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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.

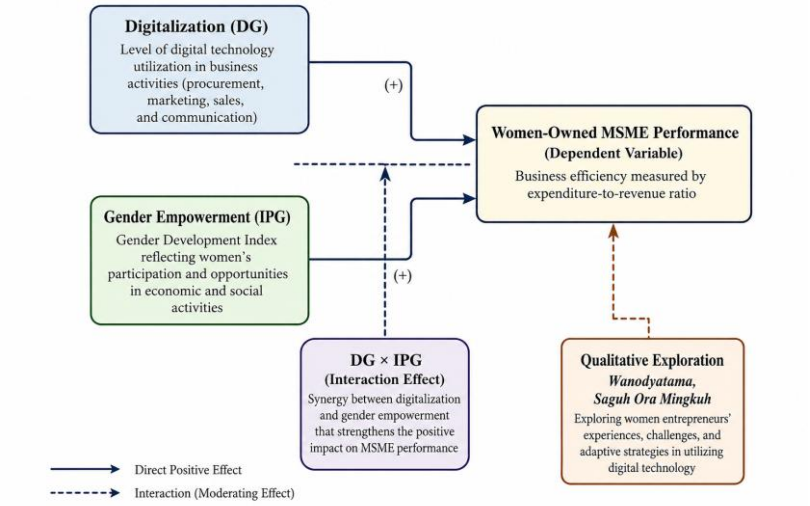


Figure 1. Conceptual Framework
Source: Developed by the authors.

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.

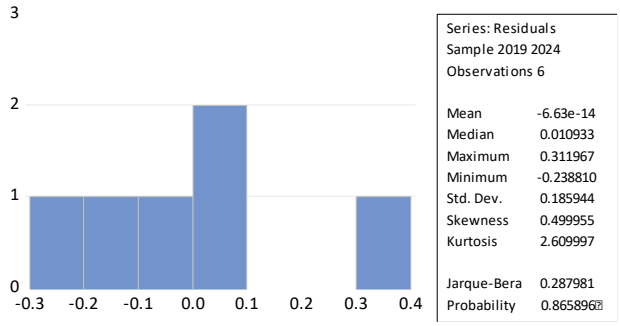


Figure 2. Normality Test
Source: Processed data (2026).

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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