platform mechanisms remain less developed than the literature on influencer traits.

### *4.7 Analysis Lens*

The analytical lens identifies the level at which each study frames the live-streaming phenomenon: consumer response, economic and supply-chain coordination, or corporate and marketing strategy. Examining this distribution is necessary because a field dominated by one level of analysis may overlook how psychological mechanisms interact with organizational decisions and platform incentives.

**Table 4. Analysis Lens**

| No | Analysis Lens | Count | Authors |
|---|---|---|---|
| 1 | Consumer Behavior Focus (e.g., Purchase Intention, Trust, Engagement, And Loyalty) | 30 | (Alnoor et al., 2024; N. Chen & Yang, 2023; Y. Chen et al., 2024, 2026; Choi et al., 2025; Ding et al., 2025; Fang et al., 2026; Hou et al., 2026; Jiao et al., 2024; Lee & Wan, 2023; S.-C. Lin & Lee, 2024; W. Lin et al., 2025; Maghraoui & Khrouf, 2025; Pan et al., 2025; Peng et al., 2024; Qing, 2025; Shao, 2026; Tian & Frank, 2024; L. Wang et al., 2022; X. Wang et al., 2022; Wei & Xi, 2024; Xu & Deng, 2026; Yan et al., 2023; J. Yu et al., 2025; K. Zhang et al., 2024; N. Zhang, 2023; Y. Zhang & Xu, 2024; L. Zhou et al., 2022; R. Zhou, 2025; R. Zhou & Baskaran, 2025) |
| 2 | Supply Chain/Economic Dynamics Focus (e.g., Game-theoretic Models And Profitability | 9 | (Cong & Li, 2024; Feng et al., 2025; Gao et al., 2025; Qiu et al., 2025; Xie et al., 2024; L. Zhang et al., 2025; W. Zhang et al., 2023; Y. Zhang & Bryson, 2025; Zhu & Deng, 2024) |
| 3 | Corporate/Marketing Strategy Focus (e.g., Pricing, Influencer Selection, And Selling Modes) | 8 | (Gu et al., 2024; Jhang-Li & Liou, 2023; Kumar et al., 2025; Li et al., 2023; Shao, 2024; S. Zhang et al., 2022; W. Zhang et al., 2023; Zhao & Fan, 2024) |
| 4 | Consumer Behavior Focus (e.g., Purchase Intention, Trust, Engagement, And Loyalty) | 3 | (Fletcher & Gbadamosi, 2022; Hsu, 2023; Kubat Dokumacı, 2025) |

*Source: Authors' own work (2026)*

As documented in Table 4, the consumer-behavior lens constitutes the dominant analytical perspective, encompassing 33 studies or 63.5% of the total review sample. These publications primarily investigate purchase intention, trust, engagement, attachment, perceived value, loyalty, and impulsive buying (Y. Chen et al., 2026; Lee & Wan, 2023; S.-C. Lin & Lee, 2024; L. Wang et al., 2022; Yan et al., 2023). This dominance demonstrates that live-streaming influencer research has developed mainly as a micro-level persuasion literature concerned with how audiences interpret source cues and convert relational or experiential reactions into behavioral intentions.

A supply-chain or economic-dynamics lens is used in nine studies (17.3%), particularly in game-theoretic analyses of commissions, agency versus reselling modes, platform–manufacturer–streamer coordination, pricing, marketing effort, and profitability (Cong & Li, 2024; Gao et al., 2025; W. Zhang et al., 2023; Zhu & Deng, 2024). Eight studies (15.4%) adopt a corporate or marketing-strategy lens, examining influencer selection, macro–micro combinations, selling modes, campaign design, and brand-level performance (Gu et al., 2024; Li et al., 2023; S. Zhang et al., 2022; Zhao & Fan, 2024).

Table 4 contains 50 analytical assignments representing 49 unique studies; three publications (5.8%) were not coded, and one study appears in two lenses. The resulting pattern identifies a clear analytical asymmetry. Consumer-level outcomes are extensively examined, whereas organizational decision making, platform governance, economic value allocation, and

the integration of psychological and operational models remain comparatively limited. Future research should therefore connect consumer mechanisms with campaign-level sales, firm profitability, platform incentives, and longer-term relational outcomes rather than treating purchase intention as the terminal consequence of live-stream influence.

### *4.8 Integrative Synthesis of the Results*

Across the theoretical, network, conceptual, thematic, contextual, and analytical classifications, the evidence converges on a three-layer structure. The first layer is influencer capital, comprising credibility, expertise, attractiveness, authenticity, identity, and audience fit. The second is platform affordance, comprising interactivity, social presence, personalization, entertainment, connectivity, and flow. The third is business-model governance, comprising commissions, pricing, selling modes, influencer combinations, and the allocation of control among brands, platforms, manufacturers, and streamers. Consumer outcomes emerge from the alignment of these layers rather than from any single influencer characteristic.

The synthesis also identifies three persistent imbalances. First, macro-influencers and consumer-behavior outcomes dominate the evidence base. Second, source characteristics receive substantially more attention than the psychological and technological mechanisms that convert those characteristics into sustained behavior. Third, purchase intention remains more developed than actual purchase, retention, advocacy, resistance, or negative outcomes. These imbalances provide the empirical basis for extending the field toward multilevel, longitudinal, and platform-sensitive explanations of live-streaming influence.

## 5. Discussion

The synthesis shows that live-streaming commerce is driven by the interaction of influencers, platforms, and business models rather than by any single actor. Influencer credibility, expertise, attractiveness, and value similarity function as initial persuasive cues whose effects depend on trust, authenticity, parasocial interaction, attachment, and engagement. Platform affordances such as interactivity, social presence, entertainment, and flow reinforce these mechanisms (N. Chen & Yang, 2023; Lee & Wan, 2023; S.-C. Lin & Lee, 2024; R. Zhou & Baskaran, 2025). The findings extend S-O-R research by showing that organism states comprise multiple relational mechanisms instead of a single psychological response. Source attributes alone do not consistently predict consumer behavior. Physical or social attractiveness attracts attention but rarely generates purchase without credibility, product diagnosticity, or relational closeness. Parasocial relationships and credibility contribute more strongly than attractiveness to utilitarian, hedonic, and social value, whereas social attractiveness mainly enhances enjoyment (Fletcher & Gbadamosi, 2022). Streamer attachment may also exert a stronger influence than trust on purchase intention (Chen & Yang, 2023). Persuasive effects therefore emerge only when consumers perceive influencers as credible, authentic, and personally relevant.

Authenticity represents the key integrative mechanism linking influencer, message, product, and audience. Congruence and value similarity explain why technically competent influencers may fail when endorsements conflict with their established identity (Shao, 2024; R. Zhou, 2025). Cognitive trust primarily supports deliberate purchase evaluation, whereas affective trust strengthens attachment, impulse buying, and continued engagement. Purchase intention and impulsive buying follow different psychological pathways. Purchase intention depends primarily on credibility, information usefulness, and value assessment, whereas impulsive buying is driven by interactivity, authenticity, parasocial closeness, entertainment, social presence, and flow. Live-streaming commerce therefore combines a deliberative route based on trust with an affective route based on immersion and immediacy. Time pressure and immersive platform design may increase conversion while encouraging impulsive consumption (Yan et al., 2023). Platform design functions as an active causal mechanism rather than a neutral communication channel. Interactivity, recommendation systems, personalization, and entertainment strengthen engagement and reduce psychological distance (Ding et al., 2025). Excessive personalization, however, may reduce perceived autonomy, while continuous stimulation may encourage impulse buying. Platform design

therefore creates both commercial value and behavioral pressure.

Business-model governance further shapes commercial outcomes. Commission structures, selling modes, pricing, production costs, and influencer combinations redistribute value among manufacturers, platforms, influencers, and consumers (Gao et al., 2025; W. Zhang et al., 2023; Zhao & Fan, 2024; Zhu & Deng, 2024). Luxury livestreaming demonstrates that micro-influencers may outperform macro-influencers through authenticity and audience fit, whereas macro streamers remain advantageous when expertise and brand control are essential. Gu et al. (2024) likewise show that influencer combinations require strategic optimization rather than simple reach maximization. The literature remains dominated by purchase intention while giving limited attention to loyalty, repeat purchase, advocacy, actual sales, resistance, negative word of mouth, and brand hate. Stronger attachment and engagement may amplify both advocacy and backlash, indicating that engagement should be conceptualized as a multidimensional outcome rather than an inherently positive construct. Virtual and AI influencers expose additional theoretical limitations. Existing studies largely transfer constructs developed for human influencers to nonhuman agents without explaining whether anthropomorphism, algorithmic agency, transparency, or emotional expressiveness fundamentally alter trust formation (Y. Chen et al., 2026; Fang et al., 2026; Hou et al., 2026). Current evidence suggests that consumers may trust the consistency of AI agents while questioning their authenticity and commercial intent.

This review reconceptualizes live-streaming commerce as an ecosystem comprising three interdependent layers: influencer capital, platform affordances, and business-model governance. Influencer capital includes credibility, expertise, attractiveness, authenticity, identity, and audience fit. Platform affordances include interactivity, social presence, personalization, entertainment, visibility, and flow. Business-model governance includes commission structures, pricing, selling modes, influencer combinations, and control allocation among brands, platforms, and influencers. Commercial outcomes depend on alignment across these three layers rather than on the dominance of any individual actor. The findings support greater integration among source credibility theory, parasocial interaction theory, attachment theory, social presence theory, the S-O-R framework, and game theory. Multi-level models should connect consumer psychology with platform design and commercial governance instead of examining these mechanisms independently. Brands should prioritize configuration fit over follower count, while platforms should balance personalization and interactivity with consumer autonomy and transparency. Managers should evaluate long-term outcomes, including retention, advocacy, returns, and negative word of mouth. Regulators should also monitor urgency cues, opaque recommendation systems, AI disclosure, and practices that exploit parasocial attachment.

## 6. Conclusion and Future Research Direction

This review of 52 studies demonstrates that live-streaming commerce is shaped by the interaction of influencer characteristics, platform affordances, and business-model governance rather than by any single factor. Influencers provide persuasive cues, platforms amplify these cues through interactive and immersive environments, and business models determine how relational influence becomes commercial value. Live-streaming commerce should therefore be understood as an ecosystem in which psychological, technological, and economic mechanisms operate simultaneously.

The review contributes by integrating source evaluation, cognitive and affective trust, parasocial interaction, attachment, engagement, perceived value, and behavioral outcomes into a unified explanatory process. Purchase intention and impulsive buying also represent distinct outcomes with different antecedents. Purchase intention relies primarily on deliberative evaluation, whereas impulsive buying is driven by immediacy, emotional stimulation, and relational closeness. The literature nevertheless remains theoretically fragmented, with limited attention to long-term consumer outcomes and negative behavioral responses.

Future research should develop multilevel models integrating influencer characteristics,

platform affordances, algorithmic mediation, and business-model governance. Greater construct clarity is needed for cognitive and affective trust, engagement, and behavioral outcomes. Longitudinal studies, field experiments, platform trace data, and configurational methods should examine actual purchasing, loyalty, advocacy, disengagement, and profitability. Comparative studies should investigate micro- and nano-influencers, human and AI streamers, disclosure practices, privacy concerns, and ethical persuasion across diverse cultural contexts. Progress in this field depends on explaining live-streaming commerce as an integrated ecosystem rather than as the influence of a single persuasive actor.

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# ORGANIZATIONAL RESTRUCTURING AS A TURNAROUND STRATEGY IN RESPONSE TO ORGANIZATIONAL DECLINE IN FAMILY-OWNED COMPANIES: AN ANALYSIS OF THE MCKINSEY 7S FRAMEWORK FROM THE PERSPECTIVE OF SOCIOEMOTIONAL WEALTH (A CASE STUDY OF THE LEGO GROUP)

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***ABSTRACT***
*This study examines organizational restructuring as a turnaround strategy at the LEGO Group, a Danish family business that experienced organizational decline in the early 2000s due to uncontrolled diversification that eroded its core competencies. Using a qualitative descriptive analytical approach with literature review methods, this research analyzes LEGO's transformation through three primary lenses: the Socioemotional Wealth (SEW) perspective, external CEO succession, and the McKinsey 7S Framework. The findings reveal that the strategic decisions of the Kristiansen family including the appointment of Jørgen Vig Knudstorp as the first external CEO in 2004 were not driven solely by economic considerations, but also by the desire to protect the family's socioemotional wealth, encompassing control, identity, reputation, emotional attachment, and dynastic succession. The restructuring undertaken included divesting non-core businesses, simplifying the product portfolio, improving supply chain efficiency, and renewing organizational culture. As a result, LEGO successfully reversed a loss of DKK 888 million in 2003 to a profit of DKK 1.028 million in 2007, while restoring overall organizational alignment. This study introduces the concept of the Socioemotional Wealth Umbrella (SEWU) as a novel framework illustrating how SEW dimensions function as a strategic umbrella that guides and constrains the restructuring process in family firms.*
***Keywords:*** *Organizational Restructuring, Corporate Turnaround, Organizational Decline, Socioemotional Wealth, McKinsey 7S Framework*

## 1. Introduction

In an ever-changing and uncertain business environment, organizations face the risk of organizational decline, which can lead to financial crises or even bankruptcy. A systematic literature review conducted by Hariyani et al. (2024) identified at least 40 factors contributing to organizational failure, ranging from weak managerial competence to expansion beyond the company's core competencies. Under these conditions, the concept of corporate turnaround—that is, efforts to restore an organization from a crisis situation to a more stable state—has become a key focus in the study of organizational change and development.

Nevertheless, successfully executing a turnaround is no easy feat. Management literature often states that approximately 70% of organizational transformation efforts fail. However, recent research by Waal (2026) indicates that this figure is not fully supported by strong empirical evidence and depends heavily on the definitions and measurement methods used. Some factors that influence the success of a turnaround include leadership changes, cost efficiency (retrenchment), and realignment of market strategy.

One of the most significant and widely studied examples of a turnaround is the case of the LEGO Group. As reported in the mainstream media outlet MarkHub24 (2025), in the early 2000s, the company suffered massive losses and was on the brink of bankruptcy due to an uncontrolled diversification strategy that strayed from its core competencies. This situation increased operational complexity and undermined the company's performance. The appointment of Jørgen Vig

Knudstorp as CEO in 2004—the first leader from outside the founding family—marked the beginning of significant changes within the organization.

Under his leadership, Knudstorp implemented a comprehensive organizational restructuring that included divesting non-core businesses, streamlining the product portfolio, improving supply chain efficiency, and shifting the organizational culture from an "unlimited innovation" approach to a more focused and controlled approach to innovation. The results of this transformation demonstrated significant success, as LEGO was not only able to emerge from a crisis but also grew to become one of the world's leading toy companies. In 2012, LEGO surpassed Hasbro to become the world's second-largest toy manufacturer and achieved a high profit margin of approximately 28%, comparable to that of global premium brands.

Although studies on LEGO have extensively discussed turnarounds, restructuring, and performance recovery strategies, most research still emphasizes business, financial, and corporate strategy aspects. These studies have not yet highlighted how emotional dimensions, family identity, and the non-financial interests of family owners influence the direction of organizational change. In the context of a family-owned company like LEGO, the decision to retain or change leadership is determined not only by economic performance but also by efforts to preserve socioemotional wealth—such as family control, reputation, emotional bonds, and the continuity of the founder's legacy.

Furthermore, research linking the SEW perspective to the appointment of an external CEO in the LEGO turnaround case remains relatively limited. Some studies have merely viewed the appointment of Jørgen Vig Knudstorp as an effective managerial decision, but have not sufficiently explored how the owner family responded to the crisis through a compromise between the family's emotional interests and the organization's need for professionalization. Thus, there remains a gap in the literature for examining LEGO as a case of family business transformation explained through the interaction between SEW, external CEO succession, and the organizational restructuring process.

This research is important because family-owned companies often face a dilemma between maintaining family control and making economically rational strategic decisions, especially during crises. In this context, the ability to manage leadership transitions and restructure the organization becomes a key factor in the success of the turnaround. The case of The LEGO Group demonstrates that a turnaround is not only about improving business performance but also involves emotional considerations, family identity, and the continuity of the company's legacy.

From an academic perspective, this study contributes to enriching the field of family business and organizational change research by positioning Socioemotional Wealth (SEW) as a key perspective, while also providing practical implications for other organizations in designing recovery strategies that strike a balance between economic and non-economic aspects.

Based on the above discussion, this study aims to analyze the organizational transformation and restructuring at the LEGO Group in response to the crisis, with a focus on the role of Socioemotional Wealth (SEW) in family-owned companies, the appointment of an external CEO during the organizational recovery process, and organizational changes analyzed using the McKinsey 7S Framework.

## 2. Literature Review

Based on this background, this literature review was prepared to explain the concepts of organizational decline, corporate turnaround, and the dynamics of change in family-owned companies, using the LEGO Group as a case study. The discussion also adopts the Socioemotional Wealth (SEW) perspective as the main theoretical framework, supported by the theory of external CEO succession, in order to provide a relevant conceptual foundation for analyzing the LEGO Group's transformation and restructuring processes.

### *2.1 Organizational Decline*

Organizational decline occurs when a company loses its competitive edge, experiences internal inefficiencies, or fails to respond to changes in the environment. In the book Organizational Effectiveness: A Comparison of Multiple Models, organizational decline is defined as a condition in which an organization experiences a decline in competitiveness, weakened internal coordination, and a reduced capacity for innovation in response to environmental changes. This decline is generally caused by a combination of internal and external factors, such as non-adaptive leadership, outdated strategies, market changes, and competitive pressures. In the literature on organizational decline, early symptoms often manifest as a diminished focus on core competencies, increased organizational complexity, and weakened adaptive capacity; if not addressed promptly, these conditions can escalate into an organizational crisis (Cameron & Whetten, 1983).

A recent systematic review conducted by Hariyani et al. (2024) identified at least 40 causes of organizational failure, indicating that a decline in performance is rarely caused by a single factor; a combination of strategic, managerial, and environmental weaknesses also plays a role. In the turnaround literature, the initial problems are often not merely a decline in profits, but a loss of focus on core competencies, increasing complexity, and a deterioration in adaptive capacity (Zou et al., 2025).

### *2.2 External CEO Succession*

External CEO succession is the process of replacing a company's top leadership by appointing an individual from outside the owner family or the company's internal structure. In family-owned companies, this decision typically arises when the organization faces performance pressures, a crisis, or the need for a more professional strategic overhaul. The appointment of an external CEO is often viewed as a way to bring in a fresh perspective, enhance managerial objectivity, and accelerate the organization's recovery process (Finkelstein, Hambrick, & Cannella, 2009, as cited in Carpenter, 2011).

In the context of family businesses, the appointment of an external CEO is also linked to efforts to ensure business sustainability without completely relinquishing the family's ownership control. Appointing a leader from outside the family can be a solution when the company needs more specialized expertise to address changes in the business environment and market demands. Furthermore, this decision reflects a compromise between the family's interest in preserving the company's identity and the organization's need to act more strategically and rationally (Chua et al., 2018; Zahra & Sharma, 2004). In the case of the LEGO Group, the external CEO succession—marked by the appointment of Jørgen Vig Knudstorp—was a crucial step in the company's restructuring and performance recovery.

### *2.3 Transformational Leadership*

According to Widayati et al. (2017), transformational leadership is a leadership style that is oriented toward a future vision, capable of interpreting environmental dynamics, and transforming those changes within the organization. Leaders with this style serve as pioneers of change, provide encouragement, and inspire employees to be more adaptive, creative, and innovative. The goal is to bring about renewal in management performance through courage and responsibility in guiding and steering the organization. A leader's success can be measured by the extent to which they are able to influence their subordinates to work together toward achieving the organization's goals. Additionally, motivation from others is a key factor that drives both individuals and organizations to achieve their desired objectives.

Although organizational change is very important, not all organizational changes lead to progress; this necessitates that organizational leaders exercise strong oversight over the implementation of change to prevent organizational regression (Dewi et al., 2021). Management acts as a mediator between the organization's direction and employee

performance and also has a significant influence on their success or failure (Suryani & John, 2018). Transformational leadership plays a crucial role in the context of family-owned businesses because it maintains the commitment of organizational members while driving the changes needed to navigate crises. In the context of the LEGO Group, visionary and adaptive leadership is manifested through restructuring measures and the streamlining of corporate strategy.

### *2.4 Socioemotional Wealth (SEW)*

The Socioemotional Wealth (SEW) theory emphasizes that the sustainability of the business for future generations is viewed as the primary goal of family businesses, making the involvement of family members in the business a crucial aspect (Andriyani et al., 2022). According to Chua et al. (2015) as cited in Mintarza & Pratono (2024), the Socioemotional Wealth (SEW) theory provides a framework for understanding the distinctive behavior of family businesses, which often prioritize non-financial goals such as family control, identity, and legacy over economic performance alone. This focus on SEW drives decision-making that may seem irrational from an economic perspective but makes sense when viewed through the lens of the family's desire to preserve its socioemotional assets.

The SEW theory explains why family businesses are willing to sacrifice short-term financial gains in order to protect the legacy, reputation, and long-term emotional ties associated with the family business (Mintarza & Pratono, 2024). In the context of the LEGO Group, the SEW perspective is relevant because, according to The LEGO Group (2016), the owner family has retained ownership control through Kirkbi A/S, even as the company undertook a major restructuring and appointed an external CEO to restore performance.

According to Reina et al. (2023), Socioemotional Wealth (SEW) is a set of non-economic resources derived from family involvement in the firm and serves as the primary foundation for family business decision-making. To operationalize this concept, SEW research often draws on the FIBER model, which consists of five main dimensions: Family Control and Influence, Identification of Family Members with the Firm, Binding Social Ties, Emotional Attachment, and Renewal of Family Bonds Through Dynastic Succession.

#### *2.4.1 Family Control and Influence*

The Family Control and Influence dimension represents the family's desire to maintain control and influence over the company. From the SEW perspective, family control serves not only as a mechanism for overseeing business activities but also as a means of protecting the family's values, goals, and identity embedded within the organization. Therefore, the owner family often prioritizes the continuity of control over the achievement of short-term economic gains.

#### *2.4.2 Identification of Family Members with the Firm*

This dimension describes the extent to which family members view the company as part of their identity. In this context, the company's reputation and the family's reputation become intertwined. The company's success is perceived as the family's success, while the company's failure may be viewed as a social failure for the family.

Because of this identity connection, the owner's family tends to pay closer attention to the company's image, product quality, customer relationships, and social legitimacy. Research summarized in the article shows that family identification often drives innovation, commitment to the business, and behavior aimed at preserving the family's reputation in the eyes of the public.

#### *2.4.3 Binding Social Ties*

This dimension relates to the social relationships that family-owned businesses

build and maintain with various stakeholders, such as employees, suppliers, customers, local communities, and the broader family network. These relationships are considered a valuable part of the company's emotional capital and must be nurtured.

Social ties often encourage family-owned businesses to place greater emphasis on employee well-being, social responsibility, and long-term relationships with the community. Therefore, business decisions are not always based solely on economic efficiency, but also on the social consequences that may affect relationships built over many years.

#### *2.4.4 Emotional Attachment*

Emotional attachment refers to the affective bond that family members have with the company. The company is viewed as part of the family's history, a symbol of previous generations' struggles, and a source of family pride. Therefore, various business decisions are often influenced by emotions, a sense of ownership, and interpersonal relationships among family members.

This dimension can have varying effects. On the one hand, emotional attachment can strengthen the family's commitment to the company's sustainability. On the other hand, excessive emotional attachment has the potential to lead to less rational decisions or family conflicts that affect business operations. Several studies included in this review indicate that emotional attachment influences entrepreneurial orientation, innovation, and the performance of family businesses.

#### *2.4.5 Renewal of Family Bonds Through Dynastic Succession*

This dimension reflects a family's desire to sustain the business across generations. For many family businesses, success is measured not only by current profits but also by the company's ability to be passed down to the next generation.

A focus on succession fosters a long-term perspective in corporate management. Families tend to prioritize business continuity, the development of successors, and the preservation of family values. Therefore, strategic decisions are often evaluated based on their impact on the company's future sustainability.

### *2.5 McKinsey 7S Framework*

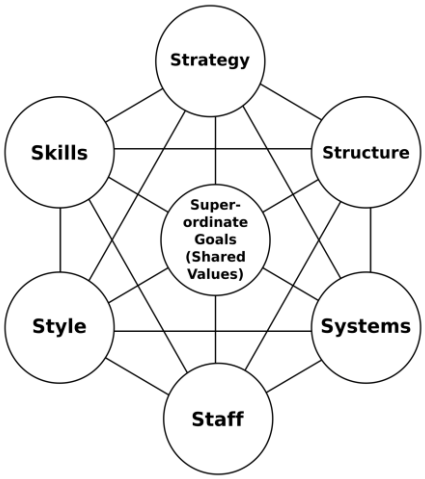



Figure 1. McKinsey 7s Framework

The McKinsey 7S Model is a framework used to analyze a company's organizational design through seven key internal elements: strategy, structure, systems, shared values, leadership style, staff, and skills. This model helps determine whether these seven elements are

effectively aligned so that the organization can achieve its goals.

In this model, the seven elements are divided into two categories: hard elements and soft elements. Hard elements include strategy, structure, and systems, which are easier to identify and manage. Meanwhile, soft elements encompass shared values, leadership style, staff, and skills—which are more difficult to manage because they relate to culture and human resources. Nevertheless, soft elements serve as a crucial foundation for creating sustainable competitive advantage for an organization (Ravanfar, 2015).

### *2.6 Organizational Restructuring*

According to Nulipta et al. (2019) as cited in Muharyono & Wibowo (2023), organizational restructuring is the process of reorganizing work units, departments, tasks, and functions that involves all stakeholders, including employees, because bureaucratic restructuring has a direct impact on everyone within the organization. As organizations evolve, they are highly likely to undergo changes as a consequence of the dynamics of the times and social conditions in society. These changes do not occur without reason but are triggered by powerful factors that force organizations to adapt. Factors driving restructuring include the environment, goals and values, technology, organizational structure, individual behavior, and the role of consultants.

According to Hellriegel and Slocum (1998) as cited in Muharyono & Wibowo (2023), organizational restructuring has five main characteristics, namely tasks, technology, organizational structure, human resources, and organizational culture. Meanwhile, Stoner et al. (1996) as cited in Muharyono & Wibowo (2023), suggest that there are three approaches to implementing organizational restructuring: through structural changes, technological changes, and human resource changes. In the case of the LEGO Group, restructuring is evident through the divestiture of non-core businesses, the simplification of the product portfolio, and the reorganization of the supply chain and work culture.

### *2.7 Corporate Turnaround*

A corporate turnaround is a situation in which a company that had previously experienced a decline in economic performance and a period of decline successfully achieves a significant recovery, thereby turning around its financial condition and returning to optimal levels of success and performance (Rahimah & Ahmar, 2022). According to Dolz et al., (2019), in family-owned firms, turnaround is also influenced by family ownership and non-economic considerations; studies on family firms indicate that recovery measures are chosen not only based on efficiency but also on what the family, as owners, wishes to preserve.

According to O'Neill, H.M. (1986) as cited in Rahimah & Ahmar (2022), there are four main approaches to implementing a turnaround strategy. First, the management strategy, which emphasizes not only drastic staff turnover but also efforts to boost the motivation of the remaining management team and rediscover the company's identity. Second, the restructuring strategy, which requires fundamental changes in the organizational structure, the implementation of new production methods, and a more effective distribution system. Third, a cost-cutting strategy, which focuses on immediately addressing the company's declining performance through cost reductions and the elimination of unproductive inventory. Fourth, a growth strategy, which involves steps to revitalize the company by promoting business expansion and development. In the case of the LEGO Group, the turnaround was achieved through an organizational restructuring approach.

### *2.8 Conceptual Framework*

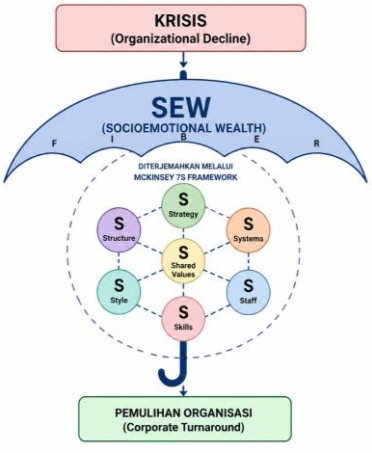



Figure 2. Conceptual Framework

This conceptual framework explains that organizational decline serves as a catalyst for family-owned companies to implement strategic changes in order to achieve a corporate turnaround. In a crisis, a company may take the significant step of appointing an external CEO when internal leadership is deemed incapable of addressing the complexity of the problems at hand. The presence of an external CEO fosters transformational leadership, which plays a role in establishing a new vision, driving organizational change, and fostering commitment to the company's recovery process. However, in family-owned companies, this change process is not based solely on economic considerations but is also influenced by Socioemotional Wealth (SEW), which reflects the values, identity, control, reputation, and sustainability of the owner family. SEW values are translated into adjustments to various organizational elements through the McKinsey 7S Framework, which are then implemented through organizational restructuring as a strategy to achieve a corporate turnaround.

In the conceptual framework diagram above, the authors illustrate the SEW theory in the form of an umbrella that we call the Socioemotional Wealth Umbrella (SEWU). The Socioemotional Wealth Umbrella (SEWU) is a conceptual framework that explains how the dimensions of socioemotional wealth (FIBER) function as a strategic umbrella that shelters and influences the organizational restructuring process in family businesses as they face organizational decline to achieve a corporate turnaround. In this context, SEW is not one of the elements being restructured but rather a factor that guides, constrains, and influences how the restructuring is carried out. This means that when family businesses face a crisis, they will not pursue a turnaround based purely on economic considerations, as non-family businesses might.

In the Socioemotional Wealth Umbrella (SEWU) concept, the umbrella handle in the conceptual framework diagram represents the *"guiding principles"* that family businesses use to maintain their direction and business continuity amid various pressures and environmental changes. Just as the handle allows a person to hold, control, and direct the umbrella, SEW serves as the primary guiding principle that helps family businesses make strategic decisions without losing their family identity and values.

## 3. Research Methods

This study employs a qualitative approach with a descriptive-analytical nature. The qualitative approach was chosen because this study aims to gain an in-depth understanding of the phenomenon of organizational transformation at The LEGO Group, particularly regarding the role of Socioemotional Wealth (SEW), the appointment of an external CEO, and the corporate turnaround process in addressing organizational crises. Meanwhile, according to Ratna (2012) as cited in Fitrah (2016), the descriptive-analytical approach is used to describe the phenomena

occurring while simultaneously analyzing the interrelationships among the concepts employed in the study.

The method used was a literature review, which involves collecting data by examining various relevant sources, such as scientific journals, books, company reports, and articles related to organizational change, corporate turnaround, family businesses, and the case of The LEGO Group. The selection of references was based on the relevance of the topic, the credibility of the sources, and their connection to the research focus.

Data analysis is conducted in several stages: searching for and collecting relevant literature; reading and understanding the content of the references; noting down important information and findings; grouping the data by topic; and then synthesizing these findings into a systematic and integrated discussion. Through this process, the author can construct a well-structured argument and avoid plagiarism by processing and rephrasing the information in their own words (Sugiyono, 2019).

## 4. Research Findings and Discussion

### *4.1 Crisis and Organizational Decline at the LEGO Group*

The LEGO Group is a family-owned toy manufacturer based in Denmark. The company was founded by Ole Kirk Kristiansen in 1932, with LEGO as its flagship brand. In conducting its operations, the company firmly upholds the business motto *"det bedste er ikke for godt,"* which means "only the best is good enough" (The LEGO Group, n.d.). This principle is instilled in all employees to ensure they remain committed to creating the highest-quality toys on the market.

Since 1998, the LEGO Group has faced a sustained decline in revenue, culminating in a loss of US$400 million in 2004, which brought the company to the brink of bankruptcy. This situation was exacerbated by the failure of its production innovation and creativity strategies, which actually eroded the brand's original identity. According to Priyono et al. (2021) in Rose & Junaidi (2024), this failure stemmed from the fact that the initial changes implemented by LEGO did not take into account the brand's historical context or the design enthusiasm that had long been deeply ingrained in the public's hearts. What LEGO experienced is a form of organizational decline, which is a decline in organizational performance that occurs when a company loses its competitiveness, experiences internal inefficiencies, or fails to respond to environmental changes (Cameron & Whetten, 1983). In this case, it was caused by the company's over-diversification, which led to a loss of focus on its core business.

### *4.2 The Role of Socioemotional Wealth (SEW) in Decision-Making*

Socioemotional Wealth (SEW) is a set of non-economic resources stemming from family involvement in the company and serves as the primary foundation for family business decision-making (Reina et al., 2023). The concept of SEW is often explained through the FIBER model, which consists of family control and influence, identification of family members with the firm, binding social ties, emotional attachment, and renewal of family bonds through dynastic succession. These five dimensions illustrate that the owner family not only seeks to maximize the firm's profits but also to maintain family control, the identity associated with the firm, strong social relationships, emotional attachment, and the continuity of the business across generations (Reina et al., 2023).

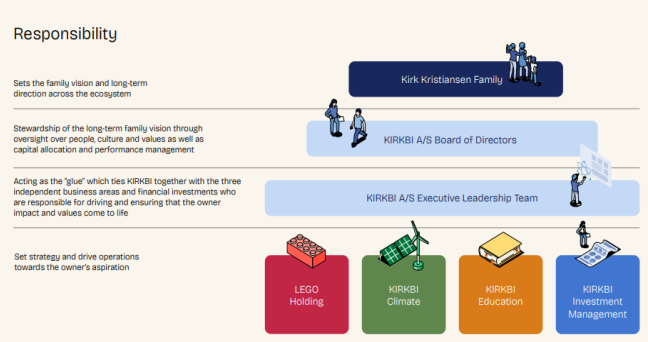



Figure 3. Governance Structure
Source: KIRKBI Annual Report 2025

In the context of the LEGO Group, SEW's values are reflected in KIRKBI's governance structure, which places the Kristiansen family at the highest level of the company's ownership and oversight system. This demonstrates that the professionalization of the organization does not eliminate family control but is carried out within a framework designed to preserve the family's influence over the company's strategic direction. In the context of LEGO, the Kristiansen family seeks to maintain control, identity, legacy, and the sustainability of LEGO as a family-owned company. Therefore, when the company faces a crisis, the strategic decisions made are not only aimed at restoring financial performance but also at preserving the family's socio-emotional values (KIRKBI, 2025). The Kristiansen family did not appoint an external CEO because they wanted to relinquish control over LEGO, but rather because they wanted to protect and preserve their socio-emotional wealth through the company's turnaround.

The Kristiansen family's involvement is evident not only through their shareholding but also through the practice of active family ownership. During the fourth-generation succession process, Kjeld Kirk Kristiansen explained that each generation will designate one family member as the "most active owner," whose role is to maintain the family's close ties with the LEGO Group, the LEGO Foundation, and KIRKBI (The LEGO Group, 2016). This mechanism demonstrates that the family remains involved in the company's oversight and strategic decision-making, ensuring that the professionalization of the organization does not diminish the family's influence over the direction of LEGO's development.

Knudstorp's statement that *"the family's values are more important"* indicates that the Kristiansen family is not solely pursuing financial gain. From a SEW perspective, business decisions are influenced by efforts to preserve the family's values, identity, reputation, and sustainability. Therefore, the decision to appoint an external CEO can be understood not as a relinquishment of family control, but rather as a strategy to protect family values threatened by the company's crisis (The LEGO Group, 2016).

The Kristiansen family's involvement is evident not only through their share ownership. Thus, the crisis faced by LEGO was viewed not only as a threat to business performance but also as a threat to the Kristiansen family's socioemotional wealth. These circumstances prompted the family to pursue professionalization by appointing an external CEO as a strategy to safeguard the company's sustainability while preserving the family values and legacy that form the core of socioemotional wealth.

### *4.3 Appointing an External CEO as a Strategy for Professionalization*

External CEO succession is the process of replacing a company's top leadership by appointing an individual from outside the owner family or the company's internal structure. In family-owned companies, this decision typically arises when the organization faces performance pressures, a crisis, or the need for a more professional strategic overhaul (Finkelstein, Hambrick, & Cannella, 2009, as cited in Carpenter, 2011)

In the case of the LEGO Group, the move toward professionalization was marked by the appointment of Jørgen Vig Knudstorp as CEO in September 2004. This appointment was a significant milestone because Knudstorp was the first CEO from outside the Kristiansen family since the company was founded by Ole Kirk Kristiansen in 1932. Before becoming CEO, Knudstorp earned a degree in economics from the University of Aarhus and worked as a management consultant at McKinsey & Company. He joined LEGO in 2001 as Director of Strategic Development, then served as Senior Vice President of Corporate Affairs in 2003 before being entrusted with leading the company in 2004 (Hollar, n.d.).

Knudstorp's appointment came at a time when LEGO was in the midst of a serious crisis. In 2003, the company suffered losses of more than USD 300 million and faced a threat to its business continuity. This situation prompted the Kristiansen family to appoint a professional leader who was deemed capable of turning the company around without compromising the family values that formed the foundation of the organization (Hollar, n.d.).

From an Organizational Development (OD) perspective, Knudstorp can be viewed as a change agent leading the organization's transformation process. As the new CEO, he not only brought about a leadership transition but also initiated strategic changes that affected various aspects of the organization. One of the first steps he took was to implement an aggressive cost-cutting policy, sell off business units that were not contributing optimally, and refocus the company on LEGO's core competency as a manufacturer of brick-based construction toys (Hollar, n.d.).

In addition to implementing operational efficiencies, Knudstorp also demonstrated transformational leadership through his ability to establish a clear vision for change. In various interviews, he emphasized that LEGO had lost its focus due to overly rapid expansion and excessive component production, so the organization needed to return to "the famous LEGO system of old." This statement demonstrates his ability to identify the root causes of the organization's problems while steering change toward the company's core identity (Zusammengebaut, 2016).

Knudstorp also strengthened consumer engagement through closer collaboration with the LEGO fan community. Britannica notes that he involved many adult LEGO fans in discussions and the development of new product designs, enabling the company to receive direct feedback from users who have a deep understanding of LEGO products (Hollar, n.d.).

### *4.4 Corporate Turnaround and Organizational Restructuring*

A corporate turnaround is a situation in which a company that had previously experienced a decline in economic performance and a period of decline successfully achieves a significant recovery, enabling it to turn around its financial condition and once again reach optimal levels of success and performance (Rahimah & Ahmar, 2022). LEGO's situation in the early 2000s exhibited the characteristics of an organization in need of a turnaround, as the company was suffering heavy losses, increasing debt, and a loss of strategic focus due to excessive diversification.

According to Zusammengebaut (2016), based on an interview with Jørgen Vig Knudstorp, one of the main causes of the LEGO crisis was overly rapid expansion into various new business areas, which increased organizational complexity and diminished the company's focus on its core competencies. Knudstorp acknowledged that the product development process had spiraled out of control because the company was producing too many parts, thereby straying from the fundamental LEGO concept. Therefore, the turnaround strategy focused on simplifying products and realigning the company with the LEGO System, which had long been the company's defining identity. These findings indicate that the recovery process involved not only operational efficiency but also efforts to realign the organization with the company's core values.

LEGO's strategy can be understood as a combination of retrenchment and strategic refocusing. Retrenchment was carried out through cost reduction, operational streamlining, and the divestiture of less profitable business activities. Meanwhile, the refocusing strategy involved redirecting the company's focus back to LEGO's core competencies as a manufacturer of brick-based construction toys. This combination of strategies is a pattern commonly found in corporate turnaround processes (Rahimah & Ahmar, 2022). Knudstorp explained this situation with the following statement:

*"Our development process was a little bit out of control in that we simply produced too many parts. It was no longer the Lego idea. We need to somehow get back to the famous Lego system of old days."*

In addition to streamlining its product lineup (refocusing strategy), LEGO also implemented various operational efficiency measures as part of its turnaround strategy. According to Britannica, after being appointed CEO, Knudstorp implemented aggressive cost-cutting measures, accelerated the new product development process, and divested several business units that were not contributing optimally to the company's performance—specifically, selling control of four LEGOLAND theme parks as part of an effort to refocus the company's resources on LEGO's core business (Hollar, n.d.). These steps demonstrate that LEGO's turnaround focused not only on strategic changes but also on improving operational efficiency to improve the company's financial condition. These efforts align with the retrenchment phase of a corporate turnaround, which aims to reduce waste, increase productivity, and restore organizational stability (Rahimah & Ahmar, 2022).

LEGO's turnaround was aimed not only at improving financial performance but also at restoring the company's identity, which had begun to fade due to excessive diversification. In his interview, Knudstorp stated that the product development process had strayed from LEGO's core concept, so the company needed to return to *"the famous LEGO system of old days"* (Zusammengebaut, 2016). This statement indicates that LEGO's recovery is focused on reinforcing the company's core values—rooted in creativity, a modular play system, and the play experience that has defined LEGO since its inception. This commitment to the company's identity and values is also reflected in statements by the owner family, which emphasize the importance of preserving "the LEGO idea" and family values as the foundation for strategic decision-making (The LEGO Group, 2016). Thus, LEGO's turnaround can be understood as an organizational recovery effort that is not only economically oriented but also aimed at reinforcing the company's identity as part of a legacy and set of values to be preserved across generations.

### *4.5 Analysis of LEGO's Transformation Using the McKinsey 7S Framework*

Based on the conceptual framework that has been developed, the LEGO Group's transformation in the face of organizational decline can be understood through the Socioemotional Wealth Umbrella (SEWU) perspective. SEWU illustrates how the dimensions of Socioemotional Wealth (FIBER) function as a strategic umbrella that encompasses and influences the direction of organizational restructuring in family-owned companies when facing a crisis to achieve a corporate turnaround. In the context of the LEGO Group, the organizational changes implemented were not only aimed at restoring economic performance but also at preserving the identity, control, reputation, and sustainability of the owner family. Therefore, the McKinsey 7S Framework was used to identify adjustments to strategy, structure, systems, shared values, leadership style, human resources, and organizational capabilities, which were then interpreted as manifestations of SEWU values in the organizational restructuring process.

**Table 1. Implementation of SEWU in Relation to the McKinsey 7S Framework**

| McKinsey 7S | The SEW Perspective That Influences | Indications on LEGO |
|---|---|---|
| Strategy | Family Control and Dynastic Succession | The restructuring strategy is designed to ensure the sustainability of the family business, not merely to generate short-term profits |
| Structure | Family Control and Influence | The family retains ownership control through Kirkbi despite appointing a professional CEO |
| System | Family Control and Identification | The management system was overhauled to help LEGO refocus on the company's core values |
| Shared Value | Identification and Emotional Attachment | The values of creativity, learning, and quality are upheld as the identity of the family and the company |
| Style | Emotional Attachment and Family Control | The leadership style has become more professional without diminishing the family's influence |
| Staff | Binding Social Ties | Human resources management focuses on long-term relationships with employees and stakeholders |
| Skill | Dynastic Succession and Identification | Organizational competency development is carried out to ensure the company's sustainability across generations |

### *4.6 The Impact of a Turnaround on Organizational Recovery*

| [ mDKK ] | 2007 | 2006 | 2005 | 2004 | 2003 |
|---|---|---|---|---|---|
| **Income Statement:** | | | | | |
| Revenue | 8,027 | 7,798 | 7,027 | 6,295 | 6,770 |
| Expenses | (6,556) | (6,393) | (6,605) | (6,394) | (7,919) |
| Operating profit before special items | 1,471 | 1,405 | 423 | (99) | (1,149) |
| Impairment of fixed assets | 24 | 270 | 86 | (677) | (172) |
| Restructuring costs and other special items | (40) | (353) | (129) | (136) | (283) |
| Financial income and expenses | (35) | (44) | (5) | (75) | 88 |
| Profit before tax | 1,464 | 1,281 | 329 | (987) | (1,515) |
| Profit, continuing activities | 1,028 | 1,290 | 214 | (1,284) | (965) |
| Profit, discontinuing activities | – | – | – | (516) | 77 |
| Net profit for the year | 1,028 | 1,290 | 214 | (1,800) | (888) |
| **Balance sheet:** | | | | | |
| Assets relating to continuing activities | 6,009 | 6,907 | 7,058 | 5,160 | 8,785 |
| Assets relating to discontinuing activities | – | – | – | 1,636 | – |
| Total assets | 6,009 | 6,907 | 7,058 | 6,796 | 8,785 |
| Equity | 1,679 | 1,191 | 563 | 404 | 2,344 |
| Liabilities relating to continuing activities | 4,330 | 5,716 | 6,495 | 5,160 | 6,441 |
| Liabilities relating to discontinuing activities | – | – | – | 271 | – |
| **Cash flow statement:** | | | | | |
| Cash flows from operating activities | 1,033 | 1,157 | 587 | 720 | 989 |
| Investment in property, plant and equipment | 399 | 316 | 237 | 285 | 653 |
| Cash flows from financing activities | (467) | 597 | (656) | (70) | (205) |
| Total cash flows | 592 | 1,925 | 1,570 | 443 | (541) |
| **Employees:** | | | | | |
| Average number (full time), continuing activities | 4,199 | 4,908 | 5,302 | 5,603 | 6,535 |
| Average number (full time), discontinuing activities | – | – | 1,322 | 1,029 | 1,160 |
| **Financial ratios (in %):** | | | | | |
| Gross margin | 65.0 | 64.9 | 58.0 | 57.9 | 54.3 |
| Operating margin (ROS) | 18.1 | 17.0 | 5.4 | (14.5) | (23.7) |
| Net profit margin | 12.8 | 16.5 | 3.0 | (28.6) | (13.1) |
| Return on equity (ROE) | 71.6 | 142.1 | 44.2 | (131.0) | (28.1) |
| Return on invested capital (ROIC I) | 69.7 | 63.6 | 16.2 | (2.0) | (13.5) |
| Return on invested capital (ROIC II) | 77.1 | 67.4 | 15.2 | (18.9) | (19.1) |
| Equity ratio | 27.9 | 17.2 | 8.0 | 5.9 | 26.7 |
| Equity ratio (incl. subordinate loan) | 46.2 | 33.2 | 8.0 | 5.9 | 26.7 |

Figure 4. LEGO Financial Highlights
Source: LEGO Annual Report 2007

LEGO's successful turnaround can be seen in the company's financial recovery following the crisis in the early 2000s. According to the LEGO Annual Report 2007, the company's

revenue increased gradually from DKK 6,770 million in 2003 to DKK 8,027 million in 2007. During the same period, net income—which had previously recorded a loss of DKK 888 million in 2003—turned into a profit of DKK 1,028 million in 2007 (The LEGO Group, 2007).

In addition, the company's profitability also showed significant improvement. Return on Equity (ROE) rose from -28.1% in 2003 to 71.6% in 2007, while the operating margin—which had previously been negative at -23.7% in 2003—increased to 18.1% in 2007. These improvements indicate that the turnaround strategy not only halted the decline in the company's performance but also succeeded in generating sustainable growth (The LEGO Group, 2007).

From an organizational perspective, LEGO's recovery is reflected not only in financial indicators but also in the increasing alignment between the company's strategy, structure, systems, leadership, and values. The refocus on the core business, simplification of the product portfolio, operational efficiency, and strengthening of the brand identity demonstrate alignment among organizational elements that support the success of the company's transformation. From an Organization Development perspective, this situation can be understood as a form of organizational coherence—a state in which the organization's goals, culture, work processes, and strategic direction operate in harmony, thereby supporting organizational performance more effectively (Cummings & Worley, 2019).

Thus, the success of LEGO's turnaround is demonstrated not only by increased profitability and revenue growth, but also by the company's success in reestablishing organizational alignment. This recovery shows that the strategic changes implemented were able to refocus the company on its core competencies while strengthening LEGO's identity as a family-owned, long-term-oriented company.

## 5. Conclusion

This study concludes that the LEGO Group's successful corporate turnaround was the result of the integration of economic and non-economic considerations grounded in the Kristiansen family's Socioemotional Wealth (SEW). The crisis LEGO faced in the early 2000s—marked by significant losses due to over-diversification—was viewed not only as a threat to business performance but also as a threat to the family's identity, control, and legacy. This prompted the family to make the decision to professionalize the company by appointing an external CEO, Jørgen Vig Knudstorp, as a strategic move to save the company while preserving the family's socioemotional values.

Through an analysis of the McKinsey 7S Framework within the Socioemotional Wealth Umbrella (SEWU) framework, it is evident that all elements of the organization—from strategy, structure, systems, shared values, leadership style, human resources, to capabilities—are undergoing adjustments that are not only oriented toward economic efficiency but are also guided by the FIBER dimensions of SEW. Strategies such as refocusing on core competencies, divesting non-core business units, and renewing the organizational culture are tangible manifestations of a restructuring process imbued with family values.

The success of this transformation is reflected in a significant recovery in financial performance, as LEGO managed to achieve sustained growth in revenue and profitability through 2007, while also rebuilding organizational coherence that strengthened LEGO's position as the world's leading toy company.

Academically, this study contributes by introducing the SEWU concept as a new analytical framework in the study of family businesses, while also affirming that, in the context of family businesses, sustainable turnaround requires a balance between economic rationality and the preservation of socio-emotional wealth. The practical implications of this study are relevant to other family businesses facing crises, as they indicate that effective recovery strategies must

consider not only financial aspects but also the dimensions of identity, values, and the sustainability of the family as owners.

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# ANALYSIS OF THE EFFECTIVENESS OF THE GOVERNMENT INTERNAL CONTROL SYSTEM (SPIP) AND GOOD GOVERNANCE IN ENHANCING PERFORMANCE ACCOUNTABILITY (A CASE STUDY AT THE INSPECTORATE OF SUKABUMI REGENCY)

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***Abstract***
*The research focuses on examining the effectiveness of the Government Internal Control System (SPIP) and good governance in improving performance accountability at the Sukabumi Regency Inspectorate. This research employed a descriptive qualitative approach with data collected through in-depth interviews, observations, and documentation. Four informans were selected using purposive sampling. Data validity was tested through data tringulation, while data analysis was supported by Nvivo 14 through coding, theme categorization, and matrix coding query techniques. The findings indicate that SPIP and good governance have been applicated effectively through risk-based supervision, standard operating procedures, information technology utilization, and the application of transparency and accountability principles. These practices have contributed to improved performance accountability, as reflected in performance achievement indicators, SPIP maturity levels, and APIP capability levels categorized as good. However, several challenges remain, including limited human resource, insufficient understanding of risk management, recurring audit findings, and suboptimal documentation practices. Therefore, strengthening human resource capacity, optimizing risk management, and enhancing the utilization of information technology are necessary to improve performance accountability sustainably.*
***Keywords****: Governance Internal Control System (SPIP), Good Governance, Performance Accountability.*

## 1. Introduction

Effective, transparent, and accountable governance is a primary demand of the bureaucratic reform era in Indonesia. As the manager of public resources, the government is required to account for every policy and program to the public. This is underscored by Government Regulation Number 60 of 2008 concerning the Government Internal Control System (SPIP), which emphasizes states SPIP is a crucial instrument for providing reasonable assurance regarding the achievement of organizational objectives through efficient and effective internal controls, thereby supporting good governance. Building on this perspective, M. A. Nasir et al. (2024) state that SPIP implementation serves as an important mechanism for strengthening internal control systems, enhancing oversight effectiveness, and fostering accountable governance. Furthermore, Indriani & Siswantoro (2023) explain that well-implemented SPIP enhances internal control effectiveness, minimizes control weaknesses, and strengthens organizational accountability, although improvements are still needed regarding monitoring and follow-up on evaluation results.

Government performance accountability is measured through the Government Agency Performance Accountability System (SAKIP), as regulated by Presidential Regulation Number 29 of 2014. SAKIP requires government agencies to plan, measure, evaluate, and report performance in a systematic and quantifiable manner as a form of accountability for their governance activities. This aligns with research by Sofyan & Rahmawati (2025), which indicates that effective SAKIP implementation enhances accountability, transparency, and the quality of performance management within government agencies. According to Mardiasmo (2021), public accountability constitutes the government's obligation to account to the public for its management of resources. Additionally, Arens et al. (2017) state that internal control systems help ensure that organizations are able to accomplish their objectives, particulary in term of operational efficiency and regulatory compliance. Empirical evidence from Mujennah et al. (2022) further indicates that the adoption of the Government Internal Control System (SPIP) contributes to enhancing government agency

performance accountability by strengthening regulatory compliance control systems and improving organizational management effectiveness.

Performance accountability achievements at the Sukabumi Regency Inspectorate show positive progress, yet certain issues remain. Based on the 2022 Performance Report (LKj), the average performance indicator achievement reached 100%, with an SPIP maturity level of 106.13% and an APIP capability level of 66.67%. The 2023 Performance Report again showed a 100% achievement rate for performance indicators, with budget realization reaching 98.03%. In the 2024 Performance Report, performance indicator achievement reached 100% but budget realization was only 54.55%; meanwhile, the 2025 Performance Report showed an average performance achievement of 99.79% with 97.82% budget realization indicating improved efficiency but highlighting the continued need to optimize internal controls and performance oversight. Furthermore, the LKj documents note recurring findings and suboptimal SPIP implementation across regional government agencies, indicating that the effectiveness of the internal control system remains limited.

However, challenges persist regarding the application of SPIP and good governance principles. This aligns with research by Nasir & Gunawan (2019), which states that while the implementation of good governance and the Government Internal Control System (SPIP) significantly influences Government Agency Performance Accountability (AKIP), performance accountability in practice remains suboptimal, requiring strengthened oversight and follow-up on evaluation results. Similarly, research by Alya Rihhadatulaisy Mufidah et al. (2023) indicates that SPIP implementation at the Garut Regency Regional Inspectorate has generally been effective in supporting agency performance; nevertheless, certain oversight components have yet to meet targets, necessitating improvements in the effectiveness of internal controls. Furthermore, research by Purwanti (2022) indicates that the implementation of good governance in local government still faces challenges regarding transparency, accountability, and the management of government systems; consequently, strengthening systems and institutions is necessary to ensure optimal governance.

Regional inspectorates, acting as Government Internal Supervisory Apparatus (APIP), play a strategic role in ensuring the effectiveness of the Government Internal Control System (SPIP) and the application of good governance principles. As an element of government internal oversight, APIP no longer functions merely as a "watchdog" but also as a consulting partner that provides assurance, recommendations for improvement, and added value in support of governance, risk management, and internal control. Research by Putri & Setyaningrum (2024) indicates that enhancing APIP capabilities requires the effective application of governance, risk, and control (GRC) frameworks so that the oversight function can enhance the quality of government governance. This aligns with Government Regulation Number 60 of 2008 which states that internal oversight is conducted to provide reasonable assurance regarding the effective and efficient conduct of government operations. Furthermore, BPKP Regulation Number 6 of 2025 emphasizes the importance of enhancing APIP capabilities to strengthen the quality of internal oversight, governance, risk management, and control. Therefore, an in-depth analysis is required regarding the effectiveness of SPIP application and good governance in strengthening accountability for organizational performance.

Prior studies have predominantly examined the impact of the Government Internal Control System (SPIP) and good governance on performance accountability through quantitative approaches focused on macro causal relationships. However, these studies largely overlook the deep structural, behavioral, and operational friction occuring at the frontline of regional government oversight. An empirical gap exists within the Sukabumi Regency Inspectorate: while formal perfomance indikator show near perfect achievement such as high SPIP maturity and APIP Level 3 capability sharp budget realization fluctuatuons (dropping to 54.55% in 2024) and recurrent audit findings persist across local apparatus agencies. The novelty of this study lies in addressing this decoupling between formal compliance and field implementation. By depliying a qualitative case

study powered by NVivo 14, this research uncovers how the five SPIP elements interact with governance principles in practice and identifies the ground level impredimentsnamelu jurisdictional scale, severe staffing shortages, and procedural documentation gaps that hinder sustainable accountability.

## 2. Literature Review

### *2.1 Government Internal Control System (SPIP)*

Ayem & Kusumasari (2020) explain that the Government Internal Control System (SPIP) is an integral, continuous process carried out by leadership and all employees to provide reasonable assurance regarding the achievement of organizational objectives through reliable financial reporting, compliance with laws and regulations, efficient and effective activities, and the safeguarding of state assets. Research by Fazlurahman et al. (2021) states that SPIP is a system comprising specific criteria based on government regulations that serves to control the conduct of government operations. In accordance with Government Regulation Number 60 of 2008, SPIP consists of five elements: the control environment, risk assessment, control activities, information and communication, and the monitoring of internal controls.

According to Arens et al. (2017), SPIP comprises policies and procedures designed to provide reasonable assurance that organizational objectives can be achieved efficiently and effectively. Effective internal control minimizes irregularities, enhances work efficiency, and supports the establishment of accountability within public sector organizations. These findings are supported by research from Haryanto & Andayan (2023), which indicates that the internal control system has a positive and significant impact on the performance accountability of government agencies. Furthermore, Munandar & Sopianti (2025) explain that the effective implementation of SPIP strengthens oversight functions, improves regulatory compliance, and fosters more accountable governance.

### *2.2 Good Governance*

According to Nabila et al. (2025), good governance is a concept of government administration that emphasizes the principles of accountability, efficiency, participation, transparency, effectiveness, and the rule of law in the conduct of government affairs. Rosela et al. (2020) state that the implementation of this concept aims to establish a governance system capable of delivering quality public services, preventing corruption, and upholding the rule of law and the protection of human rights.

Mardiasmo (2021) explains that good governance is a system of government management that prioritizes accountability and transparency as key elements in the management of public resources. Implementing good governance principles is crucial for enhancing public trust in the government. Governments are required to conduct their affairs openly, responsibly, and free from misconduct. Effective governance enables objective decision-making and supports the delivery of optimal public services. This view is reinforced by research from Tulak et al. (2023), which indicates that applying the principles of transparency and accountability as the main pillars of good governance can improve public service quality and strengthen public confidence in government administration. Furthermore, Maolani et al. (2023) explain that a public accountability system is a vital instrument for achieving good governance, as it fosters transparency, enhances service quality, and reinforces government accountability to the public.

### *2.3 Performance Accountability*

Performance accountability represents the obligation of government agencies to account for the execution of programs and activities aimed at achieving established organizational goals. According to A. Nasir & Gunawan (2019), government agency performance accountability is the manifestation of an agency's obligation to account for the success or failure of its mission in meeting established targets and objectives through a periodic accountability system. This accountability is realized through the preparation of performance reports that transparently and measurably depict the success levels of program implementation and budget

utilization. This view is reinforced by research from Rosayda et al. (2023) which states that government agency performance accountability is a essential instrument for achieving good governance by providing transparent and accountable performance information that serves as a basis for decision-making, evaluation, and public accountability.

Based on Presidential Regulation Number 29 of 2014 concerning the Government Agency Performance Accountability System (SAKIP), every government agency is required to undertake performance planning, measurement, reporting, and review and evaluation as an integrated system designed to enhance agency accountability and performance. The system aims to inhance the efficiency and effectiveness of budget utilization while fostering an accountable government. This is supported by research from Sofyan & Rahmawati (2025), which indicates that the effective application of SAKIP contributes to enhanced accountability, transparency, and performance within government organizations. Furthermore, Ritto et al. (2025) explain that the application of SAKIP pursuant to Presidential Regulation Number 29 of 2014 serves as a performance measurement instrument that integrates planning, measurement, reporting, and evaluation, thereby enhancing the effectiveness of government administration and the quality of agency accountability.

According to Mardiasmo (2021), public accountability is the obligation of trustees to account for, present, report, and disclose all activities to the trustors namely, the public. In local government, performance accountability serves as a tool to assess the extent to which government agencies effectively carry out their duties and functions in accordance with established targets. This view is supported by research from Stefan et al. (2023), which states that the application of SAKIP is a crucial instrument for measuring performance achievements, enhancing organizational effectiveness, and strengthening government agency accountability through processes of performance measurement, reporting, and evaluation. Furthermore, research by Muzaqi et al. (2025) explains that SAKIP implementation contributes to realizing the principles of good governance specifically accountability and transparency through integrated performance management.

## 3. Research Methods

A descriptive qualitative methodology is adopted in this research. The selected methodology was used to analyze the implementation of the Government Internal Control System (SPIP) and good governance in enhancing performance accountability at the Sukabumi Regency Inspectorate. The qualitative approach was chosen for its ability to provide an in-depth understanding of policy implementation, oversight processes, and actual conditions in the field. According to Sugiyono (2023), qualitative research is used to understand phenomena in their natural setting through the perspectives of informants, based on real-world conditions.

The research was conducted at the Sukabumi Regency Inspectorate. Informants were selected using purposive sampling a technique involving the selection of individuals based on specific criteria targeting those with the knowledge, experience, and direct involvement in the application of the Government Internal Control System (SPIP), the application of good governance, and the management of performance accountability, thereby ensuring they could provide information relevant to the research objectives Sugiyono (2023). The study involved four informants: a Skilled Auditor, a First-Level Government Affairs Supervisor (P2UPD), a First-Level Auditor, and the Inspectorate Secretary.

**Table 1. Research Informant**

| No | Informant Code | Information |
|---|---|---|
| 1 | Informant 1 | Skilled Auditor |
| 2 | Informant 2 | First Expert P2UPD |
| 3 | Informant 3 | Junior Auditor |
| 4 | Informant 4 | Secretary of the Inspectorate |

*Source:* researcher (2026)

The research data were obtained through detailed interviews, observation, and documentation. Sugiyono (2023) emphasizes that in qualitative research, data collection techniques generally take place in natural settings utilizing observation, in-depth interviews, and documentation to obtain comprehensive data regarding the phenomenon under study. Semi-structured interviews were conducted using an interview guide to elicit information on the application of the Government Internal Control System (SPIP), the application of good governance, supporting factors, obstacles, and contributions to enhancing performance accountability. Direct observations were made regarding supervisory activities, the implementation of internal controls, the execution of performance evaluations, and the implementation of good governance within the Sukabumi Regency Inspectorate. Documentation was obtained from Performance Reports (LKj) covering the 2022–2025 period.

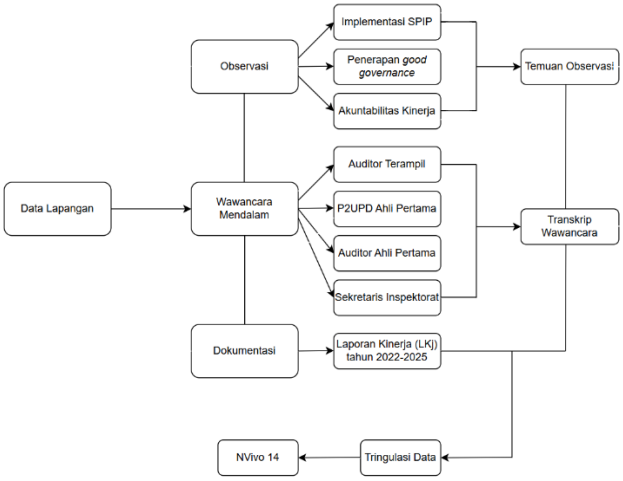



**Figure 1. Data Collection Workflow**
*Source*: researcher (2026)

The research process was systematically organized into several stages. The first stage involved research preparation, encompassing problem identification, a literature review, the development of interview instruments, and the selection of informants for in-depth study. The second stage was data collection through in-depth interviews, field observations, and document review. The third stage involved data processing: transcribing interview results, organizing research documents, and importing all data into NVivo 14 software. The fourth stage was data analysis, conducted through coding, thematic grouping (nodes), data visualization (using Word Clouds, Tree Maps, Hierarchy Charts, and Project Maps), and the analysis of relationships between themes using Matrix Coding Queries Jackson, K., & Bazeley (2019). The final stage involved drawing conclusions based on the interpretation of all research findings.

Data validity was tested using source triangulation and technique triangulation, as proposed by Denzin, N. K., & Lincoln (2011). Source triangulation was achieved by comparing information from four informants, while technique triangulation involved comparing results from interviews, observations, and documentation. This process aimed to ensure the consistency, credibility, and validity of the research data.

Research results were analyzed using NVivo 14 through several steps: open coding to identify key concepts; grouping nodes based on research themes; data visualization using Word Clouds, Tree Maps, Hierarchy Charts, and Project Maps; and Matrix Coding Queries to identify relationships between SPIP elements and good governance principles. Subsequently, the analysis results were interpreted descriptively by synthesizing findings from interviews, observations, and documentation to provide an overview of the effectiveness of SPIP implementation and good governance in enhancing the performance accountability of the Sukabumi Regency Inspectorate.

## 4. Research Findings and Discussion

### *4.1 Results*




**Figure 2. Word Cloud Results**
*Source*: researcher (2026)

A word cloud is used to provide an initial overview of the research data's content trends based on word frequency. This visualization helps identify the informants' primary areas of discussion, serving as a foundation for the subsequent thematic analysis.

The word cloud analysis reveals that the most dominant terms are Kinerja (Performance), Inspektorat (Inspectorate), Pemerintah (Government), Pengawasan (Oversight/Supervision), Sukabumi, and Kabupaten (Regency). The dominance of these terms indicates that the primary focus of both the informants and the research documents is the execution of the government's internal oversight function by the Sukabumi Regency Inspectorate, aimed at enhancing organizational performance. The term Inspektorat appears most prominently because it serves as the unit of analysis regarding the implementation of the Government Internal Control System (SPIP) and the implementation of good governance principles. The high frequency of this term demonstrates that the discussion largely centers on the Inspectorate's institutional role as the Government Internal Supervisory Apparatus (APIP).

The terms Kinerja and Pengawasan also appear prominently. This indicates that oversight activities serve as the primary instrument for improving the performance accountability of regional government agencies. In the context of this study, oversight is understood not merely as auditing, but as encompassing reviews, evaluations, monitoring, guidance, technical assistance, and follow-ups on audit findings. Thus, oversight functions as a key mechanism for implementing SPIP and a means of realizing the principle of accountability within good governance. Furthermore, the appearance of terms such as SPIP, Sistem (System), Pengendalian (Control), Risiko (Risk), Maturitas (Maturity), Kapabilitas (Capability), and APIP highlights that SPIP implementation is a dominant theme in the research data. These terms indicate that the informants focused heavily on applying the five elements of SPIP, raising SPIP maturity levels, strengthening APIP capabilities, and managing risk as part of bureaucratic reform.

The risk-based oversight approach used to determine the entities subject to oversight is operationally reinforced by Informant 4 during their interview:

"We now employ a risk-based process; essentially, we identify work programs or specific initiatives that entail high risk and constitute strategic issues. These become the targets of our oversight, we do not monitor every single entity, but rather focus on areas based on risk assessment. This makes our oversight more effective and targeted."

The prevalence of terms such as Accountability, Report, Achievement, Indicator, Target,

Objective, Program, and Evaluation indicates that enhancing performance accountability is the primary focus of oversight activities. This demonstrates that the implementation of SPIP and good governance is geared toward ensuring the achievement of organizational performance targets through structured systems for reporting, evaluation, and performance measurement. Furthermore, the appearance of terms like Reform, Bureaucracy, Service, Governance, and Society suggests that the application of SPIP and good governance is not solely focused on internal organizational control but is also part of the bureaucratic reform agenda aimed at enhancing the quality of governance and public services. On the other hand, terms such as Regulation, Number, Review, Formulation, Management, and Internal indicate that oversight activities within the Inspectorate are deeply impacted by regulatory compliance, the use of standard operating procedures, and administrative governance mechanisms. This demonstrates that good governance practices are implemented through adherence to established legal norms and procedures.

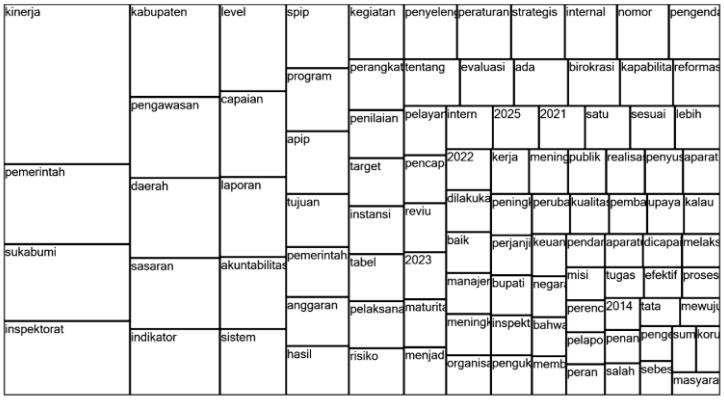



**Figure 3. Tree Map Results**
*Source*: researcher (2026)

A tree map serves to visually display the proportional distribution of themes derived from the coding process. The area of each box represents the frequency with which a concept appears, thereby enabling researchers to compare the relative dominance of different themes across the entire dataset.

Overall, the word cloud underscores that the study's empirical focus lies in the close relationship between SPIP, oversight, and performance accountability. The prominence of terms such as "oversight," "SPIP," and "accountability" indicates that oversight acts as the primary mechanism integrating SPIP implementation with the principles of good governance. These visual findings align with the results of the coding and matrix coding analyses, which identify the oversight function as the most dominant factor in strengthening the performance accountability of the Sukabumi Regency Inspectorate. Thus, the word cloud serves as supporting evidence that the implementation of SPIP and good governance in this study is oriented toward strengthening the oversight system as a means of ensuring organizational accountability.

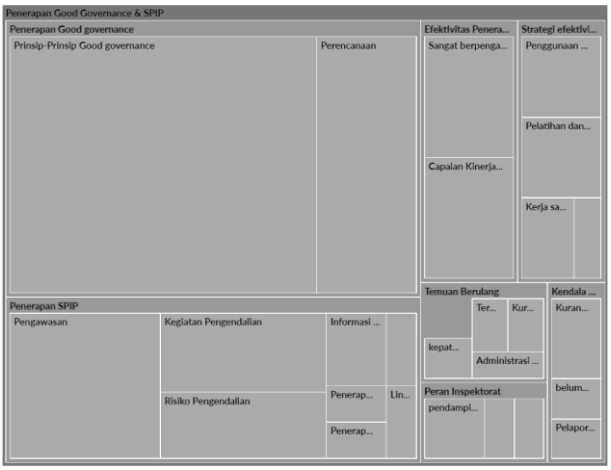



**Figure 4. Hierarcy Chart Results**
*Source*: researcher (2026)

A hierarchy chart is used to illustrate the structural relationships between the main themes and sub-themes derived from the coding process. This visualization helps explain the systematic organization of research concepts and highlights the themes that received the most extensive discussion.

The hierarchy chart analysis reveals that the research data is concentrated on several interconnected main themes: the application of good governance; the application of the Government Internal Control System (SPIP); the effectiveness of SPIP and good governance implementation regarding performance accountability; strategies for the effective application of SPIP and good governance; recurring findings; the role of the Inspectorate; and obstacles to implementing SPIP and good governance. The size of each box in the hierarchy chart represents the intensity or frequency of a theme's occurrence across the entire dataset of interviews and documentation. The larger the theme's size, the more dominantly it was discussed by informants or reflected in the research documents.

The most dominant theme is the implementation of good governance, indicating that the practice of good governance is the primary focus of oversight activities at the Sukabumi Regency Inspectorate. Within this theme, the sub-theme of good governance principles accounts for the largest proportion, particularly regarding the aspect of accountability. This dominance of accountability suggests that informants view accountability encompassing the execution of duties, adherence to operational procedures, the preparation of defensible reports, and performance evaluation as the core of good governance application. Meanwhile, the principle of transparency also emerges as a significant theme, albeit with a smaller proportion. Transparency is realized through information provision, the use of oversight applications, the holding of evaluation meetings, and the publication of performance documents in accordance with applicable regulations. Furthermore, the theme of planning demonstrates that good governance principles are integrated from the very beginning spanning the formulation of the vision, mission, goals, and strategic objectives, as well as the Strategic Plan (Renstra), Work Plan (Renja), and performance agreements ensuring that good governance is applied not only during the implementation phase but also throughout the organizational planning process. Informant 3 provides a concrete illustration of this transparency through the use of an internal application:

"Regarding transparency, for internal staff, we use the Simwas application, every working paper, work program, and audit result report (LHR) is uploaded there, making them accessible to everyone. The same applies to planning documents such as the Annual Work Plan (Renja), Strategic Plan (Renstra), performance agreements, and performance reports must all be published. That is one example of our transparency."

The next major theme is the implementation of SPIP (Government Internal Control System), illustrating that SPIP has become a primary instrument in supporting internal oversight activities. Within this theme, the oversight sub-theme stands out as the most dominant aspect compared to other SPIP elements. This is evidenced by activities such as risk-based auditing, monitoring, reporting of oversight results, adherence to standard operating procedures (SOPs), and the implementation of integrity pacts. Furthermore, the control activities sub-theme also accounts for a significant proportion, reflecting the conduct of periodic evaluations, the drafting of SOPs, the monitoring of follow-ups on audit findings, and quality control throughout the oversight process. Additionally, the findings indicate that the SPIP framework has been implemented in accordance with regulations, although the intensity of implementation and discussion varies across its components. Leadership commitment regarding the control environment sub-theme is explained by Informant 1:

"The control environment is essentially about how leadership maintains awareness of policies. It concerns policies and documentation specifically, ensuring our activities are well-documented. For instance, at the start of the year, we sign an integrity pact. The essence of this pact is to ensure that in carrying out our duties since our work at the Inspectorate involves oversight we always uphold independence, integrity, and objectivity, that is the core of our pact. That is why it is one of the policies our leadership requires us to establish."

The hierarchy chart also highlights the theme of the effectiveness of implementing SPIP and good governance regarding performance accountability as a dominant data cluster. The most prominent sub-theme within this group is the informants' perception that the application of SPIP and good governance significantly influences the enhancement of accountability and leads to improved organizational performance outcomes. These findings demonstrate a consistent view among informants that implementing these two concepts improves the quality of oversight, strengthens internal control systems, enhances reporting quality, and drives the more effective achievement of organizational performance indicators. Thus, the interplay between SPIP, good governance, and accountability is not merely conceptual but is reflected in the actual oversight practices at the Sukabumi Regency Inspectorate.

In addition to illustrating implementation, the hierarchy chart identifies various strategies that support the effective application of SPIP and good governance. Key strategies include the use of digital applications, the conduct of training and outreach programs, enhanced inter-agency cooperation, and efforts to improve oversight effectiveness. The prevalence of application usage indicates that digital transformation has become a crucial instrument for strengthening internal control systems through platforms such as Simwas, Sipedas, MyASN, E-Kinerja, and other information systems. Meanwhile, training and outreach activities reflect efforts to enhance human resource competencies, ensuring that the implementation of SPIP and good governance principles proceeds more optimally. The implementation of this supervisory program innovation is corroborated by Informant 4, who stated:

"Our Inspectorate has moved away from manual methods; we are essentially how should I put it driven to use applications for our oversight activities. Specifically, we utilize a program known as PIJJ Remote Internal Oversight which relies on software applications. This approach stems from the Inspector's enthusiasm for developing applications, and we now have several apps that support our supervisory functions. First, there is Simwas an internal oversight information system which covers everything from the planning stage through to follow-up actions. Then there is Sipeka if I recall correctly, that stands for a performance management system. There is also Sipedas, a system for managing village finances. And finally, there is E-MR, an application dedicated to risk management."

On the other hand, the hierarchy chart also reveals the existence of recurring findings throughout the research process. Themes such as regulatory compliance, coordination, administration, and resource limitations consistently emerged across various informants. The

recurrence of these themes indicates a high level of consistency in the informants' perceptions regarding the factors influencing the effectiveness of SPIP implementation and good governance. This consistency reinforces the credibility of the research findings, as they were derived through the triangulation of various data sources. Informant 2 described these recurring issues as follows:

"I have been conducting evaluations, reviews, and oversight for three years now, and there are always recurring findings. For instance, agencies carry out activities without the necessary terms of reference or Standard Operating Procedures (SOPs). That is the most common issue."

Another prominent theme is the role of the Inspectorate, which reflects a paradigm shift for the Government Internal Supervisory Apparatus (APIP) from a traditional oversight function to that of a strategic organizational partner. This role is manifested through guidance, monitoring, and consulting activities provided to regional government agencies. These findings demonstrate that the Inspectorate does not merely perform an assurance function but also acts as a consultant, assisting agencies in enhancing the quality of governance and internal control.

Nevertheless, the hierarchy chart also highlights obstacles in the implementation of SPIP and good governance. The most dominant challenges include human resource limitations, suboptimal implementation in certain areas, and persistent weaknesses in activity reporting and documentation. The challenges posed by geographical scope and human resource constraints were detailed by Informant 4, who stated:

"First of all, Sukabumi Regency is currently the largest regency in West Java and Madura. That is one point. Then, looking at the geography and the number of entities the volume of audit subjects it is quite substantial. We have 381 villages, 5 urban villages, 47 districts, and 35 regional government agencies. There are also 58 Community Health Centers. So, there are so many entities, yet our available human resources specifically auditors and P2 staff number only 45 people. That is one of the obstacles, our staffing requirement is 118, but currently, only 45 positions are filled."

Additionally, Informant 3 confirmed the existence of weaknesses regarding internal administrative documentation:

"Sometimes for instance, with internal meetings where we always conduct evaluations, such as performance reviews the process simply isn't documented. This is particularly relevant to SPIP, where evaluations must be recorded. If we conduct performance evaluations but fail to document them, there is how should I put it no evidence, even though the activity actually took place. That is really the only issue: the documentation aspect or rather, the lack thereof."

These findings indicate that the primary challenge in implementing SPIP and good governance lies not in the regulatory framework, but in organizational capacity to execute policies consistently and sustainably.

Overall, the hierarchy chart illustrates that accountability is the central theme linking the application of good governance with SPIP. Good governance is realized through the strengthening of principles such as accountability, transparency, and sound planning, while SPIP is implemented through oversight, control activities, risk management, and information systems that support internal control processes. The synergy between these two concepts has proven to contribute to enhancing the performance accountability of the Sukabumi Regency Inspectorate. Nevertheless, the effectiveness of their implementation still requires strengthening human resource capacity, optimizing the use of information technology, and refining documentation systems to ensure that the goal of accountable, good-governance-oriented administration can be achieved sustainably.

**Table 2. Matrix Coding Query Results**

| ***Good Governance*** | **SPIP** | | | | |
|---|---|---|---|---|---|
| | **Information and Communication** | **Control Activities** | **Control Environment** | **Monitoring** | **Control Risk** |
| Transparency | 1 | 1 | 0 | 1 | 0 |
| Accountability | 0 | 0 | 1 | 8 | 0 |
| Responsibility | 0 | 0 | 0 | 0 | 0 |

*Source*: researcher (2026)

A Matrix Coding Query is used to analyze the interrelationships between research themes based on coding results. This visualization illustrates the strength of the interplay between good governance principles and the elements of the Government Internal Control System (SPIP), thereby identifying which dimensions share the strongest link in supporting enhanced performance accountability.

The Matrix Coding Query results reveal that the interplay between good governance principles and the elements of the Government Internal Control System (SPIP) is not evenly distributed across all dimensions. Across the entire dataset, the most dominant relationship was found between the principle of accountability and the SPIP element of oversight, with a co-occurrence frequency of eight instances. This finding indicates that accountability is the good governance principle most strongly implemented through SPIP oversight mechanisms.

Oversight within SPIP is realized through audits, reviews, evaluations, monitoring, tiered supervision, follow-up on examination results, and periodic performance evaluations. These mechanisms serve as primary instruments for ensuring that the execution of all duties is accountable and aligns with audit standards, Standard Operating Procedures (SOPs), and statutory regulations. Regarding the quality process of this tiered oversight reporting, Informant 4 added:

"Regarding this tiered oversight for instance, when conducting oversight, the report doesn't go straight from the staff member to the top instead, the staff member is supervised by the team leader, who is in turn supervised by the technical controller. The results of the technical controller's oversight are then supervised by the Regional Inspectorate Division Head, eventually reaching the final stage with the Inspector. That is the nature of tiered oversight."

Every auditor is also required to account for their performance based on official professional standards. Informant 1 highlighted this connection:

"In terms of accountability, our work as auditors is based on SAIPI (Government Internal Auditor Standards). There are clearly defined audit standards. Our accountability is evident because we work according to established standards. If we were to work outside those standards, it would amount to malpractice. So, in my view, our governance is actually quite good."

Thus, the stronger the oversight function, the higher the organization's level of accountability. Conversely, the relationship between the transparency principle and the elements of the Government Internal Control System (SPIP) is relatively weaker. Transparency shows only a single link to each of the following elements information and communication, control activities, and oversight while no connection was found with the control environment or risk assessment. These findings indicate that transparency practices at the Sukabumi Regency Inspectorate are primarily manifested through the use of information systems, report submission, evaluation meetings, and oversight mechanisms, rather than through the establishment of an organizational culture or risk management processes. This situation is

understandable given that some audit findings are restricted under regulations regarding the confidentiality of Audit Result Reports (LHP), resulting in the selective application of transparency. Meanwhile, the principle of responsibility showed no direct link to any SPIP elements during the coding process. A zero value across all cells does not imply that responsibility is absent from the organization; rather, it indicates that during coding, informants tended to associate the concept of responsibility with accountability rather than treating it as a distinct theme. In other words, the aspect of responsibility has been internalized within accountability practices through adherence to Standard Operating Procedures (SOPs), audit standards, and the obligation to account for oversight outcomes.

Conceptually, the matrix results indicate that SPIP implementation at the Sukabumi Regency Inspectorate is oriented more toward strengthening accountability than transparency. This aligns with the primary objectives of SPIP as stipulated in Government Regulation Number 60 of 2008, providing reasonable assurance regarding effectiveness, efficiency, reliable reporting, the safeguarding of state assets, and compliance with laws and regulations. Ultimately, all these objectives converge on enhancing accountability in government administration.

On the other hand, the limited connection between transparency and certain SPIP elements suggests that the implementation of good governance has not yet been fully and evenly integrated across all components of the SPIP framework. Transparency is still primarily realized through internal communication and reporting channels, whereas integration with the control environment and risk management does not yet appear prominent in the coding results. This presents an opportunity to strengthen a more open organizational culture and develop a more participatory risk management system. Based on the results of data coding and project map visualization, this study arrived at the following formulation

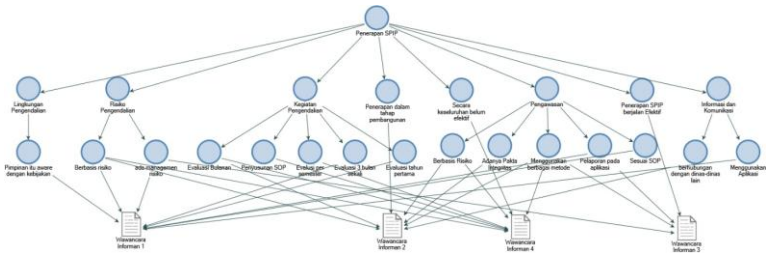



**Figure 5. Coding results for the SPIP implementation mapping project.**
*Source*: researcher (2026)

A Project Map is used to visualize the relationships between concepts, themes, and research data sources. This visualization provides a comprehensive overview of the interconnections among SPIP implementation, the application of good governance, supporting factors, obstacles, and improvements in performance accountability, thereby facilitating a comprehensive interpretation of the research findings.

Coding results indicate that the application of the Government Internal Control System (SPIP) at the Sukabumi Regency Inspectorate has generally been effective, despite facing certain implementation challenges. This effectiveness is reflected in the execution of all SPIP components namely the control environment, risk assessment, control activities, information and communication, and monitoring which have been integrated into the oversight process.

Regarding the control environment, leadership demonstrates a strong commitment to SPIP implementation through the establishment of organizational policies, the annual signing of integrity pacts, and the cultivation of a control culture that emphasizes integrity and professionalism. These conditions demonstrate that the "tone at the top" has served as the primary foundation for SPIP implementation. In terms of risk assessment, the Inspectorate has implemented a risk management approach aligned with the integrated SPIP concept. However,

interview results reveal ongoing challenges, specifically a lack of understanding among some regional government agencies regarding the compilation of risk registers, which has hindered the risk identification process from functioning optimally. These findings indicate that SPIP effectiveness is influenced not only by the Inspectorate's internal readiness but also by the organizational capacity of the entities subject to oversight. The fact that risk management understanding remains suboptimal at the agency level was confirmed by Informant 1, who stated:

"You see, the SPIP framework includes a risk assessment component. Sometimes, when we conduct audits at the agencies, we find they don't yet have a risk register. Every Regional Apparatus Organization (OPD) is required to have risk management documentation, yet they lack awareness and a true understanding of risk. Why is that? Well, people are often afraid to identify risks themselves you know how it is. Take corruption risk, for instance; they'll immediately say, 'But Sir, we aren't involved in corruption.' But that's not the point. The point is that the risk of corruption exists, so you need to implement mitigation measures to prevent it from happening. That is precisely what we are trying to do now raising awareness among the agencies. So, that's where the main challenge lies; dealing with risk issues is usually the hurdle we face during audits."

The control activities aspect demonstrates a relatively high level of implementation. All oversight processes have been conducted in accordance with the Indonesian Government Internal Audit Standards (SAIPI), Standard Operating Procedures (SOP), and the Annual Oversight Work Program (PKPT), alongside tiered supervision, periodic evaluations, monitoring, audits, reviews, and performance assessments. These mechanisms indicate that control activities have been carried out systematically to minimize the risk of irregularities. Regarding information and communication, the use of various digital applications such as Simwas, Sipedas, MyASN, E-Kinerja, and other supporting tools reflects a digital transformation that facilitates the implementation of the Government Internal Control System (SPIP). This digitalization accelerates information dissemination, enhances coordination between work units, and simplifies the documentation of oversight results. Meanwhile, monitoring activities are conducted through periodic evaluations monthly, semiannually, and annually via the Government Agency Performance Accountability System (SAKIP) mechanism and internal evaluations by leadership. However, analysis also revealed that some evaluation activities were not optimally documented, representing a weakness in substantiating the implementation of controls.

The effectiveness of SPIP implementation is further supported by Performance Accountability Report (LKj) data, which shows an SPIP Maturity Level achievement of 100% in 2023 and 2024, in 2025, the realization reached 89.97% (categorized as "high"), while the Government Internal Supervisory Apparatus (APIP) capability remained at Level 3 with 100% achievement. These data indicate that, at an institutional level, the implementation of SPIP has resulted in an effective internal control system, although further strengthening is still required in the areas of risk management, documentation, and human resource adequacy.

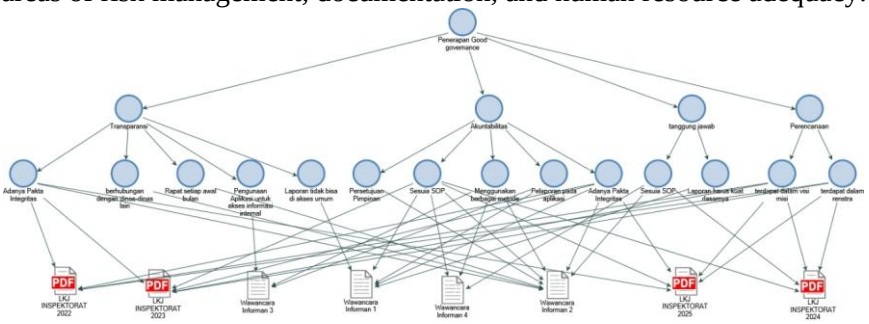



**Figure 6. Coding results for the project mapping the implementation of good governance.**

*Source*: researcher (2026)

Coding analysis results indicate that good governance principles have been applicated in the management of the Sukabumi Regency Inspectorate through the application of accountability, transparency, professionalism, regulatory compliance, and responsibility in carrying out supervisory duties.

The principle of accountability is realized through the drafting of performance agreements, the measurement of Key Performance Indicators (KPIs), the application of Standard Operating Procedures (SOPs) and SAIPI across all audit processes, the use of E-Kinerja and MyASN applications for performance reporting, and the conduct of periodic performance evaluations. Furthermore, all supervisory activities are carried out based on leadership approval and supported by adequate audit evidence, ensuring that every examination result is justifiable both administratively and professionally. The principle of transparency is applied through the use of internal information systems such as Simwas that allow all auditors to access supervisory documents, the publication of planning documents and performance reports, and the holding of routine monthly evaluation meetings. However, public transparency remains constrained by statutory regulations, particularly regarding the confidentiality of Audit Result Reports (LHP). Thus, transparency is applied proportionately in accordance with the principles of public information disclosure. The principle of professionalism is evident in the execution of audits based on professional standards, the use of various supervisory methods such as audits, reviews, evaluations, monitoring, and specific-purpose examinations and a tiered supervision structure involving auditors, team leaders, technical controllers, Assistant Inspectors, and the Inspector. This system ensures the quality of supervisory outcomes is maintained.

Additionally, good governance is reflected in strategic planning documents that consistently establish the vision of "Realizing an Accountable and Service-Oriented Government System" and a mission to enhance public services through innovation, professionalism, and accountability. This demonstrates that good governance principles have become an integral part of the organization's policy direction, rather than merely an administrative practice. Nevertheless, the implementation of good governance still faces several challenges, including a limited number of auditors relative to the scope of the supervisory area and the volume of audit subjects, highly dynamic regulatory changes, and suboptimal documentation of evaluation results. These constraints could potentially undermine the effectiveness of implementing good governance principles if not accompanied by a strengthening of institutional capacity. Regarding the challenge posed by the dynamic nature of regulatory changes, Informant 4 explained:

“Furthermore, there is the issue of regulatory changes which are currently constant so naturally, we have to adapt to these shifts; the situation is very dynamic. Consequently, our human resources are required to be adaptive or agile, so to speak and that is essentially the situation.”

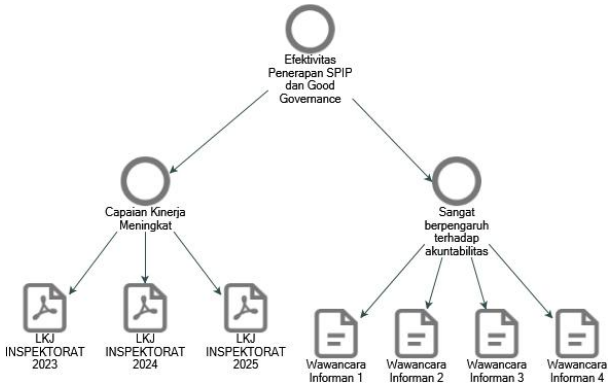



**Figure 7. Coding results for the project mapping the implementation of SPIP and good governance.**

*Source*: researcher (2026)

Based on the coding results, it was found that the implementation of SPIP and good governance are closely linked in enhancing the performance accountability of the Sukabumi Regency Inspectorate. All informants consistently stated that these two concepts significantly influence the quality of governance, the effectiveness of oversight, and the achievement of organizational performance. The alignment of the fundamental indicators of these two concepts was described by Informant 2, who stated:

"It certainly has a major impact; as mentioned earlier, if the fundamental principles of SPIP are implemented correctly, it will inevitably affect performance accountability, because the assessment indicators for performance accountability largely overlap with the fundamental principles of both good governance and SPIP."

The application of SPIP provides a systematic control framework comprising an integrated control environment, risk management, control activities, information and communication, and monitoring. Meanwhile, the application of good governance principles ensures that these control processes are carried out based on accountability, transparency, professionalism, integrity, and regulatory compliance. The synergy between these two systems results in organizational governance that is more structured, documented, auditable, and accountable. Documentary data indicates that the improvement in performance accountability is reflected in the achievements of the SPIP Maturity Level and APIP (Government Internal Auditor Apparatus) Capability indicators, which serve as the Inspectorate's Key Performance Indicators (KPIs). During the 2022–2025 period, the achievements for both indicators fell within the high to very high categories, enabling the consistent attainment of the strategic goal: "Increased Performance Accountability of Regional Government Agencies." This demonstrates that the implementation of SPIP and good governance serves not merely as an administrative compliance mechanism but also as a strategic instrument for enhancing the quality of organizational accountability.

However, the study also found that the improvement in accountability has not yet reached its full potential. Several inhibiting factors remain, including limited human resources (auditors), suboptimal risk management implementation across regional agencies, incomplete evaluation documentation, and the geographical complexity of the Sukabumi Regency oversight area. These factors indicate that the effectiveness of SPIP and good governance still requires the strengthening of organizational capacity to achieve more sustainable performance accountability.

Overall, the research results indicate that the implementation of SPIP and good governance are mutually reinforcing. SPIP provides a systematic internal control mechanism, while good governance establishes a normative foundation comprising accountability, transparency, professionalism, and integrity. The synergy between these two aspects has been shown to enhance organizational governance quality and strengthen the performance accountability of the Sukabumi Regency Inspectorate, although its effectiveness remains influenced by factors such as human resource capacity, the quality of risk management implementation, and the consistency of control documentation. Thus, it can be concluded that the more effective the application of SPIP and the more optimal the implementation of good governance principles, the higher the level of performance accountability the Sukabumi Regency Inspectorate can achieve.

## 5. Discussion

Based on the NVivo 14 analysis, this study demonstrates that the implementation of the Government Internal Control System (SPIP) and good governance at the Sukabumi Regency Inspectorate positively influences the enhancement of performance accountability. This conclusion was reached by synthesizing all analysis results, ranging from word clouds and hierarchy charts to matrix coding queries and project maps. Word cloud visualizations reveal the dominance of terms such as performance, oversight, SPIP, accountability, and Inspectorate, indicating that the

organization's primary activity focuses on executing oversight functions to improve accountability. These results are reinforced by a tree map showing that the themes of oversight, control, and accountability account for the largest proportions, thereby demonstrating that SPIP has become a key mechanism supporting organizational governance.

These findings are further underscored by a hierarchy chart showing that the application of good governance and SPIP are the two most dominant themes across the entire research dataset. Regarding good governance, the principles of accountability, transparency, and planning were the themes most frequently discussed by informants. Meanwhile, regarding SPIP, elements such as oversight, control activities, risk management, information and communication, and monitoring have been systematically implemented through risk-based audits, the use of SOPs and SAIPI, monitoring, periodic evaluations, and the utilization of information technologies such as Simwas, Sipedas, and E-Kinerja. This implementation demonstrates that SPIP functions not merely as an internal control tool but also as an instrument to strengthen good governance principles within the conduct of oversight.

The positive relationship between SPIP, good governance, and performance accountability is clearly evident in the matrix coding query results. The analysis reveals that the strongest relationship exists between the principle of accountability and the SPIP oversight element, showing the highest frequency of association compared to other inter-theme relationships. These findings indicate that the more effective the oversight function executed through SPIP, the higher the level of organizational performance accountability. In other words, the enhancement of accountability is driven not only by the existence of an internal control system but also by the application of good governance specifically accountability and transparency within every oversight process.

Furthermore, the project map demonstrates that all elements of the Government Internal Control System (SPIP) have been implemented and integrated with the principles of good governance. Leadership commitment, the application of risk-based oversight, the utilization of information technology, the conduct of periodic evaluations, and the enhancement of Government Internal Supervisory Apparatus (APIP) capabilities have proven to support improved oversight quality and the achievement of performance indicators. Documentation from the 2022–2025 Performance Accountability Reports (LKj) also indicates that SPIP maturity falls within the high category and APIP capability has reached Level 3, this signifies that the internal control system is functioning effectively and contributing tangibly to enhanced performance accountability. However, the study also identified several challenges, including human resource limitations, suboptimal risk management understanding among regional government agencies, recurring audit findings, and less-than-optimal activity documentation. These challenges do not indicate a failure in SPIP or good governance implementation; rather, they represent factors requiring improvement to ensure the continuous enhancement of effectiveness.

These findings align with the research of Nasir & Gunawan (2019), which concluded that the application of SPIP and good governance has a significant positive impact on Government Agency Performance Accountability (AKIP). Similarly, research by Mufidah et al. (2023) demonstrated that SPIP aplicartion enhances oversight effectiveness, despite challenges in certain control elements. These findings also reinforce the research of Putri & Setyaningrum (2024), which explained that enhancing APIP capabilities through the strengthening of governance, risk, and control (GRC) improves the quality of oversight and accountability within public sector organizations.

Overall, the research findings indicate that the implementation of SPIP and good governance at the Sukabumi Regency Inspectorate has a positive effect on enhancing performance accountability. This positive impact is reflected in improved oversight quality, the implementation of more systematic internal controls, the utilization of information technology, adherence to standards and regulations, and enhanced organizational performance outcomes. Thus, SPIP and good governance serve not merely as administrative instruments but as a fundamental basis for

achieving effective, transparent, and accountable government governance. Nevertheless, strengthening human resources, fostering a risk management culture, and improving documentation quality remain essential to ensure that the implementation of these concepts yields optimal and sustainable benefits.

## 6. Conclusion

SPIP and good governance practices at the Sukabumi Regency Inspectorate operate effectively in establishing tiered supervisory structures, achieving Level 3 APIP capabilitis, and maintaining formal Key Performance Indicators. Nonetheless, their substantive contribution to performance accountability remain uneven. Matrix coding reveals an over reliance on compliance audits to enforce accountability, while the integration of public tranparency, preventative control environments, and agency level risk assessment remains underdeveloped.

From a practical perspective, these findings provide critical insights for regional governance. First, local authorities must strengthen risk management capabilities by providing structured technical guidance to regional apparatus organizations (OPDs), thereby fostering independent risk registers and eliminating institutional apprehension toward risk self disclosure. Second, inspectorates must optimize digital platforms (such as Simwas and E-MR) to establish integrated documentation and verifiable audit trails for all informal evaluations, periodic reviews, and corrective follow ups. Third, to mitigate the severe workforce deficit where 45 existing functional auditors oversee hundreds of administrative entities across vast geographic areas the regional government needs to realign staffing allocations and expand Remote Internal Oversight (PIJJ) mechanisms.

This research has limitations that warrant consideration. As a single qualitative case study focused primarily on four key internal informants and official performance documentation (LKj) within the Sukabumi Regency Inspectorate, the empirical insights capture an internal supervisory perspective rather than the frontline operational experiences of external auditees (OPDs). Consequently, future research should employ multi site comparative qualitative studies or mixed method designs to incorporate auditee feedback and assess cross-jurisdictional accountability dynamics across diverse local governments.

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# ETHICAL BOUNDARIES OF ARTIFICIAL INTELLIGENCE USE IN THE ACCOUNTING PROFESSION: AN INTEGRATIVE REVIEW

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***Abstract***
*Artificial intelligence (AI) is increasingly transforming accounting practice by extending automation beyond routine processing toward analytical, predictive, and knowledge-intensive activities. While these developments offer significant efficiency and decision-support benefits, they also raise important ethical and professional concerns related to reliability, transparency, bias, confidentiality, professional judgment, and accountability. This study conducts an integrative review of recent literature to examine how AI is currently applied within the accounting profession, identify the ethical and professional issues arising from its use, and determine the boundaries and safeguards required for responsible AI integration. Using a source-based Scopus search, 169 publication sources were identified and screened, resulting in 41 potentially relevant studies and 12 studies included in the final review. A bottom-up thematic synthesis identified five higher-order themes: task-dependent allocation of human and AI roles; reliability, verifiability, and traceability of AI-generated outputs; non-delegable professional judgment and accountability; data governance, confidentiality, fairness, and transparency; and preservation of professional competence and skepticism. The findings indicate that AI is more suitable for structured, repetitive, and independently verifiable tasks, while greater human involvement is required as tasks become more judgment-intensive and consequential. Based on these findings, the study proposes a three-zone ethical boundary consisting of delegable AI-supported tasks, controlled AI augmentation, and non-delegable professional responsibility. The study concludes that responsible AI use in accounting should be understood as accountable augmentation rather than unrestricted substitution, with the degree of AI autonomy decreasing as the need for professional judgment, contextual interpretation, verification, and accountability increases.*
***Keywords***: *Artificial intelligence, Accounting profession, Professional ethics, Human-AI collaboration, Ethical boundaries.*

## 1. Introduction

Accounting practice has continuously evolved in response to technological and organizational change. The increasing use of digital technologies has shifted many accounting activities from predominantly manual and transaction-oriented processes toward more automated, data-driven, and analytical forms of work (Londoño-Cardozo, 2025). Digital transformation has also altered the composition of the accounting workforce, with technological change exerting stronger substitution effects on routine and entry-level work while increasing demand for technically skilled and highly educated employees (Chen et al., 2024). More recently, developments in artificial intelligence (AI) have accelerated this transformation by extending the use of technology beyond routine processing toward prediction, analysis, and decision support. Within accounting practice, technologies such as robotic process automation (RPA), machine learning (ML), and generative artificial intelligence (GenAI) are increasingly being applied to different types of accounting and auditing activities (Abbas et al., 2026).

AI applications can support accountants in performing routine and data-intensive activities as well as more knowledge-intensive tasks. RPA is used for activities such as document management, reconciliations, transaction processing, and compliance-related procedures, while analytical AI can support anomaly detection, risk assessment, forecasting, and financial analysis (Abbas et al., 2026). GenAI and large language models (LLMs) further extend these capabilities by supporting textual analysis, accounting-standard interpretation, document summarization, and the preparation of accounting-related outputs (Leitner-Hanetseder et al., 2026; van Zijl et al., 2026). These applications may improve efficiency and allow accountants to allocate more attention to analytical and judgment-intensive activities.

However, the increasing involvement of AI in accounting activities also creates important professional and ethical concerns. Empirical evidence shows that AI-generated accounting outputs may be inconsistent, contain false positives, or incorrectly apply accounting standards, meaning that apparently convincing outputs cannot automatically be regarded as reliable (Leitner-Hanetseder et al., 2026; van Zijl et al., 2026). AI adoption may also introduce concerns relating to algorithmic bias, objectivity, privacy, data confidentiality, transparency, accountability, trustworthiness, and excessive reliance on automated recommendations (Lehner et al., 2022; Alruwaili & Mgammal, 2025; Abbas, 2026). Such risks are particularly important in accounting because professional practice requires not only technical accuracy but also professional judgment, skepticism, accountability, and ethical responsibility.

The issue becomes more critical when AI is used to influence professional judgments and decisions. Sugahara and Kano (2026) show that GenAI-generated advice can influence ethical judgments in accounting contexts and that the opacity of AI-assisted judgment may create concerns regarding reliability and accountability. Similarly, Jaworska (2025) argues that AI systems cannot assume legal or moral responsibility for accounting decisions and therefore should not replace professional judgment in binding decisions. These findings suggest that the central issue is not simply whether accountants should use AI, but rather how far AI should be allowed to participate in accounting tasks without displacing human professional responsibility.

Although recent studies have examined AI adoption, performance, professional judgment, data governance, privacy, bias, and human oversight in accounting, these issues are often examined separately across different technologies and accounting activities. For example, Abbas (2026) identifies continuing research needs concerning explainability, privacy, confidentiality, bias, accountability, and human–AI collaboration, while Leitner-Hanetseder et al. (2026) specifically call for clearer frameworks to determine which accounting tasks can be reliably delegated to AI and how AI-generated outputs should be verified. This fragmentation leaves limited synthesis regarding where the ethical boundary should be drawn between acceptable AI assistance and inappropriate delegation of professional responsibility in accounting practice.

Accordingly, this study conducts an integrative review of recent literature to examine the use of AI within the accounting profession and to synthesize its associated ethical and professional implications. Specifically, the study examines how AI is applied across accounting activities, identifies the ethical and professional issues arising from its use, and determines the safeguards required for responsible AI adoption. Through the integration of these findings, the study develops a conceptual understanding of the ethical boundaries of AI use in accounting practice, particularly regarding the allocation of tasks between humans and AI, the verification of AI-generated outputs, professional judgment, and accountability.

## 2. Literature Review

Artificial intelligence (AI) refers to a system's ability to correctly interpret external data, learn from such data, and use those learnings to achieve specific goals and tasks through flexible adaptation (Kaplan & Haenlein, 2019). AI can utilize external information obtained from sources such as the Internet of Things (IoT) and big data to identify underlying rules and patterns through machine learning (ML), which broadly refers to methods that enable computers to learn without being explicitly programmed (Kaplan & Haenlein, 2019). By overcoming some of the computationally intensive, intellectual, and even creative limitations of humans, AI has opened new application domains across manufacturing, healthcare, finance, education, and marketing, with significant implications for productivity and performance (Dwivedi et al., 2021).

The development of AI has given rise to a range of technologies with different capabilities. Machine learning (ML) enables systems to learn patterns from problem-specific training data and automate analytical model building, while deep learning (DL) extends this capability through artificial neural networks with increasingly complex architectures (Janiesch et al., 2021). Natural

language processing (NLP), meanwhile, enables computers to process and analyze human language (Russell & Norvig, 2016). More recently, generative artificial intelligence (GenAI) has extended these capabilities by enabling systems to generate new content, including text, images, audio, and other forms of digital content based on patterns and structures learned from data (Feuerriegel et al., 2024). These developments have enabled AI applications ranging from prediction and anomaly detection to document analysis, computer vision, and large language models (LLMs) capable of generating, summarizing, and analyzing textual information (Feuerriegel et al., 2024).

Within the accounting profession, these technologies are increasingly being applied to both routine and knowledge-intensive activities. Machine learning, for example, can be used to analyze large volumes of financial data, identify patterns and anomalies, assess risks, and support transaction testing, while robotic process automation (RPA), which can be integrated with AI capabilities, facilitates the automation of repetitive and rule-based accounting processes (Abbas et al., 2026). More recently, GenAI and LLMs have expanded the technological capabilities available to accounting professionals by supporting activities involving the generation, summarization, and analysis of textual information (Abbas et al., 2026). Collectively, these developments suggest that the role of technology in accounting is shifting beyond the automation of routine processes to support increasingly analytical and knowledge-intensive tasks.

### *2.1 Professional Accounting Ethics and AI*

Professional accounting practice is grounded in ethical responsibilities that extend beyond technical competence. The International Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants (IESBA) establishes five fundamental principles: integrity, objectivity, professional competence and due care, confidentiality, and professional behavior. These principles require professional accountants to act honestly, exercise judgment without inappropriate bias or influence, maintain sufficient professional knowledge and skill, protect confidential information, and comply with relevant laws and regulations while avoiding conduct that may discredit the profession (IESBA, 2024). The Code also provides a conceptual framework requiring professional accountants to identify, evaluate, and address threats to compliance with these fundamental principles.

The increasing use of artificial intelligence introduces new circumstances in which these ethical principles must be applied. AI-assisted accounting may influence the information used in professional judgments, the way accounting tasks are performed, and the extent to which professionals rely on technological outputs. Consequently, ethical considerations arise not only from the final outcome produced with AI but also from the processes through which data are obtained, AI-generated information is evaluated, professional judgments are formed, and responsibility for decisions is retained. These concerns are consistent with earlier research in auditing, which identified privacy, confidentiality, fairness, transparency, accountability, professional skepticism, and professional competence as ethical considerations arising from AI-assisted professional work (Munoko et al., 2020). Similarly, Lehner et al. (2022) identified objectivity, privacy, transparency, accountability, and trustworthiness as central ethical challenges associated with AI-based decision-making in accounting and auditing. This is particularly relevant because the 2024 edition of the IESBA Code incorporates technology-related provisions applicable to professional accountants, reflecting the increasing importance of technological competence and ethical judgment in technology-enabled professional activities (IESBA, 2024).

In this study, the IESBA fundamental principles are used as a normative foundation rather than predetermined analytical categories. Ethical issues are first identified inductively from the reviewed studies through bottom-up coding and thematic synthesis. The resulting themes are subsequently examined in relation to the fundamental principles of professional accounting ethics to assess how AI-related risks and safeguards interact with accountants' existing ethical responsibilities. This approach allows the ethical boundaries of AI use to emerge from contemporary accounting literature while remaining anchored in established professional

ethical standards.

## 3. Research Methods

### *3.1 Scoping and Problem Identification*

Following the guidance for conducting integrative reviews proposed by Cronin and George (2023) and Whittemore and Knafl (2005), the review began with the identification of the research problem and the establishment of the scope of inquiry. A preliminary examination of the literature was conducted to develop an initial understanding of the growing application of artificial intelligence (AI) within the accounting profession and to identify issues requiring further synthesis. The initial scoping indicated that AI is increasingly being applied across various accounting activities while simultaneously raising ethical concerns related to professional judgment, accountability, transparency, data confidentiality, bias, and professional responsibility. Based on these observations, the review focused on examining the ethical implications associated with the use of AI in the accounting profession and identifying the boundaries necessary to ensure that its use remains consistent with professional and ethical responsibilities. This problem formulation informed the development of the following research questions:

RQ1. How is AI currently applied across different activities within the accounting profession?
RQ2. What ethical and professional issues arise from the use of AI in accounting practice?
RQ3. What ethical boundaries and safeguards can guide the responsible use of AI in the accounting profession?

These research questions subsequently guided the literature search, study selection, data extraction, and synthesis processes.

## 4. *Literature Search.*

To identify recent literature on the use of artificial intelligence (AI) in the accounting profession, a source-based search was conducted using Scopus. The search began by identifying publication sources associated with the subject areas of Artificial Intelligence and Accounting. This procedure resulted in 169 potentially relevant sources. These sources were subsequently examined individually to identify studies addressing the application of AI within accounting contexts.

The titles and abstracts of studies identified within these sources were screened for relevance to the scope of the review, particularly their focus on AI applications in accounting practice. This screening process resulted in 41 potentially relevant studies for further assessment.

The review was limited to studies published between 2025 and 2026 to capture recent developments in AI applications within the accounting profession. This period was selected to focus the review on contemporary evidence reflecting the rapid advancement and increasing integration of AI technologies into accounting practice. The year 2026 represents the year in which the literature search was conducted. Studies identified through these procedures were subsequently assessed according to the predefined eligibility criteria presented in Table 2.

**Table 1. Scopus Search Strategy**

| Search Dimension | Selection |
|---|---|
| **Database** | Scopus |
| **Search approach** | Source-based search |
| **Subject Areas** | Artificial Intelligence; Accounting |
| **Publication Period** | 2025-2026 |
| **Initial Sources Identified** | 169 sources |

Source: Authors' own elaboration (2026).

### *4.1 Study Selection and Evaluation*.

The initial source-based search in Scopus identified 169 publication sources associated with Artificial Intelligence and Accounting. These sources were examined individually to identify potentially relevant studies. The titles and abstracts of the identified studies were screened according to their relevance to AI applications in accounting, resulting in 41 studies for further assessment.

The full texts of these 41 studies were subsequently examined to determine their relevance to the objectives and research questions of the review and their compliance with the predefined eligibility criteria. Following the full-text assessment, 12 studies met the eligibility criteria and were included in the final review.

### *4.2 Data Extraction and Analysis.*

To address the research questions, data were extracted from the 12 studies included in the final review. Following the principles of integrative review methodology, the extraction and analysis process aimed to synthesize findings across studies and develop higher-order themes from the existing literature (Cronin & George, 2023; Whittemore & Knafl, 2005).

The analysis initially followed a bottom-up approach, in which relevant information was extracted from each study without imposing predetermined thematic categories. Data extraction focused on the types and applications of AI in accounting practice, the accounting activities or tasks affected by AI, the benefits and risks associated with its use, ethical issues identified or discussed by the authors, and recommendations or safeguards proposed to address these concerns.

The extracted information was subsequently coded, and conceptually similar codes were compared and grouped into broader categories. Through an iterative process of comparison and refinement across the 12 studies, recurring patterns were identified and synthesized into higher-order themes representing the major ethical issues associated with AI use in the accounting profession. These themes were then examined in relation to established principles of professional accounting ethics to develop a conceptual understanding of the ethical boundaries of AI use in accounting practice. The resulting thematic structure provided the basis for organizing and interpreting the findings presented in the subsequent sections.

**Table 2**
**Eligibility Criteria for Study Selection**

| Criteria | Criteria Details |
|---|---|
| **IC 1** | The study should be a peer-reviewed publication in a journal or conference proceeding. |
| **IC 2** | The study should be published in English. |
| **IC 3** | The study should be published between 2025 and 2026. |
| **IC 4** | The study should examine the use or application of AI within an accounting context. |
| **IC 5** | The study should provide evidence or discussion relevant to the ethical, professional, risk, governance, accountability, or responsible-use implications of AI in accounting. |

Source: Authors' own elaboration (2026).

## 5. Research Findings and Discussion

### *5.1 Thematic Synthesis of the Reviewed Studies*

The analysis of the 12 included studies revealed that the ethical implications of artificial intelligence in accounting cannot be understood solely in terms of whether AI is used or not. Rather, the findings indicate that the ethical significance of AI use depends on the nature of the accounting task, the reliability and traceability of AI-generated outputs, the degree of human involvement, the governance of data and technological systems, and the extent to which professional responsibility remains with the accountant. Through bottom-up coding and iterative comparison, five higher-order themes emerged: (1) task-dependent allocation of human and AI roles, (2) reliability, verifiability, and traceability of AI-generated outputs, (3)

non-delegable professional judgment and accountability, (4) data governance, confidentiality, fairness, and transparency, and (5) preservation of professional competence and skepticism.

**Table 3**
**Higher-Order Themes and Central Ethical Issues in AI Use within the Accounting Profession**

| Higher-order theme | Central Issue | Primary relevance |
|---|---|---|
| Task-dependent allocation of human and AI roles | Different accounting tasks permit different levels of AI involvement | RQ1, RQ3 |
| Reliability, verifiability, and traceability | AI outputs cannot be assumed to be accurate merely because they are plausible | RQ2, RQ3 |
| Non-delegable professional judgment and accountability | AI may assist decisions, but responsibility remains with human professionals | RQ2, RQ3 |
| Data governance, confidentiality, fairness, and transparency | Responsible AI use depends on the quality, security, transparency, and fairness of data and systems | RQ2, RQ3 |
| Preservation of professional competence and skepticism | Excessive reliance may weaken the skills required to evaluate AI itself | RQ2, RQ3 |

Source: Authors' own elaboration (2026).

### *5.2 RQ1: How Is AI Currently Applied Across Different Activities Within the Accounting Profession?*

The reviewed studies demonstrate that AI applications in accounting extend across a continuum from routine automation to analytical support and increasingly to knowledge-intensive activities. RPA is commonly applied to structured and repetitive processes, including invoice processing, reconciliations, audit documentation, transaction processing, sampling procedures, bookkeeping, and compliance-related activities. Analytical AI and machine learning extend these applications to transaction scoring, anomaly detection, risk assessment, full-population testing, financial forecasting, scenario analysis, and decision support. GenAI and LLMs further expand AI involvement into contract summarization, working-paper drafting, retrieval of methodological guidance, document analysis, and other text-intensive accounting activities (Abbas et al., 2026).

A similar development is evident within Accounting Information Systems. Attia et al. (2026) describe the integration of ML, RPA, and NLP into AIS to automate routine processes, improve classification, support financial reporting, detect anomalous transactions, forecast risks, and provide real-time information for managerial decision-making. This indicates that AI-enabled AIS is evolving from a transaction-processing function toward an analytical and decision-support function.

Evidence from actual accounting workflows further indicates that GenAI is currently concentrated more heavily in routine and text-intensive activities than in activities whose value derives primarily from professional judgment. Choi and Xie (2026), for example, find GenAI use in data entry, administrative work, and business communication, while its use is less frequent in complex quality assurance and advisory activities. Their field evidence also suggests that GenAI adoption reallocates accountants' time away from routine data entry toward communication and quality assurance activities.

The distinction between procedural and judgment-intensive tasks is also evident in experimental evidence. Van Zijl et al. (2026) find that AI models perform relatively well in

journal entries and basic calculations but perform substantially worse when required to critique accounting treatments, distinguish correct from incorrect information, and exercise judgment. This supports the broader observation that AI is currently more capable of automating or augmenting tasks with relatively clear rules than independently performing tasks requiring contextual interpretation, skepticism, and integrated professional judgment.

Overall, RQ1 shows that AI use in accounting follows three broad forms: automation of structured tasks, augmentation of analytical processes, and support for knowledge-intensive or judgment-related activities. However, the literature does not support treating these three forms as ethically equivalent. As AI moves from routine processing toward activities involving interpretation and professional judgment, the need for human involvement becomes progressively more important.

### *5.3 RQ2: What Ethical and Professional Issues Arise from the Use of AI in Accounting Practice?*

The first recurring issue concerns the reliability of AI-generated outputs. The reviewed studies consistently demonstrate that AI capability does not guarantee dependable accounting output. Leitner-Hanetseder et al. (2026) find substantial variation in ChatGPT performance according to model version, task type, and accounting standard. Although accuracy reached up to 77% under some conditions, false-positive responses created a risk of misleading users into believing that an incorrect answer was reliable. Van Zijl et al. (2026) similarly report instances in which LLMs incorrectly applied IFRS principles while presenting their responses confidently, and find that none of the models approached human performance when critiquing accounting treatments.

This reliability problem creates a related ethical issue of overreliance and automation bias. Choi and Xie (2026) show that although AI assistance improved transaction-classification accuracy, some participants continued to follow AI recommendations even when the recommendation differed from the decision they would otherwise have made. More experienced accountants were better able to interpret confidence signals and intervene when AI uncertainty was high, whereas less experienced accountants were more likely either to rely excessively on uncertain recommendations or fail to use available AI information effectively.

Sugahara and Kano (2026) provide additional evidence that AI influence extends beyond technical accuracy into ethical judgment. Their experiment shows that advice provided by GenAI can influence accounting-related moral judgments in a manner comparable to advice from human auditors. Individuals who perceived GenAI advice as highly credible were particularly susceptible to its influence, demonstrating the importance of algorithm appreciation and perceived algorithmic authority. Thus, even technically advisory AI can become ethically significant when users assign authority to its recommendations.

A second recurring issue concerns explainability, transparency, and traceability. Attia et al. (2026) identify the black-box characteristics of complex AI systems as a concern because users may be unable to understand how financial recommendations or classifications are generated. Excessive dependence on these outputs may consequently undermine professional judgment. Lehner (2026) develops this concern further by arguing that the increased use of model outputs, risk scores, and algorithmic thresholds can alter the epistemic basis of accounting and auditing, potentially shifting reliance away from traceable evidence and contextual professional judgment toward technical model performance.

A third group of concerns relates to data governance, privacy, confidentiality, and bias. Abbas (2026) identifies privacy, confidentiality, data security, misuse, poor data quality, algorithmic bias, and cybersecurity among the significant risks associated with AI in management accounting. The review also identifies deskilling and lack of expertise in advanced data analytics as professional risks. Alruwaili and Mgammal (2025) similarly highlight privacy concerns, bias in training data, regulatory gaps, cybersecurity risks, workforce displacement,

and the need for ethical governance and professional training.

The importance of data governance is reinforced empirically by Bin-Nashwan et al. (2025). Their results show that AI adoption was positively associated with financial reporting accuracy and auditing efficiency and negatively associated with information asymmetry. Importantly, big-data governance significantly strengthened these relationships, demonstrating that the benefits of AI depend partly on the quality, integrity, security, and regulatory compliance of the underlying data.

The final recurring professional issue is deskilling and the erosion of professional competence. Automation can remove repetitive work and free accountants for higher-value activities, but the literature also warns that the removal of foundational tasks may reduce opportunities for professionals to develop the knowledge required to evaluate more sophisticated AI outputs. Abbas (2026) identifies deskilling, reskilling, and changes in professional identity as consequences of technological transformation, while Londoño-Cardozo (2025) stresses that accountants remain necessary to interpret and validate AI-generated information, ensure compliance, and exercise professional judgment.

Taken together, RQ2 indicates that the ethical challenge of AI in accounting is not reducible to technological error. The principal concerns arise from the interaction between technological limitations and professional behavior: inaccurate outputs may be accepted without verification; opaque recommendations may receive undue authority; sensitive or biased data may be processed without appropriate safeguards; and automation may weaken the competence necessary to supervise AI effectively.

### *5.4 RQ3: What Ethical Boundaries and Safeguards Can Guide the Responsible Use of AI in the Accounting Profession?*

The synthesis of the reviewed studies suggests that the ethical boundary of AI use should be determined primarily by the nature and professional consequence of the task, rather than simply by the type of AI technology being used. The same AI system may be acceptable for summarizing a contract or preparing an initial classification while being inappropriate as the sole basis for a material accounting judgment or binding professional decision.

Evidence for this distinction is particularly clear in Jaworska (2025), who argues that AI systems lack legal personality and cannot assume the legal or moral responsibility attached to financial reporting decisions. The study therefore concludes that binding accounting decisions should not be delegated autonomously to AI. Instead, AI should complement expert evaluation, with input accuracy and outputs subjected to verification, internal controls, compliance analysis, and professional review.

Leitner-Hanetseder et al. (2026) similarly call for clear frameworks distinguishing tasks that can reliably be delegated to AI from those requiring professional intervention. Their recommendations emphasize authoritative source references, traceability, verification against accounting standards and regulation, and maintenance of professional judgment. Sugahara and Kano (2026) add the need for documentation of GenAI use and professional or regulatory guidance where AI contributes to accounting judgments.

Based on these recurring patterns, the synthesis supports a three-zone ethical boundary for AI use in accounting.

5.4.1 Zone 1: Delegable AI-supported tasks. AI may perform a relatively high proportion of work where tasks are structured, repetitive, rule-based, and independently verifiable. Examples include initial transaction processing, reconciliations, document classification, data extraction, anomaly screening, and routine administrative work. Human involvement remains necessary through appropriate controls, but continuous case-by-case professional judgment is less critical.

5.4.2 Zone 2: Controlled AI augmentation. AI may provide analysis, recommendations, forecasts, summaries, or preliminary judgments when tasks involve interpretation or moderate professional judgment. However, outputs should not become final conclusions without human verification. Safeguards should include source verification, documentation of AI use, review of assumptions and confidence levels, consideration of alternative evidence, data governance, and a clearly identifiable professional reviewer.

5.4.3 Zone 3: Non-delegable professional responsibility. AI should not autonomously determine matters requiring binding professional judgment, ethical evaluation, final accountability, or responsibility to stakeholders and the public interest. Final decisions involving material accounting treatment, audit conclusions, professional sign-off, ethical dilemmas, or other high-consequence judgments must remain under meaningful human control.

This three-zone structure represents a synthesis of the reviewed evidence rather than a classification taken from any individual study. It reconciles findings showing substantial benefits from automation with evidence showing declining reliability as accounting tasks become more judgment-intensive. It also reflects the empirical observation that professional experience enhances effective human-AI collaboration: experienced accountants intervene more effectively when AI uncertainty is high.

Across all three zones, the reviewed literature identifies several cross-cutting safeguards: human oversight, verification and traceability, appropriate data governance, documentation of AI use, protection of confidential information, bias and quality controls, professional training, and clear organizational or regulatory accountability. Nashwan et al. (2025) demonstrate the importance of data-quality and compliance governance, Jaworska (2025) emphasizes internal verification and human responsibility, and Abbas et al. (2026) stress AI literacy, regulatory frameworks, and capability development.

## 6. Discussion

The findings of this integrative review suggest that the central ethical question surrounding AI in accounting is not whether AI should be permitted, but how professional responsibility should be allocated when AI participates in accounting work. This distinction is important because the reviewed studies consistently show that AI can simultaneously improve efficiency and create new forms of professional risk. The ethical boundary therefore cannot be represented as a binary distinction between AI use and non-use.

### *6.1 Ethical Boundaries Are Task-Dependent Rather Than Technology-Dependent*

One of the clearest findings from the synthesis is that task characteristics matter more than technology labels. RPA, ML, or GenAI cannot be classified as inherently acceptable or unacceptable for accounting purposes. Instead, ethical acceptability changes according to whether a task is structured, verifiable, judgment-intensive, and consequential.

This interpretation is strongly supported by the contrast between AI performance in procedural and evaluative accounting tasks. Van Zijl et al. (2026) find comparatively strong performance in journal entries but substantially weaker performance when models must critique accounting treatments and distinguish correct information from incorrect information. Likewise, Leitner-Hanetseder et al. (2026) show that output reliability varies according to task category, model, and accounting standard, demonstrating that a model capable of performing one accounting task cannot automatically be presumed competent in another.

This provides the rationale for the proposed three-zone framework. The permissible degree of AI autonomy should decrease as the level of professional judgment, uncertainty, and

accountability associated with a task increases. AI may therefore move from performing work in Zone 1, to assisting professionals in Zone 2, but should not become the responsible decision-maker in Zone 3.

### *6.2 Human Oversight Must Be Substantive, Not Merely Formal*

The findings also qualify the commonly proposed solution of maintaining a "human in the loop." Simply having a professional nominally involved does not necessarily provide effective oversight. Choi and Xie (2026) demonstrate that professional experience affects how accountants interact with AI uncertainty. Experienced accountants were more likely to intervene when AI confidence was low, whereas less experienced accountants displayed weaker responses to uncertainty.

This implies that meaningful human oversight requires competence to challenge AI, not merely the formal presence of a human reviewer. The finding is particularly relevant to the IESBA principle of professional competence and due care established in the normative foundation of this study. Accountants must not only possess professional knowledge but also maintain competence as technologies change.

Consequently, the ethical use of AI creates what may be described as a verification paradox: the greater the profession relies on AI to perform accounting work, the more important it becomes that accountants retain sufficient independent expertise to detect when AI is wrong. If automation weakens that expertise through deskilling, human oversight may remain formally present but become substantively ineffective.

### *6.3 Mapping the Emergent Themes to Professional Accounting Ethics*

When the inductively derived themes are examined against the IESBA ethical foundation, strong conceptual relationships emerge.

Integrity is implicated by the need to ensure that AI-generated information is not presented as reliable without appropriate verification. Confidently generated but incorrect accounting treatments or fabricated interpretations of standards create a risk that inaccurate information enters professional work unless accountants challenge it.

Objectivity is particularly relevant to algorithmic bias, automation bias, and algorithmic authority. Sugahara and Kano (2026) show that perceived credibility can cause AI advice to influence ethical judgment similarly to human professional advice. Objectivity therefore requires accountants to evaluate AI recommendations critically rather than treating algorithmic origin as evidence of neutrality.

Professional competence and due care is the most pervasive principle across the findings. Accountants must understand AI capabilities and limitations, verify outputs, identify circumstances in which AI is unreliable, and retain sufficient accounting competence to override technological recommendations. Continuous AI literacy and professional development are therefore ethical safeguards rather than merely employability skills.

Confidentiality directly connects with the repeated concerns regarding privacy, cybersecurity, sensitive accounting information, and the data used to train or operate AI systems. Abbas (2026) and Alruwaili and Mgammal (2025) both identify privacy, confidentiality, security, and data-protection risks as material concerns.

Professional behavior requires that AI use remain consistent with laws, regulations, standards, and the wider responsibilities associated with the accounting profession. This principle becomes particularly important where professionals might otherwise attempt to transfer responsibility to an AI system. Jaworska (2025) shows that AI cannot assume legal or moral responsibility, supporting the conclusion that accountability remains fundamentally

human.

The mapping therefore shows that AI does not create an entirely separate category of professional ethics. Rather, AI changes the circumstances under which existing ethical obligations must be exercised.

### *6.4 From Human-AI Substitution to Accountable Augmentation*

Taken together, the evidence favors accountable augmentation rather than unrestricted substitution as the appropriate model for AI integration in accounting. This does not imply that accountants must manually repeat every operation performed by AI. Such an approach would eliminate much of the efficiency that motivates AI adoption. Instead, the appropriate degree of human intervention should reflect the risk and professional consequence of the underlying task.

For structured activities, automation can legitimately substitute substantial amounts of human processing. For analytical activities, AI can extend human capabilities by processing information, identifying patterns, generating alternatives, and highlighting anomalies. For judgment-intensive activities, however, AI should provide inputs to professional reasoning rather than replace that reasoning.

This interpretation is consistent with real-world evidence from Choi and Xie (2026), who find that AI and professional expertise can be complementary and that GenAI adoption reallocates work from routine data entry toward quality assurance and other judgment-intensive activities. It is also consistent with Londoño-Cardozo (2025), who emphasizes that accountants remain responsible for interpreting and validating technological outputs and applying professional judgment.

The distinction is important because it moves the debate beyond predictions of whether AI will "replace accountants." The more relevant professional question is which components of accounting work can appropriately be delegated while preserving the human capacities on which professional trust depends.

### *6.5 The Conceptual Ethical Boundary of AI Use in Accounting*

The integrated findings therefore support a conceptual principle that can summarize the ethical boundary identified in this review:

The ethical acceptability of AI use decreases as the professional consequences of the task, the need for contextual judgment, and the difficulty of independently verifying the output increase; conversely, the required degree of meaningful human oversight and accountability increases.

Under this principle, efficiency alone is insufficient to justify greater AI autonomy. A system may be technically capable of producing a recommendation while still being unsuitable for autonomous professional use because its reasoning is not sufficiently verifiable, its data are not appropriately governed, its output may be biased or unstable, or the resulting decision carries responsibilities that cannot be delegated.

This produces the central contribution of the review. The boundary between ethical and unethical AI use in accounting is not defined by the presence of AI itself but by whether AI use preserves professional accountability. AI use remains ethically defensible when it augments accountants' capabilities while maintaining verification, competence, confidentiality, objectivity, transparency, and human responsibility. It becomes increasingly problematic when technological output replaces independent professional evaluation, obscures the basis of judgment, compromises protected data, or enables professionals to distance themselves from decisions for which they remain responsible.

## 7. Conclusion

This integrative review examined the current applications of artificial intelligence in the accounting profession, the ethical and professional issues arising from its use, and the boundaries and safeguards required for responsible AI integration. The synthesis of 12 studies shows that AI is increasingly applied across a broad range of accounting activities, including transaction processing, reconciliations, anomaly detection, risk assessment, forecasting, financial reporting, audit procedures, document analysis, and decision support. However, the extent to which AI can appropriately participate in these activities varies according to the nature of the task. AI appears particularly suitable for structured, repetitive, and independently verifiable activities, whereas its limitations become more significant when accounting tasks require contextual interpretation, professional skepticism, ethical judgment, and accountability.

The review identified five major ethical and professional themes: task-dependent allocation of human and AI roles; reliability, verifiability, and traceability of AI-generated outputs; non-delegable professional judgment and accountability; data governance, confidentiality, fairness, and transparency; and the preservation of professional competence and skepticism. These findings indicate that the ethical risks of AI use extend beyond technological errors. They also arise from the way professionals interact with AI, particularly when inaccurate or opaque outputs are accepted without sufficient verification, algorithmic recommendations receive excessive authority, sensitive or biased data are inadequately governed, or automation reduces the professional competence required to evaluate AI-generated information.

Based on these findings, this study proposes a three-zone ethical boundary for AI use in accounting. In the first zone, AI may assume a relatively greater role in structured and verifiable tasks. In the second zone, AI may support analytical and interpretive activities, but its outputs should remain subject to meaningful professional verification and oversight. In the third zone, activities involving binding professional judgment, ethical responsibility, final accountability, or high-consequence decisions should remain under human control. Across these zones, responsible AI use requires safeguards including human oversight, verification and traceability, appropriate data governance, documentation of AI use, confidentiality protection, bias and quality controls, professional training, and clear accountability.

When interpreted in relation to the IESBA fundamental principles, the findings further suggest that AI does not create a separate system of professional ethics. Instead, AI changes the circumstances in which existing ethical responsibilities must be exercised. Integrity requires professionals to verify AI-generated information before relying on it; objectivity requires critical evaluation of algorithmic influence and bias; professional competence and due care require accountants to understand AI capabilities and limitations; confidentiality requires appropriate protection of sensitive information; and professional behavior requires continued compliance with professional, legal, and regulatory responsibilities.

Overall, the central conclusion of this review is that the appropriate degree of AI autonomy should decrease as the need for professional judgment, contextual interpretation, verification, and accountability increases. Accordingly, responsible AI integration in accounting should be understood as a form of accountable augmentation rather than unrestricted substitution. The ethical boundary is therefore not determined simply by whether AI is used, but by whether its use preserves professional judgment, meaningful human oversight, and accountability for the resulting accounting decisions.

## 8. Limitations and Future Research

This study is subject to several limitations. First, the review is based on 12 studies, which provides a focused synthesis of recent evidence but limits the breadth of the literature represented. The relatively small number of included studies reflects the predefined eligibility criteria and the contemporary focus of the review. Consequently, the themes and ethical boundaries proposed in this study should be interpreted as a synthesis of emerging evidence rather than as an exhaustive

representation of all research concerning AI and the accounting profession.

Second, the review was deliberately restricted to studies published between 2025 and 2026 in order to capture contemporary developments in AI applications in accounting. While this narrow period increases the relevance of the evidence to current technologies, it excludes earlier research that may provide additional theoretical, historical, or empirical perspectives on automation, machine learning, algorithmic decision-making, and professional ethics in accounting.

Third, the literature search relied exclusively on a source-based search using Scopus. Although Scopus provides broad coverage of peer-reviewed scholarly publications, relevant studies indexed in other academic databases or published in sources not captured through the selected search approach may have been omitted. The inclusion of only English-language peer-reviewed journal articles and conference proceedings further limits the review by excluding potentially relevant research published in other languages or publication formats.

Fourth, the integrative nature of the review means that the included studies differ in their methodological approaches, accounting contexts, AI technologies, and units of analysis. Some studies examine actual professional practice, whereas others use experimental, conceptual, or review-based approaches. Therefore, the evidence underlying the identified themes does not have the same empirical weight across all studies. The proposed three-zone framework should consequently be viewed as a conceptual synthesis requiring further empirical validation, rather than as a formally tested decision model.

Finally, AI technologies are developing rapidly, meaning that the capabilities and limitations identified in studies published during 2025-2026 may change as models, organizational practices, and regulatory frameworks evolve. Future research should therefore test the proposed ethical boundary framework across different accounting domains, professional settings, jurisdictions, and AI systems. In particular, empirical research is needed to examine how the three proposed zones operate in actual accounting decisions, how the degree of required human oversight can be measured, and whether different levels of AI autonomy affect professional judgment, reporting quality, accountability, and compliance with professional ethical principles.

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# FINANCIAL LITERACY CHALLENGES OF INDONESIAN YOUTH IN THE DIGITAL ECONOMY

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***Abstract***
*Indonesia's digital economy has driven rapidly and more young people are using digital financial services. However, financial literacy among Indonesian youth remains a concern. The National Survey of Financial Literacy and Inclusion (SNLIK) 2025 confirmed the financial literacy rate among people of youth (age 15-17) was 51.68%, while the financial inclusion rate of youth reached 74.00%* (Otoritas Jasa Keuangan, 2025). *This difference suggests that the development of access and participation in financial services should be balanced with the knowledge and skills to use them responsibly. This study uses a preliminary qualitative literature review to examine financial literacy challenges among Indonesian youth in the digital economy. The literature was organized into three themes: (1) youth participation in the digital economy and financial services, (2) financial education opportunities, and (3) implications of digital economy for financial education. Key sources include Indonesia Student Competency Assesment (TKA) 2025, OECD/INFE Core Competencies Framework of Financial Literacy for Youth, e-Conomy SEA 2024, Outlook Ekonomi Digital 2025 and Indonesia's Financial Transaction Reports and Analysis Center (PPATK) 2024. The findings indicates the limited attention to youth financial literacy in existing research and the exposure of young people to digital financial risks highlight the need for stronger financial education. Therefore, financial education should aware early and be connected to youth's real life digital financial experiences to support safe, responsible and well decision-making.*
***Keywords****: financial literacy, Indonesian youth, digital economy, financial education, digital financial services*

## 1. Introduction

The digital economy has transformed the way people access financial products and services, creating new opportunities for economic participation, through online commerce, digital platforms, and digital financial transactions. Digital Economy covers various economic activities that rely on digital information and connect individuals, businesses, data, devices, and operations (Javaid et al., 2024). Along with the development of technology, digitalisation has become an important factor of economic growth and has changed the financial systems worldwide. As digital financial services become more accessible, people are expected not only to participate in the digital economy but also to make responsible financial decisions in increasingly complex financial environments.

Indonesia's digital economy has grown rapidly in recent years. According to the *e-Conomy SEA 2024* report by Google, Temasek, and Bain & Company, the digital economy reached $90 billion in Gross Merchandise Value in 2024, which is the largest in Southeast Asia with digital payments growing 19% to a Gross Transaction Value of $404 billion (Google, Temasek, & Bain & Company, 2024). The report also highlights the continued expansion of digital payments and e-commerce, mirroring the increasing adoption of digital financial services across the country. Meanwhile, the *Outlook Ekonomi Digital Indonesia 2025* (Huda , Ayu, & Septyarini , 2025) describes Indonesia's ongoing digital transformation through the growth of financial technology, digital commerce, and digital payment systems. The report also notes this transformation brings challenges related to digital literacy, financial literacy, and the ability of society adaptation to the digital economy.

Young people are among the groups most affected by these developments, since they are exposed to digital financial services from an early age. According to the *OECD/INFE Core Competencies Framework*, financial literacy is an understanding and knowledge of financial concepts and risks, with the skills, confidence, and motivation to make effective decisions for a financial contexts, improve the financial well-being of individuals and society, and to enable participation in economic life (OECD/INFE Core, 2015). Youth actually are at a critical stage of building their financial foundation for the future, and the terms used to describe this can vary, such

as a knowledge of payment accounts, insurance, credits, and savings, depending on the level of financial development within a country.

The *PISA 2022 Assessment and Analytical Framework of Financial Literacy* revealed that many students 15 age and above had an experience with financial products, such as bank accounts and prepaid debit cards with the consent of parent or guardian (OECD, 2023). Financial habits, behaviours, and skills built since childhood and adolescence, often learned from parents and around them, can shape the complexity of finance. These early experiences can provide the opportunities for young people to develop practical financial knowledge, supported by appropriate regulation and financial consumer protection.

Despite these opportunities, unfortunately financial literacy among Indonesia youth remains a concern. The *National Survey of Financial Literacy and Inclusion* (SNLIK) performed by the Financial Services Authority (OJK) in 2025, confirmed Indonesia's national financial literacy index stands at only 66.46%, with the 15-17 age group recording an even lower rate at 51.68%. Moreover, this rate also showed a slight decrease from 51.70% in 2024 to 51.68% in 2025. At the national level, the 2025 financial literacy index of 66.46% is still below the RPJMN 2025-2029 target of 69.35%, indicating that improvements in financial literacy remain an important issue. Meanwhile, the students in 15-17 age group are already active users of digital services, with an inclusion rate of 74.00% (Otoritas Jasa Keuangan, 2025). The difference between these two indicators highlights an important issue: participation and access in financial services may be developing faster than young people's financial knowledge and skills. Therefore, growing access to financial digital services needs to be accompanied by adequate financial literacy so that young people can use financial products responsibly, understand the risks, and know their financial decisions in the future.

Demographically, youth and Generation Z form the largest group of internet users in Indonesia at 62.39 million (Huda , Ayu, & Septyarini , 2025). This means that Indonesian youth are increasingly integrated in digital financial ecosystems. However, as the OECD (2022) warns in the rapidly evolving digital financial world, young people are more exposed to financial products than ever before. A lack of financial literacy hinders the ability to make financial decisions, affecting the personal finances and even the global financial landscape. A study by Effendi et al. (2026) showed that Indonesian have good understanding of financial products, but their awareness of financial planning remains low, along with their level of financial literacy.

These findings point a critical gap: Indonesian youth are increasingly active participants in the digital economy, while their financial literacy is still not enough to help them navigate it safely. Therefore, this study aims to examine the financial challenges faced by Indonesian youth in the context of the growing digital economy through a preliminary qualitative literature review of recent national and international sources.

## 2. Literature Review

### *2.1 Financial Literacy for Youth*

Financial literacy is an important competence for young people because it helps them understand financial concepts and make suitable financial decisions. The *OECD/INFE Core Competencies Framework on Financial Literacy for Youth* defines an understanding and knowledge of financial concepts and risks, with the knowledge, attitudes, skills, and behaviours that youth need to participate safely, improve the financial well-being of individuals and society, and effectively in economic life. The framework focused on youth aged 15 to 18 and explains that financial literacy should prepare youth for financial decisions during the transition to adulthood (OECD/INFE Core, 2015).

Youth have particular financial needs that are different from those of adults. At this stage, they may have limited experience with financial products and transactions, but they have a starting point to facing important decisions related to income, saving, education, and employment. Therefore, financial literacy education should bring the knowledge and skills that

are relevant to their current situation, the future needs, and the condition of country nowadays. The OECD/INFE framework also explained that financial skills can be cultivated through different learning environments, including families, schools, mates, work experiences, and every financial activities.

The priority of early financial education for youth is also supported by the research by Mancone et al. (2024), who confirmed financial literacy programs. Their review shows that financial education can help youth develop the understanding and skills needed to make informed financial decisions and improve their future financial well-being. Financial education programs can also influence the attitudes and behaviours when the learning content is connected to the experiences of youth.

Mancone et al. (2024) highlight that financial education should consider the different needs and learning conditions of children and specifically youth of secondary school. Digital tools, experience of learning, relevant examples from books, and parental advisory can be a support financial education. They also underline that financial education have the adaption and relevance due the changing financial environment. This suggests that financial literacy education for youth should not only transfer the knowledge but also help youth to apply situation they may encounter everyday life.

### *2.2 Financial Education in the Digital Era*

The development of digital technology has changed the way people use financial service and access it. Financial transactions are increasingly nowadays through digital platforms, application on mobile, and online services. But financial products and services has become more complex these days. Kovács and Terták (2024) explain that digital transformation in the financial sector has created new opportunities but has also increased the need for financial and digital skills. Individuals now need to understand not only traditional financial concepts but also how to use digital financial services responsibly and safely.

This development can also be seen in the growth of the digital economy in Southeast Asia and Indonesia. The *e-Conomy SEA 2024* (Google, Temasek, & Bain & Company, 2024) report shows the continued growth of the digital economy in Southeast Asia, supported by the increasing use of digital services and financial activities. In Indonesia, the *Outlook Ekonomi Digital 2025* report by CELIOS (Huda , Ayu, & Septyarini , 2025) also directed the continued development of the digital economy and the growing role of digital platforms in people's economic activities. These developments reveal that digital technology becoming an important part of everyday economic and financial life. Therefore, youth need to be prepared to use the digital services with understand and manage the financial risks that may come with them.

However, being familiar with digital technology does not automatically mean that youth have sufficient financial literacy, because it requires knowledge, skills, responsible behaviour, and awareness. Therefore, financial education needs the change that brought digitalization and help young people understand both the benefits and risks of the digital financial environment. The digital transformation of financial services has also changed the way financial education can be delivered. Traditional methods of transferring financial knowledge may no longer be sufficient for all groups, especially as financial practices and technologies continue to change.

A research by Mancone, et al. (2024) also recognize digital tools as one of the important developments in financial education for youth. Digital learning tools can support more accessible and interactive learning experiences, but should still be connected to relevant financial content and the learning needs of young people. Digitalization should not only be understood as the use of technology in education, but also as a change in the financial environment that requires new forms of knowledge and skills.

## 3. Research Methods

This study uses a preliminary qualitative literature review to examine financial literacy challenges among Indonesian youth context of the growing digital economy. The study mainly uses recent academic literature with relevant national and international reports published between 2024 and 2025, and earlier framework sources included as it is relevant to discuss.

The sources were selected based on their relevance to three main topics: youth financial literacy, digital economy, and financial education. Academic sources included studies on financial literacy, financial inclusion, and digital economy development. Key sources include Indonesia Student Competency Assesment (TKA) 2025, OECD/INFE Core Competencies Framework of Financial Literacy for Youth, e-Conomy SEA 2024, Outlook Ekonomi Digital 2025 and Indonesia's Financial Transaction Reports and Analysis Center (PPATK) 2024. Other relevant academic studies were also reviewed to support the interpretation of the findings.

The literature was reviewed by identifying information related to the level of financial literacy, youth participan in digital financial services, challenges associated with digital financial activities, and the role of financial education. The information obtained from the selected sources then organized into three main themes: (1) youth participation in the digital economy and financial services, (2) financial education opportunities, and (3) implications for financial education. The findings from these articles were compared and interpreted to determine the relationship between increased participation in digital finance and literacy needs of Indonesian youth.

## 4. Research Findings and Discussion

### *4.1 Digital Economy Increases Youth Financial Participation*

The booming growth of Indonesia's digital economy has opened up more opportunities for youth to participate in various digital financial activities. The e-Conomy SEA 2024 report confirmed that Indonesia continues to lead Southeast Asia's digital economy, supported by the development of e-commerce, online services, and digital payment systems. There are consits of E-commerce, food delivery, transportation, online travel, online media, and financial services. As the growth continues, consumers continue to spend on digital products.The Outlook Ekonomi Digital 2025 report highlights how the increasing use of smartphones and internet connections has made digital platforms an essential component of everyday routine, especially for young generation or Generation Z these days. These evolution have led to youth being exposed to digital financial activities at people's exposure to digital financial activities at an early age.

The widespread use of smartphones allow youth to use various financial activities more easily than previous generations due to the support of digitalitation. Financial services available through digital wallets, QRIS, mobile banking, online shopping platforms, and social media are part of their daily experiences. Digital platforms in Indonesia such as Tiktok, Shopee, Tokopedia, Gojek, and others are also important for youth these days. As the economy becomes more digital, youth will not only be able to use these tools but also understand the consequences of all their decisions.

This trend is also evident in recent discussion across Indonesian media. News reports show that young people and children are engaging with digital transactions earlier than ever (Alfianto, 2025). While this development creates for financial inclusion, it also gives concern that financial education has not kept pace with digital financial adoption. As a result, financial literacy is increasingly recognized as an essential skill that should be introduced from an early age.

### *4.2 Financial Education Opportunities in Indonesia*

Financial education, especially for young people, should already be in place, even though it does not have to look the same in every country The PISA 2022 Assessment shows that countries use different financial literacy frameworks, and some countries even have more than

one. However, some countries do not have a specific framework at all, but they still include finance explicity in their subjects, either as its own topic or as a part of the secondary school curriculum.

This is also true in Indonesia, where financial learning is already built into economics and social studies subjects, and mostly through the economics subjects. Unfortunately, the national TKA (Tes Kemampuan Akademik) score of high school economics are still low. Based on national statistics from Badan Kebijakan Pendidikan Dasar dan Menengah, an average score is only 31.68, and 50.15% of students falling into the "insufficient" category (Kemendikdasmen, 2025/2026). This does not directly reflect financial literacy, but it still shows the need to strengthen economics and financial learning in schools.

The OECD/INFE framework also found that schools tend to focus on general economic topics, such as unemployment, government economic and policy, fiscal and monetary policy, and the financial system in general. However, students of youth also need specific financial competencies, such as:

- Basic understanding of money
- The skills and behaviours needed to manage money
- Saving
- Borrowing behaviour
- Different payment methods and signing contract
- Being aware of and respecting how money and ownership work
- Planning and budgeting
- Interest and Risk
- Fraud and scams
- Transaction security
- And Responsible use of money

Indonesian youth need to learn and integrate financial education into their lives, wheter as an additional class or by adding basic financial concepts into the existing curriculum without changing it entirely. This can serve as a foundation or a contextual learning approach, where young people become more aware of financial matters can better prepare for a more secure future.

### *4.3 Implications for Financial Education and Digital Economy Among Indonesian Youth*

In today's world, where digital financial products are everywhere, financial education is not enough if it only teaches economics as the general topics and money concepts. It is also needs to cover digital risks, fraud, online loans, transactions security, and responsible use. A bibliometric study by Effendi et al. (2026) found that youth financial literacy is still an under-research topic in the Indonesian context, making up only 5.2% of around 1.000 studies reviewed between 2014 and 2024. At the same time, Indonesia's Financial Transaction Reports and Analysis Center (PPATK) 2024 recorded online gambling transactions worth IDR 359.81 trillion in 2024, reflecting the digital financial risk exposure in the country (Azhari, 2024, from Effendi et al., 2026). Moreover, young people of age 11-19 are recorded of worth 293,4 billion.

This suggests that strengthening financial literacy should be a key factor in preparing Indonesian Youth for digital economy. Financial education should not only present financial concepts, but also encourage students to relate their own experiences into financial concepts. Learning activities that address financial topics such as understanding payment methods, managing personal finances, or financial literacy, can help young people build their competencies, rather just memorizing money.

This view is consistent with the analysis by Mancone et al. (2024), who concluded that financial literacy education programs are more effective when they include real financial

information and practical learning opportunities. The review also highlights the importance of linking financial platforms, and to engage young people with appropriate educational opportunities.

As Indonesia's digital economy continues to expand, a lifelong skill that should have for young people is financial literacy education, not just an academic subject. Families, school, policymakers, and other stakeholders all have important roles to play in helping young people become economically responsible citizens. Encouraging financial literacy from a young age will not only improve an individual's ability to make financial decisions, but also lead to greater financial well-being in digital era.

## 5. Conclusion

This study highlights the financial literacy issues among Indonesian youth in today's digital economy. Although smartphones and online services give young peope easy access to financial tools, high user does not automatically mean they have the financial knowledge. The financial inclusion and literacy gap among Indonesian youth with ages around 15 until 17, highlight the urgent need for better financial education. To use digital financial services safely, young people need to know how to navigate digital tools, understand the core of financial concepts, assess risks, and manage their money responsibly.

Due to many reports and researches, therefore, financial education should begin at a young age and stay relevant to everyday life. Strengthening literacy through collaboration among families, schools, and regulators will help ensure that Indonesia's digital economy grows with responsible, smarter participation, and well-informed money management.

The authors would like to recommend the future studies, since it is only a preliminary qualitative literature review. Future studies can be incorporate additional methodologies, such as qualitative or mixed methods approaches. Those suggested explorations on financial literacy among young Indonesian, and to complement the current study.

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# DIGITAL FINANCIAL INCLUSION AND BUSINESS INDEPENDENCE: EVIDENCE FROM MICRO AND SMALL ENTERPRISES IN MAKASSAR, INDONESIA

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***Abstract***
*The rapid development of digital technology has transformed financial landscapes, necessitating Micro and Small Enterprises (MSEs) to adapt to digital financial systems to remain competitive. This study aims to analyze the level of digital financial inclusion penetration and measure the level of business independence among MSEs in Makassar, Indonesia, while simultaneously examining the influence of digital financial inclusion on business independence. Employing a quantitative explanatory approach, this research utilized purposive sampling to select 140 respondents from active MSEs in Makassar. Data were collected through structured questionnaires and analyzed using simple linear regression via IBM SPSS Statistics. The findings indicate that digital financial inclusion has a positive and significant influence on business independence suggesting that while digital financial inclusion is a key driver for business autonomy, other external and internal factors account for the remaining 23,9% of the influence. These results imply that increasing the accessibility and literacy of digital financial instruments is crucial for MSEs to achieve substantive autonomy and reduce reliance on traditional, less efficient financial mechanisms. The study contributes to the literature on financial management by providing empirical evidence of the role of digital transformation in strengthening the foundations of local MSE resilience.*
***Keywords****: Business Independence, Digital Financial Inclusion, Micro and Small Enterprises, Makassar, Financial Technology*

## 1. Introduction

The existence of Micro, Small, and Medium Enterprises (MSMEs) as a vital driver of the national economy, contributing significantly to job creation, poverty alleviation, and the achievement of equitable income distribution. In this modern era, rapidly advancing digital technology has driven the emergence of various digital financial services, such as QRIS, mobile banking applications, and fintech-based lending platforms. This transformation requires MSMEs to increasingly embrace technology in order to adapt and grow, thereby creating an urgent need for digital financial inclusion. Demirgüç-Kunt et al. (2022) define digital financial inclusion as a concept describing how business entities utilize formal financial services through digital channels.

Existing literature has observed the positive impact of digital financial inclusion on improving the performance of the micro-business sector. Research by Affandi et al. (2024) indicates that the adoption of digital solutions, such as broad access to, literacy regarding, and utilization of formal financial services, significantly drives the performance and growth of MSMEs. More specifically, at the local level, a study by Adriani and Yuniar (2023) on MSMEs in Makassar City found that the use of digital payments positively influences the financial performance of business owners. The adoption of these digital payment systems is considered not only to facilitate transactions but also to serve as a driver of business advancement when combined with appropriate strategies.

While the positive impacts of financial technology adoption have been extensively studied, research specifically focusing on business independence remains very limited. Business autonomy refers to the ability of business operators to make decisions and act independently, without excessive reliance on external parties (Sen, 1999). Meanwhile, theoretical discourse regarding digital financial access remains a subject of debate; on one hand, it can enhance the efficiency of economic activities, yet on the other, it carries the potential risk of debt traps (over-indebtedness) if not balanced with adequate financial literacy.

Empirical evidence from Makassar City reveals that the business sector is dominated by

micro-enterprises; 2024 data records 31,350 micro-enterprises, 910 small enterprises, and 479 medium-sized enterprises. Amid the rapid pace of the city's economic digitalization, questions have arisen regarding the penetration level of digital financial inclusion in day to day business operations. To date, it remains unclear whether the adoption of digital finance by MSMEs in Makassar has advanced to more sophisticated services or if it is still limited to the use of basic payment transaction features.

Based on the identified research gaps and empirical context, the central question of this study is whether digital financial inclusion significantly strengthens business independence at a fundamental level, or merely represents a fleeting trend that fails to substantively alter the foundations of MSME resilience. Therefore, this study aims to objectively assess the extent of digital financial inclusion and the level of business independence among MSMEs in Makassar City, as well as to examine the effect of digital financial inclusion on business independence. These objectives are intended to provide a comprehensive understanding of the actual contribution of digitalization to strengthening the local economy.

## 2. Literature Review

### *2.1 Digital Finansial Inclusion*

Digital financial inclusion refers to a concept that describes the ability of business actors to access, use, and benefit from formal financial services through digital technologies in an accessible, secure, and affordable manner (Ozili, 2022). These digital services encompass digital payment systems, savings, financing, insurance, and other financial products that can be accessed through digital platforms, including mobile banking, e-wallets, internet banking, QRIS, and other financial technologies. Demirgüç-Kunt et al. (2022) explain that digital financial inclusion extends beyond the availability of financial services to encompass ease of access, levels of usage, service quality, and users' ability to utilize such services effectively. In Indonesia, the growing adoption of QRIS and various digital payment platforms has contributed to the expansion of financial inclusion among MSMEs, particularly by broadening their access to the formal financial system (Ardasanti et al., 2025).

### *2.2 Business Independence*

Business independence refers to the ability of business actors to manage and develop their enterprises independently through sound decision-making, effective resource management, and the capacity to reduce dependence on external assistance or parties. This concept is consistent with the Capability Approach proposed by Sen (1999), which suggests that individuals can be considered independent when they possess substantive freedom to make choices and optimally utilize available economic opportunities.

In the context of MSMEs, business independence is reflected in the ability of business owners to manage capital, formulate business strategies, control operations, manage business risks, and maintain business continuity without excessive reliance on external resources. Berger and Udell (2006) explain that ease of access to formal sources of financing and adequate financial information are important factors in enhancing the capacity of MSMEs to develop independently. Therefore, the greater the ability of business actors to effectively manage their financial resources, the higher their level of business independence.

### *2.3 Relationship Between Digital Financial Inclusion and Business Independence*

Using the Resource-Based View (RBV) framework, Barney (1991) asserts that an organization's competitive advantage is built through the possession and optimization of resources that are valuable, rare, difficult to imitate, and non-substitutable. In the context of this study, access to digital financial services is positioned as a strategic resource capable of enhancing business owners' capacity to manage transactions, expand access to financing, and formulate more effective business decisions.

Previous research by Demirgüç-Kunt et al. (2022), drawing on the Global Findex

Database, confirms that the use of digital payments contributes to strengthening economic resilience. Similarly, Adriani et al. (2023) demonstrated that the adoption of digital payments positively impacts the financial performance of MSMEs in Makassar City, while Maharani et al. (2026) found that financial inclusion fosters improved MSME performance. However, the majority of prior studies have focused exclusively on the impact of digital financial inclusion on financial performance, profitability, and business development. Consequently, research specifically examining the influence of digital financial inclusion on business independence remains relatively limited. Therefore, this study aims to address this research gap by investigating how digital financial inclusion contributes to strengthening the business independence of micro and small enterprises in Makassar City.

## 3. Research Methods

This study employs an explanatory quantitative approach to examine the impact of digital financial inclusion on business independence among micro and small business owners in Makassar City. Data collection took place over a period of approximately two months in 2026. The study population comprised all active micro and small businesses operating in Makassar City. Due to the absence of a comprehensive and up-to-date sampling frame, a non-probability sampling technique was used. Respondent selection criteria included: (1) classification as a micro or small business located in Makassar City; (2) at least one year of operation; and (3) the use of at least one type of digital financial service in daily operations (Sekaran & Bougie, 2022). This method yielded a sample of 140 respondents. Data were collected using a structured questionnaire distributed via both offline and online channels. Data processing and analysis were conducted using IBM SPSS Statistics, encompassing validity and reliability tests, classical assumption tests (normality and heteroscedasticity), and simple linear regression analysis.

## 4. Research Findings and Discussion

### *4.1 Result*

#### *4.1.1 Validity and Reliability Tests*

The questionnaire data were analyzed to evaluate the validity and reliability of the research instrument. The validity test was conducted to ensure that each item accurately measured the intended variable construct. The results indicated that all indicator items for both digital financial inclusion (independent variable) and business independence (dependent variable) had calculated r-values (rcalculated) greater than the critical r-value (0.166), confirming that all items were valid. Furthermore, the reliability test yielded Cronbach's alpha values exceeding 0.70 for each variable. This demonstrates that the research instrument possesses satisfactory internal consistency and is reliable for subsequent analysis.

**Table 1. Results of the Validity and Reliability Tests**

| Indicators | Correlated Item Total | Cronbach's Alpha |
|---|---|---|
| X1 | 0,949 | 0,967 |
| X2 | 0,949 | |
| X3 | 0,948 | |
| X4 | 0,917 | |
| X5 | 0,936 | |
| Y1 | 0,937 | 0,956 |
| Y2 | 0,899 | |
| Y3 | 0,928 | |
| Y4 | 0,928 | |
| Y5 | 0,932 | |

*Source:* source of the table

#### *4.1.2 Classical Assumption Tests*

Prior to performing the main statistical analysis, classical assumption tests, specifically testing for normality and heteroscedasticity, were conducted to confirm that the regression model satisfied the required prerequisites. To evaluate whether the regression residuals followed a normal distribution, the One-Sample Kolmogorov–Smirnov test was applied. The test produced a significance value of 0.109, which is greater than 0.05. Therefore, the residuals can be considered normally distributed, indicating that the normality assumption of the regression model was satisfied.

The heteroscedasticity test showed a significance value (Sig. 2-tailed) of 0.329 for the Digital Financial Inclusion (X) variable. Since the significance value is greater than 0.05, there is no evidence of heteroscedasticity in the regression model. Thus, the regression model satisfies the heteroscedasticity assumption and is suitable for further analysis.

#### *4.1.3 Simple Linear Regression Analysis*

**Tabel 2. Result of the F-Test**

| ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 1950.486 | 1 | 1950.486 | 440.350 | .000[b] |
| | Residual | 611.257 | 138 | 4.429 | | |
| | Total | 2561.743 | 139 | | | |
| a. Dependent Variable: Business Independence | | | | | | |
| b. Predictors: (Constant), Digital Financial Inclusion | | | | | | |

*Source:* source of the table

The ANOVA results yielded an F-value of 440.350 with a significance level of 0.000 ($p < 0.05$), indicating that the regression model is statistically significant in explaining the relationship between Digital Financial Inclusion and Business Independence. In other words, Digital Financial Inclusion represents a statistically significant predictor of Business Independence. Therefore, the regression model is considered statistically significant and provides an appropriate basis for testing the proposed research hypothesis.

**Table3. Results of the Simple Linear Regression Analysis**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 4.169 | .810 | | 5.146 | .000 |
| | Digital Financial Inclusion | .789 | .038 | .873 | 20.985 | .000 |

*Source:* source of the table

Based on the partial test results, Digital Financial Inclusion obtained a regression coefficient (B) of 0.789, with a t-value of 20.985 and a significance level of 0.000 ($p < 0.05$). These results indicate that Digital Financial Inclusion has a positive and statistically significant effect on Business Independence, suggesting that an increase in Digital Financial Inclusion has a positive and significant effect to Business Independence. The positive regression coefficient of 0.789 indicates that a one-unit increase in Digital Financial Inclusion is associated with a 0.789-unit increase in Business Independence, assuming other factors remain constant (ceteris paribus). Furthermore, the standardized Beta coefficient of 0.873 indicates a strong positive relationship between Digital Financial Inclusion and Business Independence. These

findings confirm that better access to, use of, and utilization of digital financial services are associated with higher levels of business independence, suggesting that Digital Financial Inclusion is an important factor in strengthening Business Independence.

The regression equation obtained is as follows:

$$Y = 4{,}169 + 0{,}789X$$

Where:

- Y = Business Independence
- X = Digital Financial Inclusion

The equation indicates that when the value of Digital Financial Inclusion is zero, the estimated value of Business Independence is 7.678. Furthermore, each one-unit increase in Digital Financial Inclusion is associated with a 0.619-unit increase in Business Independence, assuming other factors remain constant (ceteris paribus).

**Table 4. Regression Model Summary**

| Model Summary[b] | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .873[a] | .761 | .760 | 2.10461 |
| a. Predictors: (Constant), Digital Financial Inclusion | | | | |

*Source:* source of the table

The analysis results show a correlation coefficient (R) of 0.873, indicating a strong positive relationship between Digital Financial Inclusion and Business Independence. This positive relationship suggests that higher levels of digital financial inclusion among business owners are associated with higher levels of business independence. The correlation coefficient of 0.873 also indicates that the relationship between the two variables is relatively strong, suggesting a substantial association between Digital Financial Inclusion and Business Independence.

Furthermore, the coefficient of determination ($R^2$) of 0.761 indicates that Digital Financial Inclusion explains 76.1% of the variance in Business Independence. The remaining 23.9% is attributable to other factors or variables outside the research model that were not examined in this study. These findings indicate that although Digital Financial Inclusion is an important predictor of Business Independence, other factors also contribute to determining the level of business independence among MSMEs.

### *4.2 Discussion*

The results of hypothesis testing confirm that the involvement of business actors in the digital financial ecosystem provides a direct impetus for increasing their business independence. Conceptually, digital financial inclusion facilitates access to financing, optimizes the efficiency of payment transactions, and enables cash flow management in a structured and real-time manner.

The strong impact is reflected in a standardized Beta coefficient of $0.873$. This implies that greater engagement with digital financial tools (e.g., e-wallets, mobile banking, and QRIS) enhances operational efficiency while reducing dependence on conventional, high-cost transaction channels. Consequently, entrepreneurs are better positioned to make independent business choices and manage capital autonomously.

While Digital Financial Inclusion demonstrates a statistically significant effect, its 76.1% contribution implies that the remaining 23.9% variance in Business Independence is shaped by

other unexamined internal and external factors. These unmeasured variables may include marketing strategies, human resource management, market competition, and government regulatory frameworks.

These findings align with and reinforce previous literature (Demirgüç-Kunt et al., 2022; Ozili, 2018), indicating that fintech transformation enhances the resilience and autonomy of micro and small enterprises. Seamless access to digital financial services helps mitigate capital constraints and expand market reach (Adriani et al., 2023; Bachas et al., 2018), ultimately elevating business capacity for self-sustained growth without excessive reliance on third parties.

Furthermore, this study offers a theoretical contribution to the fields of financial management and entrepreneurship by solidifying empirical evidence on how Digital Financial Inclusion impacts MSME Business Independence. The results confirm that digital financial inclusion operates not merely as a transactional facilitator, but as a crucial enabler for cultivating autonomous and competitive enterprise structures.

## 5. Conclusion

Based on the regression analysis, it can be concluded that Digital Financial Inclusion has a positive and statistically significant effect on Business Independence. Therefore, the research hypothesis stating that Digital Financial Inclusion has a positive effect on Business Independence is accepted. These results demonstrate that elevated levels of digital financial inclusion among business owners correlate with greater business independence. Furthermore, Digital Financial Inclusion serves as a key determinant in bolstering Business Independence, even though exogenous factors beyond the scope of this research model also contribute to shaping overall enterprise autonomy

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# FROM SUBATHON TO BELONGING: HOW MARAPTHON BUILT VIEWER ENGAGEMENT AND LESSONS FOR MARKETERS

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***Abstract***
*The live streaming industry has grown into a multibillion-dollar segment of the digital economy, positioning content creators as productive economic actors whose livelihoods rest on their capacity to build engagement. This study examines Marapthon, a non-stop, subathon-format live streaming program on YouTube initiated by Reza Oktovian (YB) together with the AAA Clan, which reached the world's number-one Most Watched Channels ranking within six days of its Season 3 premiere. Employing a qualitative single-case study design, the research analyzes the broadcast archive of the @ybrap channel and streaming metrics from Streams Charts, triangulated with netnographic observation of community interaction. The data were examined through qualitative content analysis and thematic analysis, and interpreted using a three-layered framework that combines Parasocial Interaction Theory, the Uses and Gratifications perspective, and the consumer brand engagement construct. The findings reveal six mutually reinforcing engagement strategies: participation structuring through the subathon format, real-time reciprocity and personal recognition, authentic emotional narrative, community identity construction, gamification and collective achievement, and sustained liveness and co-presence. These strategies are formulated into practical input for marketers seeking to design humane, authentic, and sustainable engagement to achieve their product goals.*
***Keywords****: live streaming, viewer engagement, parasocial interaction, marapthon, consumer brand engagement.*

## Introduction

The foundation of economic activity has shifted from the physical realm toward real-time online interaction, driven by digital technological transformation. One of the most tangible manifestations of this shift is the live streaming industry, which in less than a decade has evolved from a mere entertainment medium into an economic sector worth hundreds of billions of dollars. The global live streaming market was valued at approximately USD 113.21 billion in 2024 and is projected to reach USD 600.12 billion by 2032, growing at a compound annual growth rate of 23.28% (SNS Insider, 2025). Interest in live streaming has likewise been remarkable, as total live-broadcast watch time reached 32.5 billion hours throughout 2024, double the figure recorded in 2019 (Teleprompter, 2025). In 2025, more than 3.4 billion users watched live content every month, with live video traffic accounting for nearly 23% of all internet video traffic (Business Research Insights, 2026). These figures affirm that technological progress no longer merely affects how people communicate, but has also created new economic opportunities that turn digital interaction into a high-value commodity.

This shift positions content creators as productive economic actors rather than mere entertainment providers. Indonesia occupies a highly strategic position within this ecosystem. The value of the national creator economy is projected to surge from USD 38.5 billion in 2025 to USD 112.7 billion in 2031, growing at a CAGR of 19.7% (Mobility Foresights, 2025). Indonesia itself has more than 12 million content creators who produce up to one million pieces of content every month—the highest output in Southeast Asia (Campaign Asia, 2025). YouTube is the platform with the largest potential reach, namely 139 million users (DataReportal, 2025). Behind these dazzling figures, however, lies an inequality that warrants careful attention. In 2024, approximately 17 million people identified themselves as content creators, eight million of whom treated it as their main occupation, yet their average income was only around 63% of the national minimum wage (Inside Indonesia, 2025). This inequality underscores that the capacity to convert audience attention into a decent income remains highly dependent on content creators' ability to build engagement.

In seeking an answer to this inequality, the researcher sought to examine one live streaming program that has attracted considerable attention in Indonesia, namely Marapthon. The program is a

non-stop, subathon-format live streaming program on YouTube initiated by Reza Oktovian (Reza Arap or YB) together with the AAA Clan. Marapthon turns every viewer interaction, donation, or subscription into an extension of the broadcast duration. The program grew from 34 days of uninterrupted streaming in Season 1 in 2024, to 69 days in Season 2 in 2025, and to approximately 102 non-stop days in Season 3 in 2026, titled "The Last Tale" (Malang Inspirasi, 2026). The most striking feature of Marapthon Season 3 is the speed of its penetration: since its premiere on 8 February 2026, YB's YouTube channel broke into the world's number-one Most Watched Channels ranking within just six days, maintaining a stable average of 150,000 to 200,000 concurrent viewers (Streams Charts, 2026). From an academic standpoint, this phenomenon is compelling because its success rests not solely on duration or production, but also on emotional resonance and community. This wave grew even larger because Marapthon Season 3 was dedicated to Reza Arap's late partner. Viewers followed the live broadcast not merely for entertainment but as a form of moral support, sympathy, and solidarity. The blend of casual conversation, games, and emotional moments succeeded in building a highly active, loyal community and drew millions of watch hours (Malang Inspirasi, 2026). With such distinctive characteristics, Marapthon constitutes a rich bounded case worthy of in-depth study. This research positions it as the primary unit of analysis for understanding how particular strategies can generate engagement on a scale rarely achieved by conventional marketing practitioners.

To dissect the mechanisms behind this intensity of engagement, this study draws on Parasocial Interaction Theory, introduced by Donald Horton and R. Richard Wohl (1956) through their seminal article, "Mass Communication and Para-Social Interaction: Observations on Intimacy at a Distance," published in the journal Psychiatry. The theory explains the one-sided relationship that audience members build toward media figures, in which viewers feel they know the figure as a friend even though the figure is unaware of the viewers' existence (Horton & Wohl, 1956). Its relevance becomes even stronger in the context of live streaming, because the live-broadcast format shifts the classic nature of the parasocial relationship. Traditional parasocial relationships are entirely one-sided, whereas live streaming and its social media tools open opportunities for reciprocal interaction between viewers and the streamer. The relationship shifts toward a "one-and-a-half-sided" form that leads many viewers to perceive their relationship with the streamer as a meaningful friendship (Kowert & Daniel, 2021). So that this psychological mechanism can be linked to marketing, the parasocial theory is reinforced with the concept of consumer brand engagement, understood as a consumer's positively valenced cognitive, emotional, and behavioral activity during or related to interactions with a focal object (Hollebeek, Glynn, & Brodie, 2014).

Studies of live streaming viewer engagement have thus far been dominated by quantitative research based on Western gaming platforms such as Twitch, using a social-motivation approach. The study by Hilvert-Bruce, Neill, Sjöblom, and Hamari (2018), for instance, tested a socio-motivational model grounded in Uses and Gratifications Theory on 2,227 Twitch users. They found that social interaction and a sense of community drove nearly all forms of engagement. Such research rarely examines non-stop marathon-format streaming cases, seldom departs from the context of Asian creators—particularly Indonesia—and tends to overlook the emotional-communal dimension that is precisely the engine of Marapthon. Consequently, there is as yet no study that specifically dissects the engagement strategies of a globally scaled Indonesian streaming phenomenon and translates them into practical input for marketers. It is this gap that feels increasingly urgent to fill, especially when the digital creative sector has become one of the drivers of the national economy while the average creator's monetization capacity remains low.

Building on this gap and urgency, this study offers two novelties: empirically, it is one of the earliest studies to make Marapthon the unit of analysis for marketing engagement strategies; theoretically, it extends the application of Parasocial Interaction Theory (Horton & Wohl, 1956) from the realm of classical mass communication to the context of interactive subathons while linking it to the consumer brand engagement framework (Hollebeek, Glynn, & Brodie, 2014). Accordingly, this study aims to identify and analyze the strategies used in Marapthon to enhance engagement, so that they can be formulated into input for marketers in achieving the engagement needed to support their product goals, whether goods or services. Ultimately, by placing humane interaction and community at the core of digital economic value, this study also contributes to the broader conversation on Digital Economy, Human Dignity, and Inclusive Transformation in Asia, namely how the digital economy in Asia can grow while continuing to place humanity's relational dignity as an inclusive source of value.

## Literature Review

### *Digital Economy, Live Streaming, and Creator Monetization*

Live streaming is one of the pillars of the digital economy, transforming the one-way broadcast model into a real-time interactive experience in which the streamer and viewers interact simultaneously through video, live chat, and the giving of gifts or donations. This model has developed into a direct sales and marketing channel, where real-time interaction has been shown to build both consumer trust and engagement toward sellers in social commerce (Wongkitrungrueng & Assarut, 2020). From the viewers' side, the decision to keep watching a live broadcast is driven not merely by content quality but by their closeness to the streamer as well as to the community of fellow viewers (Hu, Zhang, & Wang, 2017). It is within this ecosystem that creator monetization mechanisms—through donations, subscriptions, and the subathon format that makes viewer support the determinant of broadcast duration—place engagement as the key variable linking digital cultural activity to economic value.

### *Engagement and Consumer Brand Engagement*

The concept of engagement in the marketing literature departs from the understanding that the consumer's relationship with an object does not end at the transaction, but is formed through repeated interactive experiences and value co-creation. Brodie, Hollebeek, Jurić, and Ilić (2011) formulated the concept of customer engagement as a psychological state that arises from a consumer's interactive experiences with an object (a brand, organization, or community) within a particular service relationship. This concept was later operationalized more specifically for the social media domain by Hollebeek, Glynn, and Brodie (2014) through the consumer brand engagement (CBE) construct, which comprises three indicators: cognitive processing, affection, and activation. It is this three-dimensional framework that this study uses to interpret "engagement" not merely as a metric of viewer numbers, but as cognitive, emotional, and behavioral involvement that drives real viewer action.

### *Parasocial Interaction Theory as the Grand Theory*

Parasocial Interaction Theory, introduced by Horton and Wohl (1956), serves as the grand theory of this study. The theory explains how viewers build a relationship that feels personal and intimate toward a media figure, even though that relationship is one-sided and the figure does not know the viewers (Horton & Wohl, 1956). Subsequent development affirmed that parasocial interaction is a measurable experience in which viewers feel as though they are being addressed directly by the media figure (Hartmann & Goldhoorn, 2011). In the context of live streaming, the classic nature of the one-way relationship shifts; the presence of reciprocal interaction channels such as live chat and donations that can be accompanied by messages gives rise to what is called the "one-and-a-half-sided parasocial relationship." This relationship is marked by the potential for reciprocal communication, strong community affiliation, wishful identification, and high emotional engagement (Kowert & Daniel, 2021). It is this shift that makes parasocial theory highly relevant for dissecting how the emotional bonds in Marapthon are formed and capitalized into engagement.

### *Viewer Engagement Motivation: The Uses and Gratifications Perspective*

To explain why viewers actively select and remain with a particular broadcast, this study also draws on the Uses and Gratifications tradition, which views the audience as active media users oriented toward the fulfillment of specific needs (Katz, Blumler, & Gurevitch, 1973). In the context of live streaming, a number of empirical studies have identified such varied motivations: research on Twitch users found that the motivations for watching others play games include cognitive and affective gratification, social integration, and tension release (Sjöblom & Hamari, 2017), while viewer engagement specifically has been shown to be driven by social motivations such as interaction and a sense of community (Hilvert-Bruce, Neill, Sjöblom, & Hamari, 2018). These motivations converge on a dual-identification mechanism, namely viewers' identification with the streamer as well as with the group of fellow viewers, which drives the intention to keep watching (Hu, Zhang, & Wang, 2017). This perspective complements parasocial theory by explaining the functional drivers behind the engagement that is formed.

***Live Streaming Strategies in the Marketing Context***

In the realm of practice, the engagement built through live streaming has tangible marketing implications. Interactivity, shopping value, and trust formed during a live broadcast have been shown to increase consumer engagement toward sellers, which in turn affects purchase intention and loyalty (Wongkitrungrueng & Assarut, 2020). Thus, strategies for building engagement—whether through personal greetings, acknowledgment of donations, the formation of community rituals, or the management of emotional moments—can be understood as marketing resources that can be imitated and adapted by business actors. However, the existing literature tends to situate live streaming within the context of social commerce, and little research has examined engagement strategies in non-stop, marathon-format live streaming of a massive scale with a strong emotional-communal charge such as Marapthon.

***Conceptual Framework***

From the discussion above, this study constructs an analytical framework that combines three layers of understanding: Parasocial Interaction Theory (Horton & Wohl, 1956; Kowert & Daniel, 2021) as the explanation of why viewers' emotional bonds are formed; the Uses and Gratifications perspective (Katz, Blumler, & Gurevitch, 1973; Hilvert-Bruce et al., 2018) as the explanation of the motivation behind engagement; and the consumer brand engagement construct (Brodie et al., 2011; Hollebeek et al., 2014) as the explanation of the form and impact of engagement relevant to marketing. These three layers serve as the lens for reading and categorizing the engagement strategies in Marapthon, while affirming the position of this literature review as a theoretical framework rather than a research method.

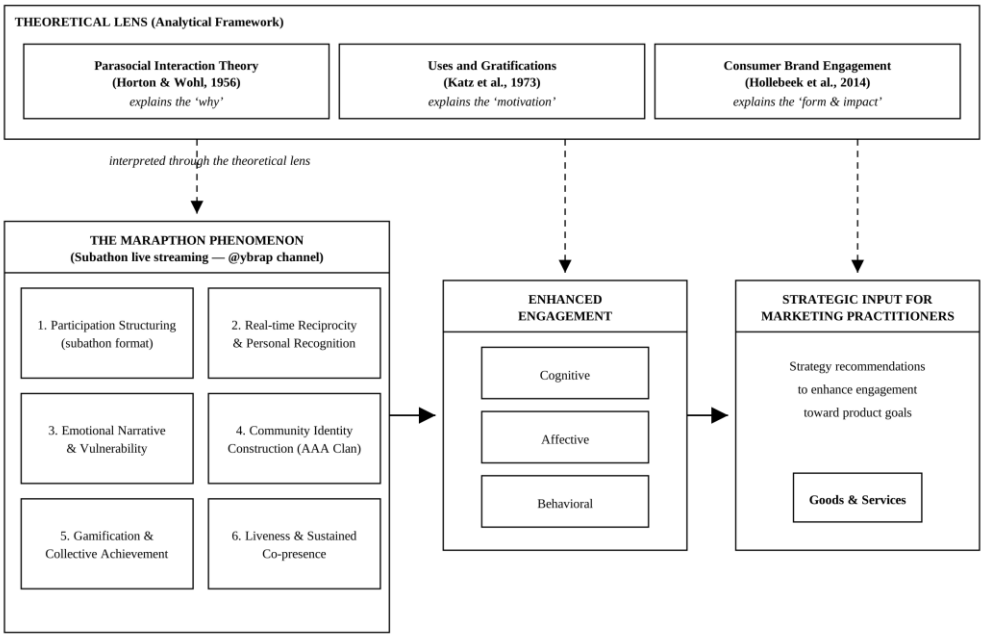



**Figure 1. Conceptual Framework of the Research**

*Source*: processed by the researcher with the assistance of Claude.ai (2026)

**Research Methods**

This study employs a qualitative approach with a case study design (qualitative case study). The case study was chosen because this research seeks to answer the question of how a contemporary phenomenon unfolds within its real-life context, when the boundary between phenomenon and context cannot be sharply separated and the researcher has no control over the events observed (Yin, 2018). The design used is a single-case holistic design, with Marapthon as a clearly bounded case. This approach aligns with the qualitative research tradition that emphasizes an in-depth understanding of meaning and process rather than statistical generalization (Creswell & Poth, 2018; Stake, 1995).

The object of this research is Marapthon. The case is bounded to the staging of Marapthon Season 3 titled "The Last Tale," which premiered on 8 February 2026, because this edition represents the program's peak achievement while also marking its conclusion. The unit of analysis is the engagement

strategies applied throughout the broadcast, whether verbal, visual, interactional, or structural (such as the donation-based duration-extension mechanism). This study uses two categories of data sources. First, primary data consisting of (a) the archive of Marapthon live broadcasts on the @ybrap channel as the main object of analysis (Reza Arap [@ybrap], 2026), and (b) broadcast performance metrics compiled from the analytics platform Streams Charts, covering peak and average concurrent viewers, hours watched, duration, and channel ranking (Streams Charts, 2026). Second, secondary data in the form of supporting documentation such as media coverage and community posts, used to contextualize and cross-verify the findings from the primary data.\

Data collection was carried out through three complementary techniques. First, documentation and observation of the broadcast archive, analyzed using qualitative content analysis procedures to systematically and reproducibly identify and code the units of engagement strategy (Krippendorff, 2018). Second, netnographic observation of community interaction in the live chat and the AAA Clan's social spaces, in order to capture the cultural dynamics, norms, and rituals that sustain engagement (Kozinets, 2020). Third, the compilation of descriptive-quantitative data from Streams Charts as an indicator of engagement intensity. The data were analyzed using thematic analysis following six phases: familiarizing with the data, generating initial codes, searching for themes, reviewing themes, defining themes, and producing the report (Braun & Clarke, 2006). The coding results of the engagement strategies were then interpreted through the theoretical framework built in the literature review, so that the identified strategies could be mapped into cognitive, affective, and behavioral dimensions and formulated into propositions adaptable by marketers

**Research Findings and Discussion**

The qualitative content analysis of the Marapthon Season 3 broadcast archive on the @ybrap channel, triangulated with netnographic observation of community interaction and performance metrics from Streams Charts, yielded six interrelated engagement strategies. Quantitatively, the program's scale of engagement was extraordinary: YB's channel broke into the world's number-one Most Watched Channels ranking within just six days of the Marapthon Season 3 premiere and maintained a stable average of 150,000–200,000 concurrent viewers throughout the broadcast (Streams Charts, 2026; Reza Arap [@ybrap], 2026). This achievement indicates that the following strategies genuinely succeeded in converting attention into massive and sustained engagement. The six strategies are summarized in Table 1 and then discussed one by one in relation to the theoretical framework that has been built.

**Table 1. Marapthon Engagement Strategies, Theoretical Lens, and Marketing Implications**

| Engagement Strategy | Manifestation in Marapthon | Theoretical Lens | Marketing Implication |
|---|---|---|---|
| Participation structuring through the subathon | Donations, subscriptions, and interactions extend the broadcast duration, making viewers parties that help determine the program’s length. | The activation indicator in CBE; one-and-a-half-sided PSR | Co-creation mechanisms: giving customers room to help create value for a product. |
| Real-time feedback & personal recognition | Mentioning the names of viewers who comment or donate; direct responses to donations and viewer comments. | Parasocial interaction (PSI) | Personalization at scale; responsive interactive service. |
| Emotional narrative | Dedication to a late partner; openness of emotion and shared grief. | The affection indicator in CBE; deep PSR | Authentic brand narrative and purpose; (ethical) emotional storytelling. |

| Engagement Strategy | Manifestation in Marapthon | Theoretical Lens | Marketing Implication |
|---|---|---|---|
| Community identity construction, namely the AAA Clan | Shared identity, distinctive language (e.g., YXGC), and signature emoticons. | Dual identification; social integration | Building a brand community with a sense of belonging, not merely followers. |
| Gamification & collective achievement | Donation targets for specific events, countdowns, and the shared pursuit of a world ranking record. | Vicarious achievement; tension release | Target-based campaigns; collective challenges with visible progress. |
| Liveness & sustained co-presence | The non-stop presence of AAA Clan members on the channel cultivates habituated viewing. | PSI sustained over time | Consistent presence (always-on) and keeping in touch. |

*Source*: results of the researcher's analysis (2026).

***Engagement Strategies in Marapthon and Their Marketing Implications***

*Participation structuring through the subathon format*

The first finding is that the subathon format is not merely a technical procedure but an engagement engine that positions viewers as parties that help determine the continuity of the broadcast: every donation, subscription, or interaction adds to the streaming duration, so that the program's lifespan is literally determined by the collective action of the audience. This mechanism activates the behavioral dimension (activation) of consumer brand engagement, namely the viewers' investment of time, energy, and resources toward the object of engagement (Hollebeek, Glynn, & Brodie, 2014). Furthermore, the feedback loop consisting of "viewer action → broadcast change → streamer response" is the most concrete embodiment of the one-and-a-half-sided parasocial relationship, where communication that was once one-way becomes reciprocal (Kowert & Daniel, 2021). For marketers, the key lesson is to design mechanisms in which customer action can help produce a visible and direct impact on a shared outcome. One example is a coffee shop opening a vote for a new variant, with interim results displayed on an Instagram story or an in-store board, and the winning variant actually produced.

*Real-time feedback and personal recognition*

The second strategy is real-time personal recognition, for instance through mentioning donors' names, direct responses to comments, and greetings that make viewers feel personally addressed. This practice strengthens parasocial interaction as conceptualized in the experience of viewers feeling as though they are being addressed directly by a media figure (Hartmann & Goldhoorn, 2011), while transforming the one-way relationship into a bond that feels reciprocal and meaningful (Kowert & Daniel, 2021). In the marketing context, this finding demonstrates the importance of personalization at scale, namely that individual recognition of customers and responsive interaction have been shown to foster trust and engagement toward sellers in the digital marketing space (Wongkitrungrueng & Assarut, 2020). For example, a seller replies quickly and personally in direct messages or comment sections. A culinary MSME, for instance, might answer a complaint on Instagram within minutes while referring to the customer's specific order: "We're so sorry, April—the sambal in yesterday's order fell short. We'll resend it tomorrow." A fast and specific response makes the customer believe their complaint is genuinely heard, rather than merely answered by a chatbot.

*Emotional narrative*

The third strategy—which the researcher regards as the one that most distinguishes Marapthon—is the use of an authentic emotional narrative. Marapthon Season 3 was dedicated to Reza Arap's late partner, so that shared emotion and grief became the core of the viewing experience (Reza Arap

[@ybrap], 2026). This emotional dimension awakens the affection dimension of engagement (Hollebeek et al., 2014) and pushes the parasocial relationship to a profound level, approaching the condition described by Horton and Wohl (1956) when a media figure becomes a source of a sense of security for the audience. The solidarity born from it explains why many viewers were present as a form of moral support rather than merely seeking entertainment. For marketers, this affirms the importance of the power of authentic brand narrative and purpose. Yet this finding also demands ethical caution: marketers must not capitalize on grief manipulatively, because such action would instead erode relational dignity. For example, a drinking-water brand sends aid to an earthquake site without much publicity and only reports it after distribution is complete. This action is consistent with its brand purpose, namely access to clean water.

*Community identity construction (AAA Clan)*

The fourth strategy is the construction of a strong community identity around the AAA Clan, marked by distinctive language (e.g., YXGC, blay, brewek), signature emoticons, and a sense of togetherness among viewers. This finding aligns with the dual-identification framework, namely engagement that grows from viewers' identification with the streamer as well as with the group of fellow viewers (Hu, Zhang, & Wang, 2017). From the motivational angle, community fulfills the need for social integration as proposed by the uses and gratifications tradition (Katz, Blumler, & Gurevitch, 1973), and empirically, social interaction and a sense of togetherness have been shown to be the main drivers of live broadcast viewer engagement (Sjöblom & Hamari, 2017; Hilvert-Bruce, Neill, Sjöblom, & Hamari, 2018). The implication for marketers is to shift from merely accumulating followers toward building a brand community with a genuine identity and sense of belonging. For instance, a product involves customers in design voting, features a "member spotlight," and grants early access to new collections for loyal buyers. This makes customers feel they partly "own" the brand rather than merely buying clothes. This approach is more effective than merely paying numerous influencers for endorsements to make an account trend quickly.

*Gamification and collective achievement*

The fifth strategy is gamification through targets, countdowns, and, above all, the pursuit of a world record. Marapthon made the attainment of the world's number-one ranking a shared mission that bound viewers together (Streams Charts, 2026). Such collective achievement cultivates a sense of vicarious achievement, namely the feeling of accomplishing something through the success of the figure and their community, which strengthens the bond with both the streamer and the community (Kowert & Daniel, 2021), while also fulfilling the needs for relaxation and achievement recognized in viewer motivation studies (Sjöblom & Hamari, 2017). For marketers, this finding suggests using target-based campaigns and collective challenges with visible progress indicators to sustain engagement momentum. In Marapthon, the AAA Clan typically set several targets. For example, they announced that if the broadcast surpassed 100,000 viewers, they would jump into the water or collaborate with a particular creator.

*Liveness and sustained co-presence*

The sixth strategy is the use of liveness, namely the uninterrupted presence of the streamers over a very long duration, which ultimately cultivates a habituated co-presence among viewers. Viewers return regularly because the broadcast is "always there." This continuity keeps parasocial interaction alive over time, transforming the moment of viewing into a ritualized habit (Horton & Wohl, 1956; Hu et al., 2017). In marketing practice, this principle affirms the value of a consistent presence (always-on) and keeping in touch in building long-term engagement, rather than relying on sporadic campaigns. For example, an MSME conducts live product-sales broadcasts on a fixed schedule, such as every night at 8:00 p.m., so that viewers have a regular "appointment." Between those schedules, it continues to greet them through stories.

***The Marapthon Engagement Model***

These six strategies do not stand alone but form a mutually supportive system between the structural layer (subathon, gamification, and liveness) and the relational layer (feedback, emotional narrative, and community). When mapped onto this study's framework, parasocial interaction theory

explains why viewers' bonds are so deep; the uses and gratifications perspective explains the motivation that makes viewers come and stay; while the consumer brand engagement construct explains the form and impact of engagement in the cognitive, affective, and behavioral dimensions relevant to marketing (Brodie, Hollebeek, Jurić, & Ilić, 2011; Hollebeek et al., 2014). The uniqueness of Marapthon lies in the fusion of a structural monetization mechanism (subathon) with an intense emotional-communal narrative—a combination that produces engagement on a scale rarely achieved by conventional marketing practice.

**Conclusion**

This study concludes that the Marapthon phenomenon initiated by Reza Arap Oktovian (YB) demonstrates how the advancement of live streaming technology has transformed into a new economic force whose success rests on the capacity to build engagement, and through a qualitative case study approach to the @ybrap channel archive and Streams Charts metrics, six mutually reinforcing engagement strategies were identified—namely participation structuring through the subathon format, real-time feedback and personal recognition, authentic emotional narrative, community identity construction, gamification and collective achievement, and sustained liveness and co-presence—which, when interpreted through the framework of Parasocial Interaction Theory, the Uses and Gratifications perspective, and the consumer brand engagement construct, reveal that Marapthon's massive engagement was born from the fusion of structural mechanisms with deep relational and emotional bonds, so that these six strategies can be formulated into practical input for marketers of both goods and services in designing engagement as a humane, authentic, and sustainable form of co-creation to achieve their product goals, while affirming that an inclusive digital economy must rest on humanity's relational dignity as its primary source of value.

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# THE EFFECT OF VIRTUAL TRY-ON ON CONSUMER SATISFACTION: THE MEDIATING ROLES OF EMOTIONS AND COGNITION IN INDONESIAN BEAUTY BRANDS

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***Abstract***
*This study aims to analyze the effect of virtual product trial features on customer satisfaction, with emotions and cognitive processes as mediating variables, for beauty brands in Indonesia. This study employs quantitative research methods. All consumers of beauty products who used the virtual trial feature when trying out products were part of this study's population. The research sample was obtained through non-probability sampling using purposive sampling techniques, involving 100 respondents. Data were collected through questionnaires and analyzed using SmartPLS 3. The results of this study indicate that (1) Emotion mediates the positive influence of Aesthetics on Consumer Satisfaction; (2) Cognition mediates the positive influence of Aesthetics on Consumer Satisfaction; (3) Emotion mediates the positive influence of Vividness on Consumer Satisfaction; (4) Cognition does not mediate the effect of vividness on consumer satisfaction; (5) Emotion does not mediate the effect of interactivity on consumer satisfaction; (6) Cognition does not mediate the effect of interactivity on consumer satisfaction; (7) Emotion has a positive effect on consumer satisfaction; and (8) Cognition has a positive effect on consumer satisfaction.*
***Keywords****: Augmented Reality; Virtual Try-On; Emotions; Cognitive Processes; Consumer Satisfaction*

## 1. Introduction

The beauty industry in Indonesia has experienced rapid growth, as reflected in a 21.9 percent increase in the number of cosmetics companies from 913 in 2022 to 1,010 by mid-2023 (Inang, 2024). Innovations within the beauty industry have also evolved, driven in part by the increasingly diverse consumer demand for personal care products. Consequently, beauty product manufacturers must do their utmost to meet this demand for personal care products. Beauty product innovations are diverse, encompassing product types, packaging, and ingredients.

Cosmetics are an essential part of women's daily lives. Not only do they enhance appearance, but these beauty products are also often considered indispensable for their daily routines. In this era of rapidly advancing technology, marketers have the opportunity to create innovative and effective promotional tools to introduce and promote their products to target consumers. One such tool is an app that connects brands with consumers in real time by blending the real world with the virtual world such as through virtual try-on features.

According to research conducted by Mordor Intelligence (as reported in Databoks, 2024), total spending on beauty products in Indonesia has shown consistent growth since 2020, with a compound annual growth rate (CAGR) of 7%. In 2020, spending on beauty products reached Rp 175 trillion; in 2021, it reached Rp 193 trillion; in 2022, it reached Rp 219 trillion; in 2023, it reached Rp 233 trillion; and in 2024, it reached Rp 256 trillion. According to a study conducted by Insight Factory (2024), the largest segments in the beauty industry are Millennials and Generation Z. Generation Z accounts for 54% of the market, while Millennials account for 41%.

One challenge for companies is helping consumers choose beauty products that meet their needs while also convincing them to purchase those products from the company. Companies need to design effective strategies to address this challenge. Technological advancements are driving companies to adopt virtual product trial features as part of their digital marketing strategies. These features aim to enhance the customer experience through elements such as aesthetics, vividness,

and interactivity, which can influence consumer satisfaction through emotional and cognitive processes.

## 2. Literature Review

### *2.1 Stimulus-Organism-Response (SOR)*

According to Simanihuruk et al. (2023), the S-O-R Model explains that consumer behavior is shaped through the interaction of three main elements: stimulus, organism, and response. The stimulus is an external factor that influences the consumer; the organism is the internal process within the consumer that processes the stimulus; and the response is the behavior or action that results from that process. According to Mehrabian and Russell, 1974 (as cited in Lin et al., 2024), in the S-O-R model, external factors are consideres ad stimuli that provoke individual responses, and psychological responses are mediated through the organism, illustrating the impact of stimuli on consumers' psychology and behavior. The stimulus (S) component in this study focuses on three elements of the virtual product trial*:* aesthetics, vividness, and interactivity. The organism (O) component consists of emotions and cognitive processes. The response (R) component focuses on consumer satisfaction.

### *2.2 Augmented Reality*

According to Orlosky *et al.,* 2017 (as cited in Zeynep Tacgin, 2020), Augmented Reality (AR) is a technology that overlays digital information onto the real world. This technology makes our environment more sophisticated, allowing users to complete their tasks more easily. The key feature of Augmented Reality is its ability to provide an immediate and real-time experience based on location and time, engaging all our senses through a simple yet sophisticated interface (Zeynep Tacgin, 2020). Some elements present in virtual product trials include interactivity, vividness, and aesthetics,

#### *2.2.1 Interactivity*

According to Yim et al., 2017 (as cited in Kim et al., 2022), interactivity refers to technology that enables consumers to participate in and control a website, including communication between consumers and sellers. According to Lin et al., (2024), when consumers experience a product virtually, it is not only the quality of the product's design that matters, but the consumer's emotional experience is equally important.

#### *2.2.2 Vividness*

According to Steuer, 1992 (as cited in Kim et al., 2022), vividness is the ability of technology to create experiences rich in sensory elements, making them feel realistic. This refers to how technology can present an environment that feels alive and real. Baytar et al., 2020 (as cited in Susilowati et al., 2023) state that vividness is optimized when it presents reality or objects as clearly as possible, almost resembling reality.

#### *2.2.3 Aesthetics*

Aesthetics is a response involving feelings of liking or disliking that arise from sensory perception of an object. The object may be considered beautiful, provide a sense of comfort, or create a pleasant impression through sight, touch, or hearing (Hekkert and Schifferstein, 2008, as cited in Rantamaa, 2023). According to Hoyer et al., 2020 (cited in Rantamaa, 2023**),** aesthetic experiences in virtual product trials can create cognitive, sensory, emotional, and social value.

### *2.3 Consumer Satisfaction*

Satisfaction is a person's feeling of pleasure or disappointment resulting from comparing the perceived performance or results of a product or service with their expectations. If the performance or experience does not meet expectations, customers will feel dissatisfied. However, if it meets expectations, the customer will be satisfied. If it exceeds expectations, the customer will be highly satisfied and happy (Kotler et al., 2022). In general, product

performance that exceeds expectations tends to create satisfaction and can sometimes lead to customer loyalty (Mothersbaugh and Hawkins, 2016).

### *2.4 Emotions or Hedonic Factors*

According to Mothersbaugh and Hawkins (2016), emotions are strong and relatively uncontrollable feelings that can influence behavior. According to Picot et al., 2021 (as cited in Tom Dieck et al., 2024), emotions are an important part of hedonic experiences because these experiences are driven by internal motivational factors (intrinsic motivation) that produce feelings of pleasure, enjoyment, and joy.

### *2.5 Cognitive or Utilitarian Processes*

According to Motherbaugh and Hawkins (2016), cognitive (thinking) and emotional (feelings) processes are important at every stage of the decision-making process. The cognitive component consists of consumers' beliefs about a product or object. According to Grenne, 2012 (in Tinghog et al., 2016), a specifically controlled cognitive process will promote utilitarian judgment.

### *2.6 Formulation of Hypotheses*

#### *2.6.1 The influence of aesthetics on consumer satisfaction, mediated by emotions*

According to Stockdale and Borovicka (2006), as cited in Shalabi et al., (2024), a brand's aesthetic qualities relate to consumers' perceptions of beauty, and emotional and cognitive responses to imagery may also include sensory reactions. This is also consistent with research conducted by Shalabi et al. (2024), which found that aesthetics in VR experiences have a significant positive effect on customer satisfaction, and hedonic or emotional responses partially mediate this effect. Based on the above explanation, the following hypothesis can be formulated:

**H1: Emotion mediates the positive influence of aesthetics on consumer satisfaction.**

#### *2.6.2 The Effect of Aesthetics on Consumer Satisfaction Mediated by Cognition*

Shalabi et al., (2024) state that Aesthetics, which refers to VR experiences, has a significant positive effect on customer satisfaction, and this effect is partially mediated by utilitarian responses or cognition. Zeng et al. (2023) state that a brand's beauty is related to how consumers perceive and experience that beauty. Based on the above explanation, the following hypothesis can be formulated:

**H2: Cognition mediates the positive influence of aesthetics on consumer satisfaction**

#### *2.6.3 The effect of vividness on consumer satisfaction, mediated by emotion*

Research conducted by Attri et al. (2024) indicates that Vividness positively influences customers perceptions of the hedonic value of their AR experiences in physical stores. Yim et al., 2017 (in Jung-Hwan et al., 2021), state that, in the context of virtual product trials, a high level of Vividness positively affects consumer evaluations, particularly by enhancing perceptions of usefulness and enjoyment through a sense of presence. Based on the above explanation, the following hypotheses can be formulated:

**H3: Emotion mediates the positive effect of Vividness on Consumer Satisfaction**

#### *2.6.4 The effect of Vividness on consumer satisfaction mediated by Cognition*

Research conducted by Attri et al. (2024) indicates that vividness positively influences customers utilitarian value perceptions of their AR experiences in physical stores. Keller and Block (1997, as cited in Brannon Barhorst et al., 2021) state that in AR, a product with a higher level of vividness influences the consumer's cognitive process. Based on the above explanation, the following hypotheses can be formulated:

**H4: Cognition mediates the positive effect of Vividness on consumer satisfaction.**

#### *2.6.5 The effect of interactivity on consumer satisfaction, mediated by emotion*

Huang and Liao, 2015 (as cited in Hsuan et al., 2021) state that highly interactive AR experiences generate high levels of joy, thereby linking interactivity to the hedonic dimension of consumer behavior. AR features such as vividness and interactivity positively influence consumer engagement, thereby increasing satisfaction and loyalty (Sinha and Srivastava, 2023). Based on the above explanation, the following hypothesis can be formulated:

**H5: Emotion mediates the positive effect of interactivity on consumer satisfaction**

#### *2.6.6 The effect of interactivity on consumer satisfaction, mediated by cognition*

Research conducted by Lin et al. (2024) indicates that interactivity in virtual clothing positively influences consumer satisfaction. The interactivity of virtual clothing allows consumers to customize and try on different outfits in real time within a virtual environment. According to Rahimizhian et al., 2020 (as cited in Lin et al., 2024), the real-time interaction mode of virtual applications can increase user satisfaction and significantly influence consumer purchase intent. Based on the above explanation, the following hypothesis can be formulated:

**H6: Cognition mediates the positive effect of interactivity on consumer satisfaction**

#### *2.6.7 The effect of emotion on consumer satisfaction*

According to Rahimizhian et al., 2020 (in Lin et al., 2024), when the perceived quality of a virtual product meets or exceeds consumer expectations, it typically results in high satisfaction, thereby triggering a positive emotional response. According to Lu and Hsiao, 2022 (in Lin et al., 2024), satisfaction is formed from product attributes and the feelings generated by interactive experiences, such as virtual trials. Based on the above explanation, the following hypothesis can be formulated:

**H7: Emotions have a positive effect on consumer satisfaction**

#### *2.6.8 The Influence of Cognition on Consumer Satisfaction*

Shalabi et al. (2024) state that cognition has a significant positive effect on customer satisfaction. According to Ashfaq et al., 2019 (as cited in Gabriel et al., 2023), satisfaction is a response typically cognitive or emotional that occurs when an individual has engaged in an activity, where the level of satisfaction is determined by the extent to which the activity meets their hopes, expectations, needs, and so on. Based on the above explanation, the following hypothesis can be formulated:

**H8: Cognition has a positive effect on consumer satisfaction**

## 3. Research Methods

This study employed a quantitative research method. The data used in this study were primary data obtained through the collection of responses to questions included in a questionnaire distributed to respondents. This study was conducted online and involved consumers who used the virtual product trial feature to test beauty products. The sampling technique used in this study was nonprobability sampling with a purposive sampling approach, with a total sample size of 100 respondents. The researcher selected participants based on the criteria of beauty product consumers who use the virtual product trial feature when purchasing products, specifically those aged 13–28 (Generation Z). The data collection method used in this study involved distributing questionnaires to respondents online via Google Forms through Instagram, WhatsApp, and Twitter. The measurement scale used for the variables in this study is the Likert scale (1–5). Data analysis will be conducted using SmartPLS 3.0 software. This study involves three variables: independent variables: Aesthetics, Vividness, and Interactivity, the dependent variable: Consumer Satisfaction; and mediating variables: Emotions and Cognitive Processes.

## 4. Research Findings and Discussion

### *4.1 Outer Model*

Based on the calculations, the outer loading for one of the Vividness variables in item VV4 is 0.562, indicating that it is invalid because the value is below the required threshold of >0.6. Therefore, that item must be removed. Consequently, the outer loadings after the removal are as follows:

Table 1. Outer Loading

| No | Question Item | Outer Loading Value | Status |
|---|---|---|---|
| 1 | AE1 | 0.762 | Valid |
| 2 | AE2 | 0.848 | Valid |
| 3 | AE3 | 0.755 | Valid |
| 4 | IN1 | 0.618 | Valid |
| 5 | IN2 | 0.808 | Valid |
| 6 | IN3 | 0.659 | Valid |
| 7 | IN3 | 0.800 | Valid |
| 8 | VV1 | 0.803 | Valid |
| 9 | VV2 | 0.868 | Valid |
| 10 | VV3 | 0.633 | Valid |
| 11 | KK1 | 0.889 | Valid |
| 12 | KK2 | 0.905 | Valid |
| 13 | KK3 | 0.787 | Valid |
| 14 | KK4 | 0.884 | Valid |
| 15 | EM1 | 0.840 | Valid |
| 16 | EM2 | 0.840 | Valid |
| 17 | EM3 | 0.817 | Valid |
| 18 | PK1 | 0.798 | Valid |
| 19 | PK2 | 0.776 | Valid |
| 20 | PK3 | 0.848 | Valid |

Source: Data processed using *SmartPLS* 3.0 (2025)

After removing item VV4, all statement items met the criterion for convergent validity, namely >0.6. Therefore, all of these statement items were deemed valid. In addition to Outer Loading, another measure used to assess convergent validity is Average Variance Extracted (AVE).

Table 2. Average Variance Extracted (AVE) Values.

| No | Variable | AVE Value | Status |
|---|---|---|---|
| 1 | Aesthetics | 0.634 | Valid |
| 2 | Vividness | 0.600 | Valid |
| 3 | Interactivity | 0.527 | Valid |
| 4 | Customer Satisfaction | 0.752 | Valid |
| 5 | Emotions | 0.693 | Valid |
| 6 | Cognitive Processes | 0.653 | Valid |

Source: Data processed using *SmartPLS* 3.0 (2025)

Based on the table above, the Average Variance Extracted (AVE) values for all variables are considered valid because they meet the AVE criterion of >0.50.

According to Hair Jr. et al. (2020), the Fornell-Larcker criterion is an approach for assessing discriminant validity. This approach compares the square root of the AVE value with the correlation of the latent variable. The square root of the AVE for each construct must be greater than the correlation with other constructs.

Table 3. Fornell-Larcker Criterion Values

| | Aesthetics | Vividness | Interactivity | Consumer Satisfaction | Emotions | Cognitive Process |
|---|---|---|---|---|---|---|
| Aesthetics | **0.796** | | | | | |
| Vividness | 0.520 | **0.774** | | | | |
| Interactivity | 0.446 | 0.447 | **0.726** | | | |
| Customer Satisfaction | 0.638 | 0.587 | 0.421 | **0.867** | | |
| Emotions | 0.555 | 0.598 | 0.424 | 0.649 | **0.832** | |
| Cognitive Processes | 0.626 | 0.412 | 0.417 | 0.653 | 0.560 | **0.808** |

Source: Data processed using *SmartPLS* 3.0 (2025)

Based on Table 3, all variables have Fornell-Larcker Criterion values higher than those of other latent variables, thus they are deemed valid based on the discriminant validity test. Next, a reliability test was conducted to measure the internal consistency of the measurement instrument. According to Hair Jr. *et al.* (2020), a Cronbach's alpha or composite reliability value that meets the rule of thumb is >0.7, while a value of 0.6 is still acceptable.

Table 4. Cronbach's Alpha and Composite Reliability Values

| Variable | Cronbach's Alpha | Composite Reliability | Status |
|---|---|---|---|
| Aesthetics | 0.713 | 0.838 | Reliable |
| Vividness | 0.655 | 0.815 | Reliable |
| Interactivity | 0.701 | 0.815 | Reliable |
| Customer Satisfaction | 0.890 | 0.924 | Reliable |
| Emotions | 0.778 | 0.871 | Reliable |
| Cognitive Processes | 0.734 | 0.849 | Reliable |

Source: Data analyzed using *SmartPLS* 3.0 (2025)

Based on Table 4, the Cronbach's alpha and composite reliability values indicate that all variables are reliable because they meet the established criteria namely, a Cronbach's alpha or composite reliability value greater than 0.7. However, a value of 0.6 is still considered acceptable. Regarding Cronbach's alpha, the Consumer Satisfaction variable had the highest value at 0.890, while the lowest value was for the Vividness variable at 0.655. For Composite Reliability, the highest value was for the Consumer Satisfaction variable at 0.924, and the lowest values were for the Vividness and Interactivity variables, both at 0.815.

### *4.2 Inner Model*

Inner Model testing was conducted by measuring the R-squared and F-squared values. The *R-squared* value ($R^2$) is used to measure the extent to which the independent variables influence the dependent variable. The F-squared value ($F^2$) is used to determine the extent to which the mediating variable contributes to explaining the dependent variable in a model.

**Table 5. $R^2$ Values**

| No | Variable | $R^2$ Value |
|---|---|---|
| 1 | Customer Satisfaction | 0.543 |
| 2 | Emotions | 0.448 |
| 3 | Cognitive Processes | 0.420 |

Source: Data analyzed using *SmartPLS* 3.0 (2025)

Based on Table 5, the R-squared value indicates that Aesthetics, Vividness, and Interactivity can explain 54.3% of Consumer Satisfaction, while other variables outside the scope of this study explain 45.7%. Meanwhile, Emotion has an R-squared value of 0.448, meaning that 44.8% can be explained by these three variables and 55.2% by other variables. As for the Cognitive Process, it has an R-squared value of 0.420, indicating that Aesthetics, Vividness, and Interactivity can explain 42%, while other variables outside the scope of this

study explain 58%.

**Table 6. $F^2$ Values**

| | Emotion | Consumer Satisfaction | Cognitive Process |
|---|---|---|---|
| Aesthetics | 0.110 | | 0.314 |
| Emotion | | 0.255 | |
| Interactivity | 0.018 | | 0.030 |
| Customer Satisfaction | | | |
| Cognitive Process | | 0.268 | |
| Vividness | 0.185 | | 0.006 |

Source: Data processed using *SmartPLS* 3.0 (2025)

Based on Table 6, the F-square values indicate that Aesthetics has a moderate effect on Emotion (0.110) and a large effect on Cognitive Processes (0.314). Interactivity has a low effect on Emotion (0.018) and Cognitive Process (0.030), while Vividness has a moderate effect on Emotion (0.185) and no effect on Cognitive Process (0.006). Emotion (0.255) and Cognitive Process (0.268) each have a moderate effect on Consumer Satisfaction. The strongest effect is that of Aesthetics on Cognitive Process, with a value of 0.314.

### *4.3 Hypothesis Testing*

Hypothesis testing was conducted to determine the relationships and the significance of the effects among the variables in this study.

**Table 7 Path Coefficients**

| Variable | Original sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T-Statistic (\|O/STDEV\|) | P-Values | Status |
|---|---|---|---|---|---|---|
| Aesthetics - Emotion - Customer Satisfaction | 0.124 | 0.128 | 0.055 | 2.266 | 0.024 | Significant |
| Aesthetics - Cognition - Customer Satisfaction | 0.220 | 0.214 | 0.069 | 3,188 | 0.002 | Significant |
| Vividness - Emotion - Customer Satisfaction | 0.161 | 0.156 | 0.050 | 3.3220 | 0.001 | Significant |
| Vividness - Cognition - Customer Satisfaction | 0.031 | 0.031 | 0.039 | 0.790 | 0.430 | Insignificant |
| Interactivity - Emotion - Customer Satisfaction | 0.048 | 0.051 | 0.035 | 1.357 | 0.175 | Insignificant |
| Interactivity-Cognitive-Customer Satisfaction | 0.065 | 0.066 | 0.046 | 1.405 | 0.161 | Insignificant |
| Emotion - Customer Satisfaction | 0.412 | 0.413 | 0.082 | 5.025 | 0.000 | Significant |
| Cognition - Customer Satisfaction | 0.423 | 0.415 | 0.090 | 4.713 | 0.000 | Significant |

Source: Data processed using *SmartPLS* 3.0 (2025

The hypothesis testing results reveal relationships among the variables in the research model. These relationships are further elaborated based on the results of testing each hypothesis.

a) Emotion mediates the positive effect of Aesthetics on Consumer Satisfaction
   Based on the results of hypothesis 1 test, which showed a P-value of 0.024 and a path coefficient of 0.123, the hypothesis is significant, meaning that Emotion mediates the

positive effect of Aesthetics on Consumer Satisfaction. Attractive brand aesthetics can evoke positive emotions, such as joy, interest, and admiration, when using the virtual try-on feature. These positive emotions can enhance consumer satisfaction because products that suit one's face boost self-confidence (Stockdale and Borovicka, 2006 (in Shalabi et al., 2024).

b) Cognition mediates the positive effect of aesthetics on consumer satisfaction
Based on the results of hypothesis 2 test, which showed a P-value of 0.002 and a path coefficient of 0.220, hypothesis 2 is significant, meaning that Cognition mediates the positive effect of Aesthetics on Consumer Satisfaction. These findings are consistent with the study conducted by Shalabi et al. (2024), which states that Aesthetics in VR experiences have a significant positive effect on customer satisfaction, mediated by utilitarian responses or Cognition. Brand aesthetics are related to consumers' perceptions and responses to a brand's appearance (Zeng et al., 2023). In the virtual try-on feature, the consumer experience is influenced not only by aesthetics but also by the cognitive process of understanding the information presented.

c) Emotions mediate the positive influence of vividness on consumer satisfaction
Based on the results of the hypothesis 3 test, which showed a p-value of 0.001 and a path coefficient of 0.161, Hypothesis 3 is significant, meaning that Emotion mediates the positive effect of Vividness on Consumer Satisfaction. According to Attri et al. (2024), vividness plays a crucial role in influencing how customers evaluate a product, both in terms of practical benefits (utilitarian) and emotional experiences (hedonic). Positive emotions arising from consumers' use of a virtual product trial feature with a high level of vividness will help increase their satisfaction with the use of that feature.

d) Cognition Does Not Mediate the Positive Effect of Vividness on Consumer Satisfaction
Based on the results of the test of Hypothesis 4, which showed a p-value of 0.430 and a path coefficient of 0.031, the result is not significant. This means that cognition does not mediate the positive effect of vividness on consumer satisfaction. If the cognitive process does not mediate the effect of vividness resulting from the virtual product trial feature, then it will not influence consumer satisfaction. The cognitive process plays a role in understanding and evaluating product information. In virtual try-ons, realistic visuals need to be accompanied by clear information so that consumers can engage cognitively and gain a better understanding. According to Keller and Block, 1997 (in Brannon Barhorst et al., 2021), product vividness in AR can influence consumers' cognitive processes.

e) Emotions Do Not Mediate the Positive Effect of Interactivity on Customer Satisfaction
Based on the results of the hypothesis 5 test, which showed a p-value of 0.175 and a path coefficient of 0.048, H5 is not significant, meaning that Emotion does not mediate the positive effect of Interactivity on consumer satisfaction. This implies that if Emotion does not mediate the effect of Interactivity resulting from the virtual product trial feature, it will not influence consumer satisfaction. In this study, most respondents purchased beauty products using the virtual product trial feature once every 3–6 months. This indicates that emotional involvement in purchasing is low because purchases involving the virtual product trial feature are not made frequently, so consumers do not experience satisfaction with the interactivity of that feature. Huang and Liao, 2015 (in Hsuan et al., 2021) state that highly interactive experiences when using virtual product trial features result in high levels of joy, thereby linking interactivity to the hedonic dimension of consumer behavior.

f) Cognition does not mediate the effect of interactivity on consumer satisfaction
Based on the results of the hypothesis 6 test, which showed a p-value of 0.161 and a path coefficient of 0.065, H6 is not significant, meaning that cognition does not mediate the effect of interactivity on consumer satisfaction. This implies that if the cognitive process does not mediate the effect of interactivity generated by the virtual product trial feature, it

will not influence consumer satisfaction. Virtual try-on features are intended to help consumers evaluate, compare, and select products based on clear information. However, without information regarding the product's advantages, ingredients, skin compatibility, or effects, consumers' cognitive engagement becomes less profound. According to Kim et al. (2021, in Attri et al., 2024), interactivity is influenced by the speed, mapping, and scope of interactions. If consumers feel they lack control over the virtual try-on, they will have difficulty adjusting and exploring features according to their needs and preferences.

g) Emotions have a positive effect on customer satisfaction
Based on the results of the hypothesis test for 7, which showed a p-value of 0.000 and a path coefficient of 0.412, H7 is significant, meaning that emotions positively affect consumer satisfaction. According to Rahimizhian et al., 2020 (as cited in Lin et al., 2024), when the perceived quality of a virtual product meets or exceeds consumer expectations, it typically results in high satisfaction, thereby triggering a positive emotional response. Positive emotions that can enhance consumer satisfaction can be triggered by a virtual product trial feature's ability to create a unique and memorable experience. Consumers will feel more emotionally connected when a virtual product trial feature for beauty products offers an experience different from ordinary shopping, such as allowing consumers to try products virtually in a more enjoyable way.

h) Cognition has a positive effect on consumer satisfaction
Based on the results of Hypothesis 8, which showed a p-value of 0.000 and a path coefficient of 0.423, H8 is significant, meaning that cognition has a positive effect on consumer satisfaction. According to Voicu et al., 2023 (as cited in Pratama et al., 2024), consumers who use virtual product trial apps while shopping for cosmetics online feel more satisfied with their experience. The better the cognitive process consumers experience leading them to feel that they understand, are confident, and are logical in evaluating beauty products the higher their level of satisfaction will be.

## 5. Conclusion

Based on the research findings outlined above, the conclusions of the study "The Effect of Virtual Product Trial Features on Consumer Satisfaction, with Emotions and Cognitive Processes as Mediating Variables: A Study of Beauty Brands in Indonesia" are as follows: Emotions mediate the positive effect of Aesthetics on Consumer Satisfaction; Cognition mediates the positive effect of Aesthetics on Consumer Satisfaction; emotions mediate the positive effect of vividness on consumer satisfaction; cognition does not mediate the effect of vividness on consumer satisfaction; emotions do not mediate the effect of interactivity on consumer satisfaction; cognition does not mediate the effect of interactivity on consumer satisfaction; emotions have a positive effect on consumer satisfaction; and cognition has a positive effect on consumer satisfaction.

Some recommendations from the researchers include: companies should pay closer attention to and improve the visual design of virtual product trial features to make them appear more realistic, polished, and appealing. For example, by enhancing image quality, lighting, and animations that evoke positive emotions. Companies can create features that allow consumers to view two or more products simultaneously, for example two different lipstick colors or two different types of foundation on a single screen. Companies can also include supplementary information in virtual product trials, such as product benefits, skin compatibility, and usage recommendations.

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# REFRAMING COMMUNITY-BASED TOURISM THROUGH A SERVICE-DOMINANT LOGIC PERSPECTIVE: A SYSTEMATIC LITERATURE REVIEW

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***Abstract***
*This study aims to reframe Community-Based Tourism (CBT) from a community participation approach toward a Service-Dominant Logic (SDL) perspective, emphasizing value co-creation, resource integration, and sustainable tourism development. A Systematic Literature Review (SLR) was conducted using the PRISMA framework, supported by triangulation through literature exploration and observation. Literature trends were examined using Emerald Journal Finder and SAGE Journals. Strategic Business Performance, Hospitality Industry, and Transformational Digital Marketing dominate the existing literature, while Smart Tourism Ecosystem remains relatively underexplored. The findings reveal a research gap in integrating these dimensions within CBT. This gap suggests the need to shift CBT from a community-centered model toward a collaborative service ecosystem that integrates multiple stakeholders and resources to create sustainable tourism value. This study proposes a Reframed Community-Based Tourism model that positions CBT as a collaborative service ecosystem, where value is co-created through hospitality capabilities, digital transformation, smart tourism ecosystems, and strategic business performance. The framework encourages destination managers to move beyond community empowerment toward collaborative stakeholder engagement, experience creation, and long-term digital relationships. It also supports integrated decision-making, innovation, service quality improvement, and sustainable destination competitiveness through effective resource integration and value co-creation.*
***Keywords****: Reframing Community-Based Tourism, Holistic Tourism Co-Creation, Smart Tourism Ecosystem, Hospitality industry, Destination competitiveness.*

## 1. Introduction

Tourism is often integrated into national strategies to generate employment, generate foreign exchange, redistribute income, and promote destination branding. Sustainable tourism development is a priority in Indonesia (Halit Keskin, Akgün, & Esen, 2026). Tourism development balances planning concepts, economic, socio-cultural, and ecosystem objectives to meet the needs of visitors, industry, the environment, and society. The Indonesian government, through the National Research and Innovation Agency (BRIN), serves as a foundation for developing country policy. One research development policy is the 2026 Economic and Community Governance Research Organization Program Activity.

Community-Based Tourism (CBT) encourages all levels of society to become tourism stakeholders, both directly and indirectly (Jin Zhang, Chow, & Cheong, 2026). The CBT program faces challenges in encouraging support from residents with economic conditions based on agricultural and livestock livelihoods, fragile ecosystems, and weak governance. Therefore, it is necessary to explore and accommodate the principles and essence of CBT so that it can hopefully illustrate the process of creating shared value and synergize with national economic goals.

The essence of CBT can be described as follows:

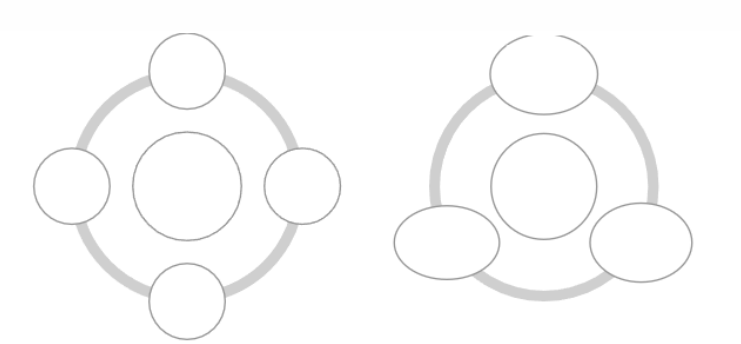


**Figure 1. The essence of Community-Based Tourism**
*Source*: Jin Zhang, Chow, & Cheong, 2026

The figure above shows that achieving the Community-Based Tourism program requires community empowerment, along with willingness and proactivity from all levels of society, and solidarity and a willingness to improve the quality of life. This phenomenon raises the question, what about the reality of the destination? In developing countries, top-down planning and weak coordination often marginalize the voices of local communities, excluding them from CBT decision-making. Meanwhile, based on the concept of Value Co-Creation (Zonatto et al., 2026; Zuo, 2026), shared value creation can be realized assuming support is based on rational cost-benefit calculations, a relational relationship between residents and tourism, becoming an economic exchange, synergizing with emotional, social, and contextual dimensions that mutually impact each other. Consequently, when communities do not experience positive impacts on their livelihoods, CBT-based policies often fail to resonate (Elbelehy & Crispim, 2026). To address this gap, the following design research was developed:

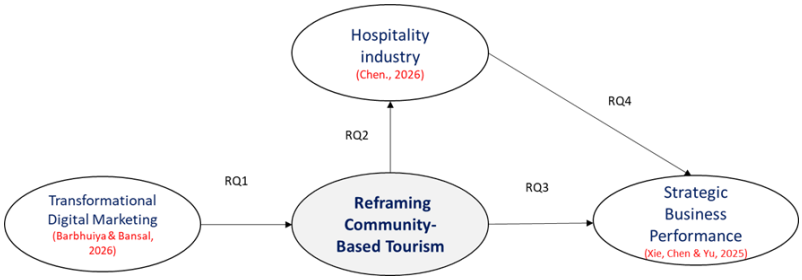



**Figure 2. Conceptual framework for Reframing Community-Based Tourism**
*Source*: adopted by author

This study investigates the mechanisms that shape community-based tourism by asking the following research questions:

1) Is the hospitality industry capable of enhancing community-based tourism reframing?
2) Does community-based tourism reframing have a positive impact on transformational digital marketing?
3) Does transformational digital marketing enhance strategic business performance?
4) How can community-based tourism reframing enhance strategic business performance?

## 2. Literature Review

### *2.1 Transformational Digital Marketing*

Platform-based digital transformation enables resource reconfiguration and advances corporate strategy (Barbhuiya & Bansal, 2026). Value co-creation views dynamic capabilities in terms of identifying resources (sensing), leveraging collaboration (seizing), and reconfiguring processes, structures, and technologies (transformation). Reframing conceptualizes dynamic capabilities as outcomes of digital transformation. Reframing has been shown to influence tourism industry performance (Wang, 2026) and destination strategic

planning (Vien Ky Nguyen et al., 2026). The dynamic capability of reframing acts as a primary driver of digital transformation. Supported by digital platforms, the tourism industry can flexibly adjust and reconfigure value-creation capabilities to manage rapidly changing destination environments. Thus, the dynamic capability of reframing empowers the tourism sector to initiate digital transformation, rebuild competitive advantage, strengthen existing capabilities, and develop new digital capabilities.

Digital transformation (Zuo, 2026) undergoes "co-evolution" toward interactive mechanisms and a shift in strategic roles to strengthen external relationships, with capability activation serving as a bridge between resource orchestration and reframing capabilities. The co-evolution of digitalization demonstrates the capability to lead resources and leverage internal strengths to enable digital agility. Digital transformation identifies various pathways for creating value through interactive digital experiences for stakeholders. The dynamic capability of reframing manifests through trend observation, opportunity exploitation, and operational transformation. Digital transformation enhances service innovation through consumer-focused adaptation (Zhao, Gao & Paas, 2026). Digital transformation aligns the tourism industry's responsiveness.

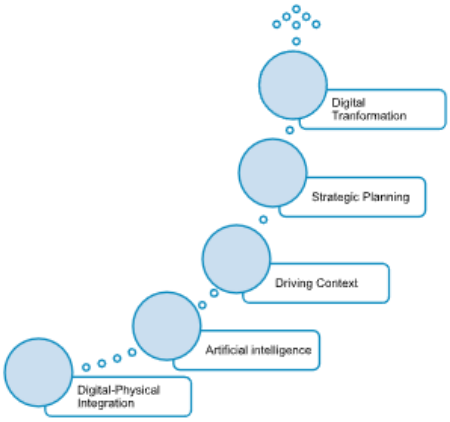



**Figure 3. Digital-Physical Integration Stage**
*Source*: adopted by author

Digital transformation strengthens the visibility and speed of tourism services (Zhao, Guan & Zheng, 2026). Operational efficiency, holistic employee behavior, and the fundamental logic of corporate digital transformation (Yap et al., 2026). Digital transformation accelerates the achievement of digital economy goals and enhances corporate performance (Zhang et al., 2026). Specifically, SMEs can leverage digital platforms to integrate resources with the ecosystem and coordinate the transformation of business processes. Strategic planning for digital transformation is driven by resource orchestration and capability activation. This strategic process identifies corporate capabilities suited to the new digital environment. Digital transformation entails the strategic activation of capabilities (Xiaojie Wu, Luo & Ma, 2026) and shapes how firms orchestrate resources. The transformation process creates a cycle of mutual influence, wherein these elements drive and refine one another.

### *2.2 Hospitality Industry*

SDL redefines how destination and industry services are created, delivered, and experienced (Zhu et al., 2026). Smart technologies serve as key drivers of personalization, operational efficiency, and stakeholder engagement. Digital technologies enable adaptive environments, customization, and service delivery, thereby enhancing satisfaction and loyalty. Digital tourism refers to the integration of digital tools, data-driven systems, and smart infrastructure that foster the co-creation of value between tourism providers and users or consumers (Zhao et al., 2026). The hospitality industry encompasses various innovations in service applications and digital platforms that collectively support personalization,

connectivity, and service optimization.

The hospitality industry functions as an interconnected socio-technical system that merges physical environments with digital consumers to enhance efficiency, interactivity, and tourist engagement (Chen, 2026). Within the tourism industry, technology enriches the service experience by enabling seamless integration among visitor needs, automated systems, and digital interfaces (Zhao et al., 2026), thereby enhancing the overall experience.

### *2.3 Strategic Business Performance*

Strategic Business Performance (SBP) is a dominant theme in management and tourism literature, as evidenced by the high volume of publications in the Emerald and SAGE databases. According to Xie, Chen, and Yu (2025), SBP reflects an organization's financial performance achievements, encompassing competitive advantage, organizational adaptability, innovation, sustainability, and long-term value creation. Measures of success include increased tourist visits or economic revenue, a destination's ability to build collaborative relationships with stakeholders, and the creation of sustainable benefits for local communities. SBP is understood as a consequence of successful value co-creation processes (Vargo & Akaka, 2009) and resource integration among actors within a service ecosystem (Adi et al., 2023). Value is created through dynamic interactions among local communities, tourists, business operators, the government, and technology providers.

Factors influencing destination competitiveness include ecology, tourist attractions, infrastructure, destination transformation (Yeh et al., 2026), and smart city development. Destination competitiveness (Vien Ky Nguyen et al., 2026) is garnering global attention in both developed and developing nations. It signifies a proactive and digital shift. Destination competitiveness is linked to economic performance and the tourism environment. A destination's socioeconomic progress correlates with its tourism growth potential. Destination competitiveness contributes significantly to advancing the digital economy, fostering digital industrialization and industrial digitalization, and embedding a distinct digital character into economic development. Digital transformation is driving significant changes within the tourism industry and tourist destinations.

Consequently, a destination's strategic performance is measured by economic indicators, the ability to build trust and strengthen collaboration, the enhancement of the quality of the tourist experience (Kumar & Adhikari, 2025), and the simultaneous creation of social, cultural, and environmental value. This perspective expands the understanding of strategic business performance from an output-oriented approach to one focused on the value-creation process. SBP serves as the outcome of "Reframed Community-Based Tourism"; when local communities, tourists, the government, business operators, and digital platforms successfully integrate resources and collaborate to co-create value, the tourism destination gains a more sustainable competitive advantage, enhances its resilience, strengthens community well-being, and achieves superior strategic performance (Barros-Arrieta et al., 2026). Thus, this study extends the concept of Strategic Business Performance from an organizational perspective to that of a service ecosystem, wherein destination success is the collective outcome of collaboration and value co-creation processes.

## 3. Research Methods

This study adopts a triangulation design (Mengmeng Zhu et al., 2026) that integrates a systematic literature review using the PRISMA protocol with exploratory and observational methods. This mixed-method approach ensures both theoretical rigor and practical relevance, aligning with research on value co-creation in the field of tourism sustainability management (Fatma & Bhatt, 2026). Combining the practical experience and knowledge of destination managers with a robust theoretical foundation derived from the systematic literature review ensures that the triangulation framework is both conceptually grounded and contextually validated. The systematic review facilitates the construction of an initial conceptual framework, while expert interviews

empirically refine, challenge, and contextualize it. Both methods are methodologically and structurally coherent.

### *3.1 Systematic literature review*

This tourism study aims to "reframe" Community-Based Tourism (CBT) (Rijal et al., 2026). This reframing seeks to shift perspectives and approaches regarding community-based tourism through the lens of SDL. The first step is to determine CBT indicators Manosuth et al., (2026) and Zhang et al. (2026) indicates that CBT indicators include: Community Empowerment, Willingness and Proactivity, Emotional Solidarity, Hospitality Industry, Smart Tourism Ecosystem, SBP, Destination

Competitiveness, Transformational Digital Marketing (Yoon & Hong, 2026), and Holistic Tourism Co-Creation. Following the identification of these nine indicators, a database search was conducted in accordance with PRISMA guidelines to ensure transparency and replicability. As this study aims to provide a reframing of Community-Based Tourism from the perspective of SDL, a brief yet comprehensive description of the literature review protocol is presented below. PRISMA guidelines illustrate transparency and reproducibility.

A literature search regarding CBT (Rodriguez et al., 2026) revealed its presence in various journals. A subsequent search was conducted using the "Emerald Journal Finder" (Mengmeng Zhu et al., 2026) on May 26, 2026. The number of articles identified based on the CBT indicator is presented in Table 1.

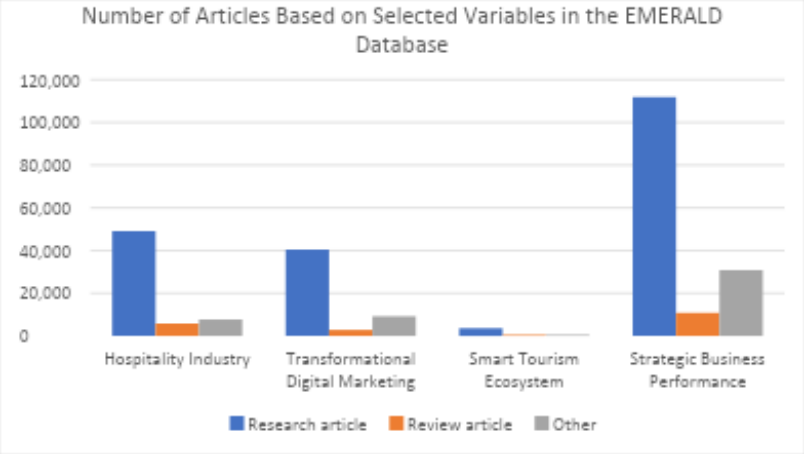
**Table 1. Reframing Community-Based Tourism from an SDL Perspective**

| No | Type | Community Empowerment | Willingness and Proactive | Emotional Solidarity | Hospitality Industry | Smart Tourism Ecosystem | Strategic Business Performance | Destination Competitiveness | Transformational Digital Marketing | Holistic Tourism Co-Creation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Research Article | 13.115 | 14.650 | 3.949 | 49.024 | 3.609 | 111.953 | 16.402 | 40.420 | 4.709 |
| 2 | Literature Review | 841 | 784 | 388 | 5.830 | 505 | 10.811 | 2.218 | 2.828 | 609 |
| 3 | Conceptual Paper | 511 | 633 | 271 | 2.599 | 203 | 7.639 | 1.069 | 2.306 | 313 |
| 4 | Case Report | 294 | 626 | 169 | 2.434 | 83 | 7.452 | 943 | 2.037 | 148 |
| 5 | Viewpoint | 209 | 608 | 159 | 2.319 | 72 | 5.690 | 795 | 1.717 | 136 |
| 6 | Review Article | 141 | 210 | 120 | 1.213 | 66 | 3.157 | 672 | 981 | 63 |
| 7 | Guest Editorial | 95 | 57 | 40 | 1.063 | 31 | 3.042 | 524 | 917 | 22 |
| 8 | Non Article | 88 | 46 | 22 | 990 | 21 | 2.369 | 305 | 649 | 14 |
| 9 | Editorial | 58 | 32 | 22 | 523 | 20 | 790 | 246 | 339 | 12 |
| 10 | Technical Paper | 19 | 16 | 20 | 428 | 11 | 681 | 98 | 266 | 10 |

*Source:* Authors' own work

Further searching was based on the "Research Article" type (Nassè, Gan, & Sampson, 2026). To ensure a more focused approach, the three categories with the highest number of articles were selected: Strategic Business Performance (Nanjundeswaraswamy & van Heerde, 2026), Hospitality Industry, and Transformational Digital Marketing. These three top categories would subsequently serve as search variables for reframing CBT. The search process then became more focused on these three "variables," utilizing a search format based on "keywords" or "variables" on the Emerald website. The search began with "Transformational Digital Marketing" (Yeh et al., 2026), followed by "Smart Tourism Ecosystem", "Hospitality Industry", and "Strategic Business Performance" (Atiya Bukhari et al., 2026), as illustrated in the following Table:

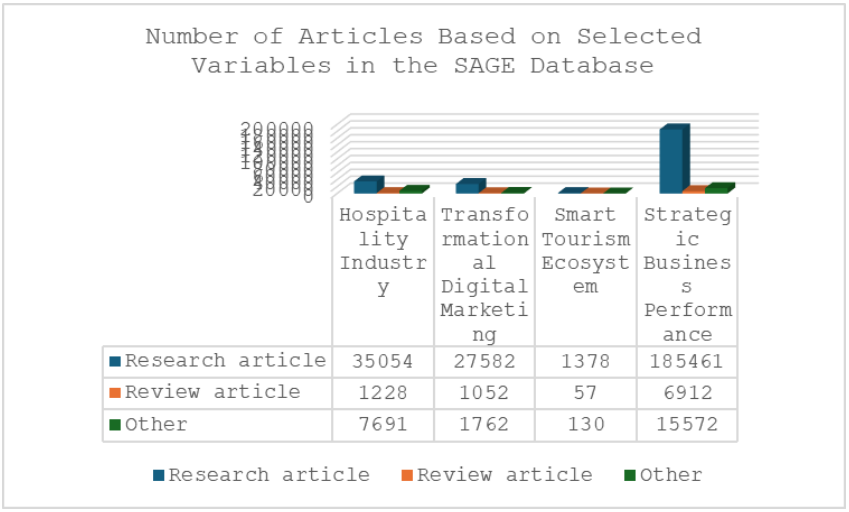
**Table 2. Number of Articles Based on Selected Variables in the EMERALD Database**




*Source*: Authors' own work

In the process of reframing community-based tourism, the most dominant constructs were identified as follows: Hospitality Industry [π = 66.423], Transformational Digital Marketing [π = 52.460], Destination Competitiveness [π = 23.272], and Strategic Business Performance [π = 153.584]. To enhance the validity of the literature search, all keywords previously obtained from Emerald were verified using the SAGE Journals Database on the same day. The objective was to ensure that the selected variables had broad and consistent coverage across international scholarly databases. After identifying keywords based on the highest article counts, a keyword search was conducted in the SAGE Database. The search results are presented in the table below.

**Table 3. Number of Articles Based on Selected Variables in the SAGE Database**




| | Hospitality Industry | Transformational Digital Marketing | Smart Tourism Ecosystem | Strategic Business Performance |
|---|---|---|---|---|
| Research article | 35054 | 27582 | 1378 | 185461 |
| Review article | 1228 | 1052 | 57 | 6912 |
| Other | 7691 | 1762 | 130 | 15572 |

*Source:* Authors' own work

Search results from the SAGE database reveal a pattern relatively consistent with that of the Emerald Journal Finder. Strategic Business Performance has the highest number of research articles (185,461), followed by Hospitality Industry (35,054) and Transformational Digital Marketing (27,582). Conversely, the Smart Tourism Ecosystem still accounts for a relatively small number of publications (1,378 research articles). The consistency of search results across both databases indicates that these three key variables are topics that have been extensively developed in international literature and are suitable as a basis for conceptual synthesis and the

reframing of community-based tourism (Shirazi et al., 2026) through the lens of Service-Dominant Logic (Mousa & Bouraoui, 2026).

The article searches and selection process follows the PRISMA flow (Abubakar & Belwal, 2026), as illustrated in the following figure.

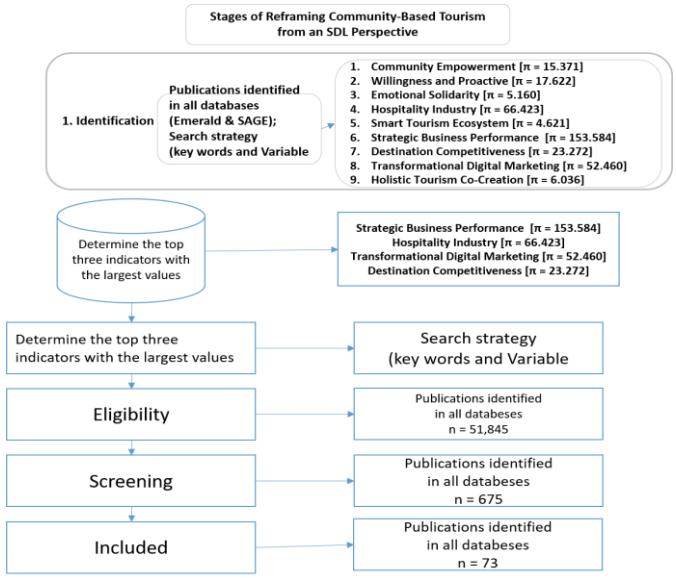



**Figure 5. Title of the fi PRISMA flow diagram indicating reviewed literature for meta-synthesis**

*Source*: Authors' own work

Following the PRISMA screening process, articles meeting the inclusion criteria were analyzed in depth (Kumari & Tiwari, 2026). The analysis examined constructs, indicators (Amin et al., 2025), conceptual definitions, and measurement instruments used in prior research. A summary of the data extraction results is presented in Table 3.

### *3.2 Article selection*

**Table 4. Title of Measurement items Reframing Community-Based Tourism**

| Constructs | Items | Adapted from |
|---|---|---|
| Hospitality Industry | Employee empowerment; Employee motivation; Service quality; Customer experience | (Sann, 2026) |
| Transformational Digital Marketing | Technology integration; Digital platforms; Customer engagement; Data-driven marketing | (Yalcinkaya et al., 2026) |
| Strategic Business Performance | Financial performance; Market performance; Competitive advantage; Organizational sustainability | (Adner & Kapoor, 2009) |
| Reframing Community-Based Tourism | To be developed through meta-synthesis from selected articles | This Study (novelty) |

*Source*: Authors' own work

## 4. Research Findings and Di Results and Discussion

A literature search across two international databases, Emerald Journal Finder and SAGE Journals, reveals varying levels of research maturity (Zhang, 2026) among the variables potentially applicable to reframing CBT from an SDL perspective. Based on the search results from Emerald

Journal Finder, the variable "Strategic Business Performance" yielded the highest number of research articles, totaling 111,953 research articles, followed by "Hospitality Industry" with 49,024 articles and "Transformational Digital Marketing" with 40,420 articles. In contrast, "Smart Tourism Ecosystem" produced only 3,609 research articles, indicating that the topic remains relatively new compared to the other three variables. Similar findings were observed in the SAGE Journals database. "Strategic Business Performance" again dominated with 185,461 research articles, followed by "Hospitality Industry" (35,054 articles) and "Transformational Digital Marketing" (27,582 articles). Meanwhile, "Smart Tourism Ecosystem" accounted for only 1,378 research articles. The consistency of search results across both databases demonstrates that "Strategic Business Performance" (Zhong & Um, 2026) is a theme that has undergone extensive development within management and business literature.

The substantial volume of publications indicates that enhancing organizational performance is a primary objective that has been extensively studied across various industrial sectors, including tourism. Consequently, this variable rests on a robust theoretical foundation, making it suitable as an outcome variable for this study. The "Hospitality Industry" variable also shows a high number of publications across both databases (Rodrigues & Calisto, 2026). This indicates that the hospitality and service industry represents a mature research context for examining interactions among organizations, customers, and stakeholders. From an SDL perspective, the hospitality industry serves as a prime example of value co-creation, as value is generated not solely by service providers but also through the active participation of customers and communities. Furthermore, "Transformational Digital Marketing" ranks third in terms of research article volume. This high publication count demonstrates that digital transformation has become a critical issue in the development of modern marketing strategies. Various studies show that integrating digital technologies, online platforms, social media, and data analytics can enhance customer engagement and strengthen value co-creation. Therefore, this variable is highly relevant to the development of increasingly digitized Community-Based Tourism (Almunawar, Musa, & Talib, 2026).

In contrast, the Smart Tourism Ecosystem variable accounts for a significantly lower number of publications compared to the other three variables (Alnawafleh et al., 2025). This disparity can be attributed to the fact that the concept of smart tourism is a relatively new field of study, evolving alongside advancements in technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Big Data, and smart destinations. Despite the lower publication volume, this variable remains significant in explaining how digital technologies connect tourists, local communities, government bodies, and industry stakeholders within a collaborative tourism ecosystem. Overall, the literature search reveals a balance between established research areas and emerging research areas. Strategic Business Performance, the Hospitality Industry, and Transformational Digital Marketing represent research themes with strong empirical foundations. In contrast, the Smart Tourism Ecosystem offers a fresh perspective on digital transformation within the tourism sector. The combination of these four variables provides a robust basis for reframing Community-Based Tourism through the lens of Service-Dominant Logic (Nogueira & Frederico, 2025), which emphasizes collaboration, resource integration, and value co-creation among all actors within the tourism ecosystem.

### *4.1 Comparative Analysis of Emerald and SAGE*

A comparison of search results across both databases reveals distinct characteristics regarding literature coverage. SAGE Journals yielded more articles on "Strategic Business Performance" (Zhang, 2026) than Emerald (185,461 vs. 111,953), indicating that SAGE offers broader coverage in strategic management, organizational studies, and business policy. Conversely, for the variables "Hospitality Industry" and "Transformational Digital Marketing", Emerald returned a relatively higher number of articles than SAGE. This demonstrates Emerald's stronger specialization in hospitality management, tourism management, and marketing, making it a highly relevant source for research on "Community-Based Tourism" (Almunawar et al., 2026). Despite the differences in article counts, the ranking patterns of the variables remained consistent across both databases. "Strategic Business Performance" consistently ranked first, followed by "Hospitality Industry", "Transformational Digital

Marketing", and "Smart Tourism Ecosystem." This consistency reinforces the validity of the variable selection in this study, as it does not rely on a single database but is instead supported by two reputable international literature sources.

Thus, the literature search process demonstrates that the selection of research variables was not subjective but was based on evidence-based literature mapping (Jurek et al., 2026). This approach provides a robust methodological justification for the selected variables, demonstrating that they represent themes of high relevance, extensive empirical support, and significant potential for constructing a conceptual model of "Reframing Community-Based Tourism" from an SDL perspective (Al-Romeedy, 2026).

### *4.2 Findings: Reframing Community-Based Tourism*

The results of this study indicate that research on CBT remains dominated by perspectives on community development (Arzumanyan, Tessier, & Wieder, 2026), community empowerment, and destination sustainability. Most studies position local communities as beneficiaries of tourism activities (Wang, 2026), whereas their involvement in value creation processes remains limited in the literature.

Through a literature mapping process using the Emerald and SAGE databases, this study identifies four conceptual clusters strongly linked to CBT development: the Hospitality Industry (Alimohammadirokni, Iskender, & Rasouli, 2026), Transformational Digital Marketing, the Smart Tourism Ecosystem (Role, 2026), and Strategic Business Performance. These four concepts consistently emerge as evolving research themes relevant to the management of community-based tourism destinations.The first finding indicates that the hospitality industry establishes a foundation regarding the importance of service quality, tourist experiences, and human resource empowerment as components of value creation. From the SDL perspective, local communities are no longer merely service providers but resource integrators who actively collaborate with tourists, the government, business operators, and other communities to create valuable tourism experiences. The second finding identifies that Transformational Digital Marketing (Alhelal, Alshiha, & Al-Romeedy, 2025) has evolved into a crucial mechanism for strengthening the relationship between destinations and tourists. Various studies confirm that the use of digital media, online platforms, social media, and data analytics enables more interactive, personalized, and collaborative communication.

Digital transformation serves not only as a promotional medium but also as a vehicle for co-creation (Adhikari, Wagleya, & Dahal, 2023) between tourists and local communities. The third finding shows that the Smart Tourism Ecosystem, despite having fewer publications than other variables, offers a fresh perspective on technology integration in tourism destination management. Literature indicates that digital technology facilitates more effective coordination among all stakeholders, thereby supporting the creation of a tourism ecosystem that is adaptive, collaborative, and sustainable. Consequently, the smart tourism concept complements the SDL perspective by integrating resources. The fourth finding indicates that Strategic Business Performance (Yahia-Marzouk, 2026) is the most dominant ultimate goal within the literature. This indicates that the successful management of tourism destinations is no longer measured solely by increases in visitor numbers, but also by the destination's ability to create competitive advantage, achieve economic sustainability, build organizational resilience, and enhance local community well-being. Consequently, strategic business performance emerges as a crucial indicator for evaluating the effectiveness of CBT implementation.

Overall, the literature synthesis suggests that the CBT concept needs to be reframed: shifting from a traditional approach centered on community participation toward a value co-creation approach (Zeamari, 2026), the core of SDL. Within this new framework, local communities are no longer viewed merely as objects of development but as key actors who, alongside tourists, the government, business operators, and technology providers, collaborate to integrate resources, share knowledge, and co-create value. This reframing drives a significant

paradigm shift. While the traditional CBT concept focuses primarily on community empowerment and the distribution of economic benefits, the SDL perspective shifts the focus to collaborative processes, resource integration (Zhong & Um, 2026), digital interaction, and value co-creation, all of which simultaneously generate higher-quality tourism experiences and enhance destination performance.

**Table 4. Reframing Community-Based Tourism from the SDL Perspective**

| No. | Traditional CBT Perspective | Reframed CBT (SDL Perspective) | Implication |
|---|---|---|---|
| 1. | Community participation | Value co-creation among multiple actors | Community becomes an active value creator |
| 2. | Local community as beneficiary | Community as resource integrator | Communities collaborate with tourists, businesses, and government |
| 3. | Tourism products | Service ecosystem | Tourism is viewed as a network of interacting actors |
| 4. | Economic benefits | Multi-dimensional value (economic, social, cultural, environmental) | Sustainability becomes the primary objective |
| 5. | Marketing activities | Transformational Digital Marketing | Digital platforms facilitate co-creation |
| 6. | Hospitality services | Hospitality experience | Tourist experience becomes the core value proposition |
| 7. | Destination management | Smart Tourism Ecosystem | Technology enables collaboration among stakeholders |
| 8. | Success measured by visitor numbers | Strategic Business Performance | Performance includes competitiveness and destination resilience |

*Source*: Authors' own work

The table above illustrates the novelty of this study. The study's originality lies in the proposed conceptual model of SDL-Based Community-Based Tourism (Tanuja & Weerakkody, 2026) a model that views CBT as a service ecosystem constructed through dynamic interactions among the Hospitality Industry, Transformational Digital Marketing, the Smart Tourism Ecosystem, and Strategic Business Performance. Unlike conventional CBT models that emphasize community participation as the primary goal, this model positions value co-creation, resource integration, and digital collaboration as the key mechanisms for generating sustainable value for all stakeholders. Consequently, this study not only revises the definition of CBT but also offers a new theoretical framework better aligned with the characteristics of tourism in the era of digital transformation (Liu et al., 2025) and the service-based economy.

Thus, this study reframes and redefines Community-Based Tourism (Elbelehy & Crispim, 2026) as follows. "Community-Based Tourism is a collaborative tourism system in which local communities, tourists, businesses, governments, and digital platforms integrate their operant and operand resources to co-create sustainable economic, social, cultural, and environmental value (Gallarza et al., 2026), leading to enhanced strategic performance and destination resilience".

## 5. Conclusion

This study aims to reframe Community-Based Tourism (CBT) (Almunawar et al., 2026) through the perspective of SDL, employing an SLR approach. A synthesis of literature from the Emerald and SAGE databases indicates that CBT development can no longer be understood merely as an approach oriented toward community participation; rather, it is a service ecosystem built through the collaboration of various actors to achieve value co-creation.

The research findings identify four key domains that consistently emerge in the literature: the Hospitality Industry, Transformational Digital Marketing, the Smart Tourism Ecosystem, and Strategic Business Performance. These four domains complement one another in establishing a new paradigm for CBT. Based on these findings, the study proposes a "Reframed Community-Based Tourism" model (Al-Romeedy, 2026), a collaborative tourism system in which local communities, tourists, business operators, the government, and digital platforms act as stakeholders who jointly integrate resources to create sustainable economic, social, cultural, and environmental value. Thus, this study expands the concept of CBT from a community participation-based approach to one centered on value co-creation (Jensen et al., 2026), resource integration, and service ecosystems frameworks that better align with the characteristics of the tourism industry in the era of digital transformation.

### *5.1 Managerial Implications*

The findings of this study offer significant implications for the management of community-based tourism destinations (Hua Tian, 2026). First, destination managers need to shift their tourism development orientation from a focus solely on community empowerment toward the development of a collaborative ecosystem involving all stakeholders. Second, enhancing hospitality quality should be viewed as a process of experience co-creation rather than merely the provision of services. Consequently, human resource capacity building, the strengthening of service culture, and community empowerment are crucial factors in creating shared value. Third, the implementation of Transformational Digital Marketing should focus on building long-term relationships with tourists through social media, digital platforms, online reservation systems, data analytics, and experience-based marketing. Digital technology must be positioned as an enabler that strengthens interactions between local communities and tourists. Fourth, the development of a Smart Tourism Ecosystem encourages local governments and destination managers to establish integrated information systems, strengthen stakeholder collaboration, and integrate digital technology into decision-making processes, thereby enhancing the competitiveness and sustainability of tourism destinations (Kastenholz, 2025).

### *5.2 Theoretical Implications*

Type your paragraphs here. For all formatting structure refer to previous This study contributes theoretically to the development of Service-Dominant Logic (SDL) by extending its application to the context of Community-Based Tourism (Mariana Simanjuntak & Situmeang, 2025). Previous research has generally explained CBT from the perspectives of community empowerment, community participation, and sustainable development. In contrast, this study demonstrates that these concepts can be understood more comprehensively through the SDL perspective, which positions all actors as resource integrators collaborating to create shared value. This research reinforces SDL propositions regarding the importance of value co-creation, service ecosystems, and resource integration as key mechanisms for establishing tourism destination competitiveness. Thus, this study expands the domain of SDL application from the general service sector to the development of community-based tourism destinations (Sun et al., 2026).

### *5.3 Implications for Future Research*

This study opens up several avenues for further research. First, the proposed "Reframed Community-Based Tourism" conceptual model (Manosuth et al., 2025) remains theoretical in nature; therefore, it requires empirical testing using a quantitative approach, for instance, through SEM AMOS. Second, future research could explore the causal relationships among the

hospitality industry, transformational digital marketing, smart tourism ecosystems, value co-creation, and strategic business performance to obtain empirical evidence regarding value formation mechanisms in community-based tourism destinations. Third, comparative studies across tourism destinations in various countries are also needed to test the generalizability of the conceptual model proposed in this study. Fourth, subsequent research could integrate recent technological advancements such as artificial intelligence, big data analytics, the Internet of Things, digital twins, and smart governance as factors that strengthen the value co-creation process within community-based tourism (Salem et al., 2026).

### *5.4 Limitations*

This study has several limitations that should be considered when interpreting the results. First, this study used an SLR approach, so the findings are conceptual in nature and have not been empirically tested. Second, the literature sources were only from two international databases: Emerald and SAGE. Although both databases have a high reputation in the fields of management, business (Ramadhan et al., 2026), and tourism, an SLR is still relevant literature indexed in other databases such as Scopus, Web of Science, ScienceDirect, SpringerLink, or Taylor & Francis. Third, the article selection process focused on the Research Article type, so some conceptual articles, books, or proceedings that could have provided additional perspectives were not included in the synthesis. Fourth, this research has not conducted a bibliometric analysis or citation network mapping (citation network analysis), so the intellectual development and evolution of Community-Based Tourism research have not been thoroughly described (Rijal et al., 2026).

### *5.5 Research Contribution*

This study contributes to the tourism literature by proposing a novel conceptual framework that reframes Community-Based Tourism from an SDL perspective. Unlike conventional CBT models that emphasize community participation, the proposed framework positions Community-Based Tourism as a collaborative service ecosystem in which value is co-created through the integration of hospitality capabilities, digital transformation, smart tourism ecosystems, and strategic business performance. This reframing extends the theoretical application of SDL while providing a comprehensive foundation for future empirical research and sustainable destination management.

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