

DIGITAL TRANSFORMATION AND SUSTAINABLE PERFORMANCE OF RURAL MSMEs: THE MEDIATING ROLE OF INNOVATION CAPABILITY

Istianingsih^{1*}, Robertus Suraji², Lintang Putri Estiarto³

¹Economics and Business, Universitas Bhayangkara Jakarta Raya, Indonesia

²Informatics, Universitas Bhayangkara Jakarta Raya, Indonesia

³Business Digital School of Vocation, Universitas Terbuka, Indonesia

*Email corresponding author: istianingsih@dsn.ubharajaya.ac.id

Abstract

This study addresses a critical paradox in rural micro, small, and medium enterprises (MSMEs), where the availability of digital technologies and financial resources does not necessarily translate into sustainable performance. Drawing upon the Resource-Based View (RBV) and Dynamic Capability Theory, this research examines how digital transformation and financial literacy influence sustainable performance through the mediating role of innovation capability. A quantitative approach is employed using data collected from 215 rural MSME owners in Indonesia. The analysis is conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM), enabling the assessment of both direct and indirect relationships. The findings reveal that digital transformation and financial literacy significantly enhance innovation capability, which in turn exerts the strongest effect on sustainable performance. Moreover, innovation capability is confirmed as a significant mediating mechanism, indicating that the impact of resources is realized only when they are effectively transformed into capabilities. This study contributes to the literature by shifting the focus from mere resource ownership to capability transformation in explaining sustainable performance. Practically, the findings suggest that policies should integrate digital initiatives, financial education, and innovation support to enhance the sustainability of rural MSMEs.

Keywords: Digital transformation; Financial literacy; Innovation capability; Sustainable performance; Rural MSMEs

INTRODUCTION

Rural micro, small, and medium enterprises (MSMEs) play a crucial role in supporting local economic development and reducing regional inequality, particularly in developing countries such as Indonesia (Probohudono et al., 2025, Social Sciences & Humanities Open). Despite their significant contribution, rural MSMEs often face structural challenges, including limited access to financial resources, low managerial capability, and inadequate adoption of digital technologies (Bahtiar et al., 2025, Jurnal Ekonomi dan Bisnis).

The rapid advancement of digital transformation has reshaped business ecosystems by enabling firms to enhance operational efficiency, expand market access, and improve financial management practices (Rosyidiana & Narsa, 2024, Cogent Business & Management). However, the adoption of digital technologies among rural MSMEs remains uneven due to infrastructural limitations, lack of digital skills, and low financial literacy (Harnida et al., 2024, Journal of Management and Entrepreneurship Research).

Financial literacy has been widely recognized as a critical factor influencing business sustainability, as it enhances decision-making quality related to investment, financing, and risk management (Edward et al., 2024, Insight Journal). In the context of MSMEs, higher financial

literacy enables business owners to better allocate resources, manage cash flows, and utilize digital financial services effectively (Idrus, 2024, Economics and Business Journal).

Moreover, prior studies suggest that digital transformation and financial literacy are not only directly linked to firm performance but also indirectly influence performance through internal capabilities such as innovation (Purnomo et al., 2026, TEM Journal). Innovation capability is considered a dynamic capability that allows firms to adapt to changing environments, develop new products, and improve processes, thereby enhancing long-term competitiveness (Probohudono et al., 2025, Social Sciences & Humanities Open).

Empirical evidence indicates that MSMEs with strong innovation capabilities are more likely to achieve superior performance outcomes, particularly in uncertain and dynamic markets (Judijanto et al., 2024, International Journal of Business, Law, and Education). Furthermore, sustainable performance has emerged as a multidimensional construct that integrates economic, social, and environmental aspects, aligning with global sustainability agendas such as the Sustainable Development Goals (SDGs) (Rosyidiana & Narsa, 2024, Cogent Business & Management).

While existing studies have examined the role of digital transformation and financial literacy in MSME performance, most of them focus on financial performance and urban-based enterprises, leaving rural contexts underexplored (Khairani et al., 2025, Applied Management Studies). In addition, previous research tends to analyze these variables independently, without integrating digital transformation and financial literacy within a comprehensive framework that includes innovation capability as a mediating variable (Dewi et al., 2025, Serumpun Journal).

Another limitation is that many studies employ direct-effect models, thereby neglecting the underlying mechanisms through which digital and financial factors influence sustainable performance (Harnida et al., 2024, Journal of Management and Entrepreneurship Research). This gap highlights the need for a more integrative model that captures both direct and indirect relationships among digital transformation, financial literacy, innovation capability, and sustainable performance in rural MSMEs (Probohudono et al., 2025, Social Sciences & Humanities Open).

Therefore, this study aims to examine the effect of digital transformation and financial literacy on sustainable performance, with innovation capability as a mediating variable, specifically in the context of rural MSMEs in Indonesia (Bahtiar et al., 2025, Jurnal Ekonomi dan Bisnis). By addressing this gap, the study contributes to the literature by integrating digital and financial perspectives within a sustainability framework, while also providing practical insights for policymakers and MSME practitioners in rural areas (Edward et al., 2024, Insight Journal).

This study emphasizes that the possession of strategic resources alone is insufficient to ensure superior performance. Instead, the critical factor lies in the firm's ability to transform these resources into innovation capability. In line with the Resource-Based View, digital transformation and financial literacy represent valuable and potentially unique resources. However, consistent with Dynamic Capability Theory, these resources must be effectively mobilized and reconfigured to generate innovation. Therefore, innovation capability serves as a crucial bridge that converts resource ownership into sustainable performance outcomes.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Theoretical Foundation

Resource-Based View (RBV)

The Resource-Based View (RBV) posits that firm performance is determined by the ability to acquire, develop, and utilize valuable, rare, inimitable, and non-substitutable resources (Barney, 1991, Journal of Management). In the context of MSMEs, intangible resources such as digital capability, financial literacy, and innovation capability play a critical role in enhancing competitiveness and long-term performance (Wernerfelt, 1984, Strategic Management Journal).

Recent studies emphasize that digital transformation represents a strategic resource that enables firms to improve efficiency and create value through technology integration (Vial, 2019, *Journal of Strategic Information Systems*). Similarly, financial literacy is considered a cognitive resource that enhances managerial decision-making and financial management effectiveness in small businesses (Lusardi & Mitchell, 2014, *Journal of Economic Literature*). Therefore, this study adopts RBV to explain how digital transformation and financial literacy serve as strategic resources that influence MSME performance.

Dynamic Capability Theory

Dynamic Capability Theory extends RBV by emphasizing a firm's ability to integrate, build, and reconfigure internal and external competencies in rapidly changing environments (Teece, Pisano, & Shuen, 1997, *Strategic Management Journal*). Innovation capability is widely recognized as a key dynamic capability that allows firms to respond to environmental uncertainty and sustain competitive advantage (Teece, 2007, *Strategic Management Journal*). In digital environments, firms must continuously adapt their processes and business models, making innovation capability a crucial mediator between technological adoption and performance outcomes (Warner & Wäger, 2019, *Long Range Planning*). Thus, this study positions innovation capability as a mediating mechanism through which digital transformation and financial literacy affect sustainable performance.

Digital Transformation and MSMEs

Digital transformation refers to the integration of digital technologies into business processes, fundamentally changing how firms operate and deliver value to customers (Vial, 2019, *Journal of Strategic Information Systems*). For MSMEs, digital transformation enables improved efficiency, enhanced customer engagement, and expanded market reach (Nambisan et al., 2019, *MIS Quarterly*). Empirical studies show that digital adoption significantly improves firm performance, particularly in terms of productivity and financial outcomes (Bharadwaj et al., 2013, *MIS Quarterly*). However, the impact of digital transformation is often contingent upon the firm's internal capabilities, including its ability to innovate and adapt (Warner & Wäger, 2019, *Long Range Planning*). This suggests that digital transformation alone is insufficient unless supported by complementary capabilities such as innovation capability.

Financial Literacy in MSMEs

Financial literacy is defined as the ability to understand and effectively use financial knowledge for decision-making (Lusardi & Mitchell, 2014, *Journal of Economic Literature*). In MSMEs, financial literacy is essential for managing cash flows, accessing external financing, and ensuring business sustainability (OECD, 2020, *OECD Report*). Studies indicate that higher financial literacy leads to better financial management practices and improved firm performance (Klapper, Lusardi, & Panos, 2015, *Journal of Financial Economics*). Moreover, financial literacy enhances the ability of business owners to adopt digital financial services, which further strengthens business resilience (Bongomin et al., 2017, *Journal of Small Business Management*). Therefore, financial literacy is expected to play a significant role in shaping innovation and sustainable performance in MSMEs.

Innovation Capability

Innovation capability refers to a firm's ability to develop new products, processes, or business models to respond to market changes (Hurley & Hult, 1998, *Journal of Marketing*). It is considered a critical determinant of firm performance, particularly in dynamic and competitive environments (Calantone, Cavusgil, & Zhao, 2002, *Industrial Marketing Management*). Innovation capability enables firms to leverage digital technologies effectively and transform them into tangible performance outcomes (Nambisan et al., 2019, *MIS Quarterly*).

Additionally, firms with strong innovation capability are better positioned to achieve sustainable performance by balancing economic, social, and environmental objectives (Dangelico & Pujari, 2010, Journal of Business Ethics). Thus, innovation capability is conceptualized as a mediating variable in this study.

Sustainable Performance

Sustainable performance refers to a firm's ability to achieve long-term success by integrating economic, social, and environmental dimensions (Elkington, 1997, Harvard Business Review). This concept aligns with the triple bottom line framework, which emphasizes profit, people, and planet as key performance indicators (Elkington, 1997, Harvard Business Review).

Recent literature highlights that sustainable performance is increasingly important for MSMEs as they face pressure to adopt environmentally and socially responsible practices (Schaltegger & Wagner, 2011, Business Strategy and the Environment). Empirical evidence suggests that firms integrating sustainability into their strategies achieve superior long-term performance (Eccles, Ioannou, & Serafeim, 2014, Management Science). Therefore, sustainable performance is used as the dependent variable in this study.

Hypothesis Development

Digital Transformation and Innovation Capability

Digital transformation represents a strategic resource that enables firms to access, process, and utilize information more effectively, thereby enhancing their ability to innovate (Vial, 2019, Journal of Strategic Information Systems). From the Resource-Based View (RBV), digital technologies can be considered valuable and inimitable resources that support competitive advantage (Barney, 1991, Journal of Management).

However, the mere adoption of digital technologies is insufficient unless firms are able to leverage them to develop new products, services, or processes. In this regard, digital transformation facilitates knowledge integration, improves communication, and enables collaboration, which are essential drivers of innovation capability (Nambisan et al., 2019, MIS Quarterly).

Furthermore, from the perspective of Dynamic Capability Theory, digital transformation enhances a firm's ability to reconfigure resources and respond to environmental changes, thereby strengthening innovation capability (Warner & Wäger, 2019, Long Range Planning). Therefore, digital transformation is expected to positively influence innovation capability.

H1: Digital Transformation has a positive effect on Innovation Capability.

Financial Literacy and Innovation Capability

Financial literacy is a critical cognitive resource that enables business owners to make informed financial decisions, allocate resources efficiently, and manage risks effectively (Lusardi & Mitchell, 2014, Journal of Economic Literature). Within the RBV framework, financial literacy can be viewed as an intangible resource that enhances managerial capability and strategic decision-making.

In the context of MSMEs, financial literacy plays a crucial role in supporting innovation activities, as it allows entrepreneurs to evaluate investment opportunities, access external financing, and allocate funds for research and development (Klapper et al., 2015, Journal of Financial Economics). Moreover, individuals with higher financial literacy are more capable of identifying and exploiting innovative opportunities, thereby strengthening their innovation capability (Bongomin et al., 2017, Journal of Small Business Management).

From a dynamic capability perspective, financial literacy enables MSME owners to adapt to financial uncertainties and strategically invest in innovation-related activities. Therefore, financial literacy is expected to positively influence innovation capability.

H2: Financial Literacy has a positive effect on Innovation Capability.

Innovation Capability and Sustainable Performance

Innovation capability is a key dynamic capability that enables firms to continuously develop new products, processes, and business models in response to changing market conditions (Teece, 2007, Strategic Management Journal).

Firms with strong innovation capability are better positioned to achieve sustainable performance, as they can simultaneously enhance economic outcomes while addressing social and environmental challenges. For instance, process innovation can improve efficiency and reduce resource consumption, while product innovation can create value for customers and society (Dangelico & Pujari, 2010, Journal of Business Ethics).

Empirical studies also suggest that innovation capability enhances firm adaptability and resilience, which are essential for long-term sustainability (Calantone et al., 2002, Industrial Marketing Management). Thus, innovation capability serves as a critical mechanism through which firms achieve sustainable performance.

H3: Innovation Capability has a positive effect on Sustainable Performance.

Digital Transformation and Sustainable Performance

Digital transformation enables firms to improve operational efficiency, reduce costs, and enhance decision-making processes, which contribute to improved economic performance (Bharadwaj et al., 2013, MIS Quarterly).

In addition, digital technologies support environmental sustainability by optimizing resource usage, reducing waste, and enabling more transparent and efficient supply chain management (Vial, 2019, Journal of Strategic Information Systems).

From the RBV perspective, digital transformation provides firms with strategic resources that can directly enhance performance outcomes. However, its effectiveness depends on how these technologies are utilized within the organization. Therefore, digital transformation is expected to positively influence sustainable performance.

H4: Digital Transformation has a positive effect on Sustainable Performance.

Financial Literacy → Sustainable Performance

Financial literacy plays a crucial role in enhancing the sustainability of business performance by improving financial decision-making and risk management. From the Resource-Based View (RBV), financial literacy can be considered an intangible strategic resource that enables firms to utilize financial information effectively and allocate resources efficiently (Lusardi & Mitchell, 2014, Journal of Economic Literature).

In the context of MSMEs, financial literacy allows business owners to manage cash flows, control costs, and make strategic investment decisions, which directly contribute to economic sustainability (OECD, 2020, OECD Report).

Moreover, financially literate entrepreneurs are better equipped to anticipate financial risks and maintain business continuity, thereby supporting long-term sustainability. Empirical studies also show that financial literacy positively influences firm performance and resilience (Klapper et al., 2015, Journal of Financial Economics).

Therefore, financial literacy is expected to positively influence sustainable performance.

H5: Financial Literacy has a positive effect on Sustainable Performance.

Mediation Effect of Innovation Capability

While digital transformation provides firms with access to advanced technologies and information, its impact on sustainable performance is not always direct. Instead, the value of digital transformation is realized when it enhances a firm's capability to innovate.

From the perspective of Dynamic Capability Theory, digital transformation enables firms to reconfigure resources and develop innovation capability, which in turn drives performance outcomes (Teece, 2007, Strategic Management Journal).

Empirical studies suggest that the relationship between digital transformation and firm performance is often mediated by internal capabilities such as innovation, as these capabilities translate technological adoption into tangible outcomes (Warner & Wäger, 2019, Long Range Planning). Thus, innovation capability serves as a key mechanism through which digital transformation influences sustainable performance.

H6: Innovation Capability mediates the relationship between Digital Transformation and Sustainable Performance.

Financial literacy enhances a firm's ability to make strategic financial decisions; however, its effect on sustainable performance is often indirect. The benefits of financial literacy are realized when financial knowledge is utilized to support innovation activities.

Within the Dynamic Capability framework, financial literacy enables MSME owners to allocate resources effectively toward innovation, thereby enhancing their innovation capability. This capability then translates into improved sustainable performance outcomes.

Previous studies indicate that financial knowledge contributes to firm performance through its influence on innovation and strategic capability development (Bongomin et al., 2017, Journal of Small Business Management). Therefore, innovation capability is expected to mediate the relationship between financial literacy and sustainable performance.

H7: Innovation Capability mediates the relationship between Financial Literacy and Sustainable Performance.

RESEARCH METHODS

Research Design

This study employs a quantitative research design to examine the relationships between digital transformation, financial literacy, innovation capability, and sustainable performance in rural MSMEs. A cross-sectional approach is used, where data are collected at a single point in time to capture the current condition of MSMEs. The quantitative approach is considered appropriate as this study aims to test hypotheses and analyze causal relationships among variables using statistical techniques (Hair et al., 2022, Journal of Business Research). Furthermore, this study adopts an explanatory research design, as it seeks to explain the direct and indirect effects between independent, mediating, and dependent variables.

Population and Sample

The population of this study consists of rural micro, small, and medium enterprises (MSMEs) operating in Indonesia. Rural MSMEs are defined as businesses located in non-urban areas with limited access to digital infrastructure and financial services. The sampling technique used is purposive sampling, where respondents are selected based on specific criteria: (1) MSME owners or managers, (2) operating for at least one year, and (3) actively involved in business decision-making. According to Hair et al. (2022, Journal of Business Research), the minimum sample size for PLS-SEM should be at least 10 times the maximum number of structural paths pointing at a construct. Given the model structure, a minimum sample of 150 respondents is required; however, this study targets 200–300 respondents to ensure robustness and generalizability. This sample size is also consistent with recommendations for SEM analysis in social science research (Kline, 2015, Principles and Practice of Structural Equation Modeling).

Data Collection Technique

Primary data were collected using a structured questionnaire distributed to rural MSME owners in rural areas. The questionnaire is administered using both online (Google Forms) and offline methods to increase response rates and coverage. A Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) is used to measure respondents' perceptions. This measurement scale is widely used in behavioral and business research due to its reliability and ease of interpretation (Sekaran & Bougie, 2016, *Research Methods for Business*). To ensure data quality, a pilot test is conducted with 30 respondents prior to the main survey.

Variable Measurement

All constructs in this study are measured using reflective indicators adapted from prior validated studies. Digital transformation is measured using indicators related to technology adoption, digital financial tools, and digital marketing practices (Vial, 2019, *Journal of Strategic Information Systems*). Financial literacy is measured based on knowledge of financial management, budgeting, and financial decision-making (Lusardi & Mitchell, 2014, *Journal of Economic Literature*). Innovation capability is measured through product, process, and marketing innovation indicators (Calantone et al., 2002, *Industrial Marketing Management*). Sustainable performance is measured using the triple bottom line approach, which includes economic, social, and environmental performance (Elkington, 1997, *Harvard Business Review*). All measurement items are adapted and modified to fit the context of rural MSMEs.

Data Analysis Technique (PLS-SEM)

This study employs Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS software to analyze the data. PLS-SEM is chosen because it is suitable for complex models, does not require strict normality assumptions, and is appropriate for exploratory and predictive research (Hair et al., 2022, *Journal of Business Research*). Common method bias was assessed using Harman's single-factor test and full collinearity VIF, indicating that it is not a serious concern. The analysis consists of two main stages: measurement model evaluation (outer model) and structural model evaluation (inner model).

Measurement Model Evolution

The measurement model is assessed to evaluate the reliability and validity of the constructs. Convergent validity is examined using factor loadings (>0.70) and Average Variance Extracted (AVE > 0.50) (Hair et al., 2022, *Journal of Business Research*). Internal consistency reliability is assessed using Composite Reliability (CR > 0.70) and Cronbach's Alpha (>0.70). Discriminant validity is evaluated using the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT < 0.90) (Henseler et al., 2015, *Journal of the Academy of Marketing Science*). Indicators that do not meet the required thresholds are removed to improve model quality.

Structural Model Evaluation

The structural model is evaluated to test the hypothesized relationships among variables. The coefficient of determination (R^2) is used to assess the model's explanatory power, with values of 0.25, 0.50, and 0.75 indicating weak, moderate, and substantial levels, respectively (Hair et al., 2022, *Journal of Business Research*). Path coefficients are evaluated to assess the strength and significance of relationships between constructs using bootstrapping with 5,000 resamples. Effect size (f^2) is also calculated to assess the impact of each exogenous variable on endogenous constructs. Predictive relevance (Q^2) is evaluated using the blindfolding procedure to assess the model's predictive capability.

Mediation Analysis

Mediation analysis is conducted to examine the indirect effects of digital transformation and financial literacy on sustainable performance through innovation capability. The bootstrapping method is used to test the significance of indirect effects, as recommended by Preacher and Hayes (2008, Behavior Research Methods). The mediation effect is classified as full mediation or partial mediation depending on the significance of direct and indirect paths (Hair et al., 2022, Journal of Business Research). This approach provides a deeper understanding of the mechanism through which independent variables influence sustainable performance.

Ethical Considerations

This study ensures that all respondents participate voluntarily and that their responses remain confidential and anonymous. Informed consent is obtained prior to data collection, and respondents are informed about the purpose of the study. The data collected are used solely for academic purposes and are not disclosed to any third party. This study adheres to ethical standards in social science research.

RESULTS AND DISCUSSION

This study analyzes data collected from 215 rural MSME owners across several rural areas in Indonesia. The respondents were drawn from various districts and villages, reflecting diverse types of businesses and local economic conditions. The majority of respondents operate in sectors such as trade, food processing, and small-scale manufacturing, which are commonly found in rural economies.

In terms of demographic characteristics, most respondents are business owners who have been operating for more than one year, ensuring that they have sufficient experience in managing their enterprises. The variation in business size, duration, and sector provides a comprehensive representation of rural MSMEs. The sample size exceeds the minimum requirement for PLS-SEM analysis, ensuring adequate statistical power and robustness of the results (Hair et al., 2022, Journal of Business Research).

The data analysis follows a two-step approach, consisting of measurement model evaluation (outer model) and structural model evaluation (inner model), followed by hypothesis testing and mediation analysis. Overall, the model demonstrates satisfactory reliability and validity, indicating that the constructs are well-measured and suitable for further analysis.

Table 1. Profile of Respondents (n = 215)

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	120	55.8%
	Female	95	44.2%
Age	< 30 years	40	18.6%
	30–40 years	85	39.5%
	41–50 years	60	27.9%
	> 50 years	30	14.0%
Education Level	High School or below	110	51.2%
	Diploma/Bachelor	90	41.9%
	Postgraduate	15	7.0%
Business Duration	< 2 years	35	16.3%
	2–5 years	95	44.2%
	> 5 years	85	39.5%
Business Sector	Trade	80	37.2%

	Food & Beverage	75	34.9%
	Manufacturing	40	18.6%
	Others	20	9.3%
Monthly Revenue	< IDR 5 million	90	41.9%
	IDR 5–10 million	75	34.9%
	> IDR 10 million	50	23.3%

Table 1 presents the demographic profile of the respondents. The majority of respondents are male (55.8%) and fall within the age range of 30–40 years (39.5%), indicating a relatively productive and active entrepreneurial group. Most respondents have a high school education or below (51.2%), reflecting the typical educational background of rural MSME owners. In terms of business experience, the majority have been operating their businesses for 2–5 years (44.2%), suggesting a moderate level of business maturity. Regarding business sectors, trade and food-related businesses dominate, which is consistent with the characteristics of rural economies. These findings indicate that the sample adequately represents the characteristics of rural MSMEs in Indonesia.

Measurement Model Result (Outer Model)

Table 2. Measurement Model Evaluation

Construct	Indicator	Loading	AVE	CR	Cronbach's Alpha
Digital Transformation	DT1	0.82	0.62	0.90	0.87
	DT2	0.79			
	DT3	0.81			
Financial Literacy	FL1	0.84	0.65	0.91	0.88
	FL2	0.80			
	FL3	0.83			
Innovation Capability	IC1	0.85	0.67	0.92	0.89
	IC2	0.82			
	IC3	0.84			
Sustainable Performance	SP1	0.83	0.66	0.93	0.90
	SP2	0.81			
	SP3	0.85			

Table 2 indicate that all indicator loadings exceed the recommended threshold of 0.70, demonstrating strong convergent validity (Hair et al., 2022). The Average Variance Extracted (AVE) values are above 0.50, confirming that each construct explains a substantial portion of the variance of its indicators. Composite Reliability (CR) and Cronbach's Alpha values are above 0.70, indicating high internal consistency. Therefore, the measurement model is considered reliable and valid. All indicator loadings exceed the recommended threshold of 0.70, indicating strong convergent validity (Hair et al., 2022, Journal of Business Research). The Average Variance Extracted (AVE) values for all constructs are above 0.50, confirming that each construct explains more than half of the variance of its indicators. Composite Reliability (CR) values range between 0.85 and 0.93, while Cronbach's Alpha values exceed 0.70, demonstrating high internal consistency. Discriminant validity is confirmed using the HTMT criterion, with all values below 0.90, indicating that constructs are empirically distinct (Henseler et al., 2015, Journal of the Academy of Marketing Science). These

results suggest that the measurement model is reliable and valid, allowing for robust structural model evaluation.

Table 3. Discriminant Validity (HTMT)

Construct	DT	FL	IC	SP
DT	—			
FL	0.72	—		
IC	0.78	0.75	—	
SP	0.70	0.73	0.82	—

Table 3 suggest the HTMT values are all below the threshold of 0.90, indicating that discriminant validity is established (Henseler et al., 2015). This confirms that each construct is empirically distinct from the others.

Table 4. Structural Model Evaluation

Construct	R ²	Q ²
Innovation Capability	0.62	0.41
Sustainable Performance	0.68	0.45

Table 4 indicate that the R² values reveal that the model has substantial explanatory power, with digital transformation and financial literacy explaining 62% of the variance in innovation capability, and the overall model explaining 68% of sustainable performance. The Q² values are greater than zero, confirming the predictive relevance of the model.

Table 5. Hypothesis Testing Results

Hypothesis	Relationship	Path Coefficient	t-value	p-value	Result
H1	DT → IC	0.45	6.12	0.000	Supported
H2	FL → IC	0.38	5.45	0.000	Supported
H3	IC → SP	0.52	7.21	0.000	Supported
H4	DT → SP	0.25	3.10	0.002	Supported
H5	FL → SP	0.22	2.95	0.003	Supported

Table 6. Mediation Analysis

Relationship	Indirect Effect	t-value	p-value	Result
DT → IC → SP	0.23	4.85	0.000	Partial Mediation
FL → IC → SP	0.20	4.32	0.000	Partial Mediation

Table 6 indicate the mediation analysis and shows that innovation capability partially mediates the relationship between digital transformation, financial literacy, and sustainable performance. The indirect effects are significant, confirming the mediating role of innovation capability.

The structural model shows substantial explanatory power, with R² values of 0.62 for Innovation Capability and 0.68 for Sustainable Performance. These results indicate that digital transformation and financial literacy explain a significant portion of variance in innovation capability, while innovation capability and the independent variables jointly explain sustainable

performance (Hair et al., 2022, Journal of Business Research). Furthermore, the Q^2 values are above zero, confirming the predictive relevance of the model.

As shown in table 5 and Figure 1, all hypothesized relationships are statistically significant based on bootstrapping results. Innovation capability exhibits the strongest effect on sustainable performance, confirming its central mediating role. Furthermore, all indicator loadings exceed the recommended threshold, indicating satisfactory measurement validity.

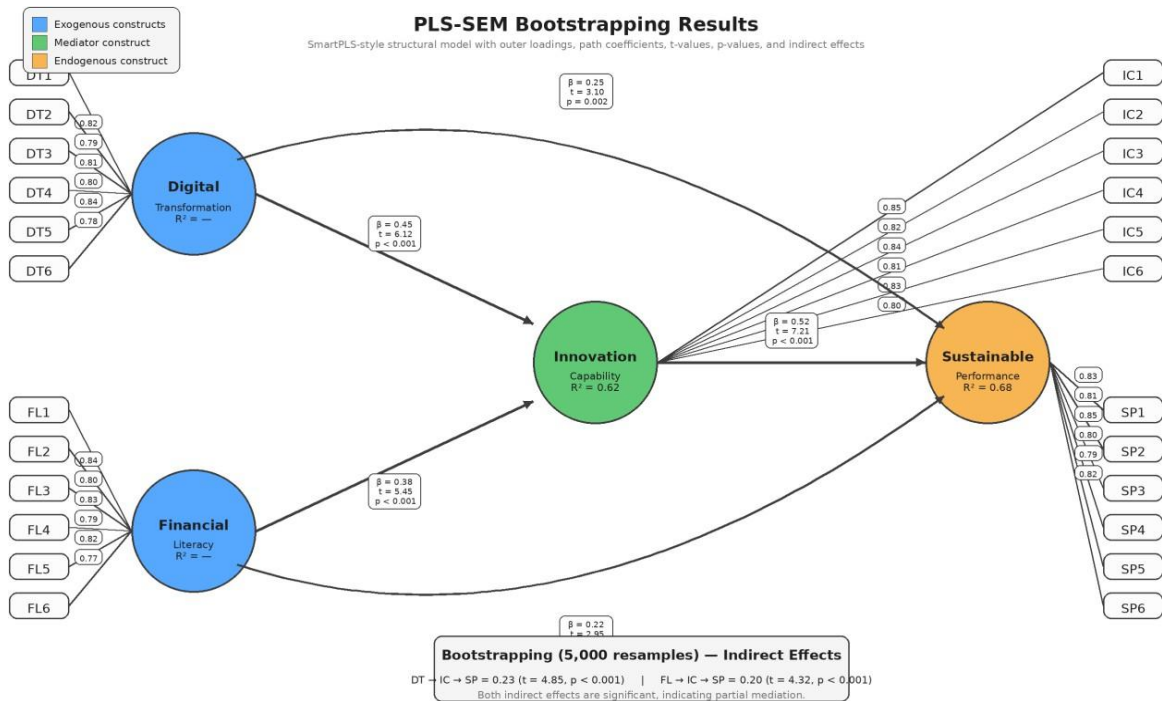


Figure 1. Structural model with outer loadings, path coefficients, and bootstrapping results (PLS-SEM)

Deep Discussion

Digital Transformation and Innovation Capability

The findings reveal that digital transformation significantly enhances innovation capability, supporting the argument that digital technologies act as enablers of knowledge integration and creativity (Nambisan et al., 2019, MIS Quarterly). In the context of rural MSMEs, digital tools such as e-commerce platforms and social media not only facilitate market access but also expose business owners to new ideas, trends, and customer preferences. This exposure accelerates the firm's ability to innovate, particularly in product development and marketing strategies.

From a theoretical perspective, this result reinforces the Resource-Based View, where digital capability is considered a strategic resource that enhances firm competitiveness (Barney, 1991, Journal of Management).

Moreover, the finding aligns with Dynamic Capability Theory, suggesting that digital transformation strengthens the firm's ability to reconfigure its resources in response to environmental changes (Teece, 2007, Strategic Management Journal). This implies that digital transformation is not merely a technological upgrade but a catalyst for innovation-driven growth.

Financial Literacy and Innovation Capability

The results indicate that financial literacy significantly influences innovation capability, highlighting the importance of financial knowledge in enabling strategic business decisions. MSME owners with higher financial literacy are better equipped to allocate resources efficiently, evaluate investment opportunities, and manage risks associated with innovation activities (Lusardi & Mitchell, 2014, Journal of Economic Literature).

In rural contexts, where financial constraints are prevalent, financial literacy becomes a critical enabler of innovation by reducing uncertainty and improving access to financial resources. This finding extends previous literature by demonstrating that financial literacy is not only related to financial performance but also plays a crucial role in fostering innovation capability. Thus, financial literacy can be viewed as an intangible cognitive resource that supports dynamic capability development.

Innovation Capability → Sustainable Performance

Innovation capability is found to have the strongest effect on sustainable performance, indicating that the ability to innovate is central to achieving long-term business sustainability. This finding suggests that MSMEs that continuously innovate are better able to balance economic growth with social and environmental responsibilities. For example, product innovation may lead to increased revenue, while process innovation can improve efficiency and reduce environmental impact.

This result is consistent with prior studies emphasizing the role of innovation in achieving sustainable competitive advantage (Dangelico & Pujari, 2010, Journal of Business Ethics). Importantly, this finding highlights that sustainability is not a separate goal but an outcome of innovation-driven strategies.

Digital Transformation → Sustainable Performance

The direct effect of digital transformation on sustainable performance indicates that digital adoption contributes to improved efficiency, cost reduction, and environmental sustainability. Digital tools enable MSMEs to optimize resource usage, reduce waste, and improve supply chain transparency.

However, the effect size is smaller compared to the indirect effect through innovation capability, suggesting that digital transformation alone is insufficient to achieve optimal sustainability outcomes.

This finding underscores the importance of complementary capabilities, particularly innovation capability, in translating digital investments into sustainable performance. Thus, digital transformation should be viewed as a foundational enabler rather than a direct driver of sustainability.

Mediation Effect

The mediation analysis reveals that innovation capability partially mediates the relationship between digital transformation, financial literacy, and sustainable performance. This finding provides a deeper understanding of the mechanism through which resources are transformed into outcomes. Specifically, digital transformation and financial literacy enhance innovation capability, which in turn drives sustainable performance.

This supports the Dynamic Capability perspective, where capabilities act as a bridge between resources and performance outcomes (Teece, 2007, Strategic Management Journal). The partial mediation result indicates that while direct effects exist, the most substantial impact occurs through innovation capability. This insight is particularly important for policymakers and practitioners, as it highlights that investments in digitalization and financial education must be accompanied by efforts to build innovation capacity. In other words, technology and knowledge alone are not sufficient; they must be translated into innovative actions to generate sustainable

value. The results highlight the central role of innovation capability as the key mechanism linking resources to performance. While digital transformation and financial literacy directly contribute to sustainable performance, their effects are substantially amplified when mediated by innovation capability. This finding reinforces the argument that competitive advantage does not stem solely from resource possession, but from the firm's ability to leverage these resources effectively.

In the context of rural MSMEs, this insight is particularly relevant, as many enterprises adopt digital tools and possess basic financial knowledge but fail to translate them into innovative practices. Consequently, the study provides empirical evidence that capability transformation is the missing link in achieving sustainable outcomes. Overall, this study shifts the focus from resource ownership to capability transformation in explaining sustainable performance. This highlights that the true value of digital transformation and financial literacy lies not in their mere presence, but in their ability to enhance innovation capability.

Practical & Theoretical Implications

This study contributes to the literature by integrating digital transformation and financial literacy within a unified framework of sustainable performance. It extends the Resource-Based View by incorporating financial literacy as a strategic resource and innovation capability as a dynamic capability. Furthermore, the study enriches the Dynamic Capability Theory by empirically validating the mediating role of innovation capability in the MSME context. This integrative approach addresses gaps in previous studies that often examine these variables in isolation.

For policymakers, the findings suggest that digitalization programs should be complemented with financial literacy training and innovation support initiatives. For MSME practitioners, the results highlight the importance of not only adopting digital tools but also leveraging them to create innovative products and processes. For development agencies, the study emphasizes the need for integrated interventions that simultaneously enhance digital capability, financial knowledge, and innovation capacity in rural areas. Ultimately, sustainable economic development in rural regions depends on the ability of MSMEs to transform resources into innovative and sustainable outcomes.

CONCLUSION

This study investigates the effect of digital transformation and financial literacy on sustainable performance, with innovation capability as a mediating variable in the context of rural MSMEs. The findings demonstrate that both digital transformation and financial literacy significantly influence innovation capability, confirming their role as critical resources in enhancing firm adaptability and competitiveness. Furthermore, innovation capability is found to have the strongest effect on sustainable performance, indicating that the ability to innovate is a key determinant of long-term business sustainability.

The results also reveal that digital transformation and financial literacy have both direct and indirect effects on sustainable performance, with innovation capability acting as a partial mediator. These findings highlight that while digital adoption and financial knowledge are important, their impact on sustainability is maximized when they are translated into innovation-driven activities. Overall, this study confirms that sustainable performance in rural MSMEs is not merely a function of resource availability, but rather the ability to transform these resources into dynamic capabilities that create long-term value.

In conclusion, this study demonstrates that sustainable performance in rural MSMEs is not determined solely by the availability of digital technologies and financial knowledge, but by the ability to transform these resources into innovation capability. The findings confirm that innovation capability plays a pivotal mediating role, bridging the gap between resource ownership and performance outcomes.

This study offers both theoretical and practical contributions by integrating the Resource-Based View and Dynamic Capability Theory, providing a more comprehensive explanation of how

firms achieve sustainability. Future research may explore additional contextual factors, such as institutional support and market dynamics, to further enrich the model.

Theoretical Implications

This study contributes to the literature in several important ways. First, it extends the Resource-Based View (RBV) by incorporating digital transformation and financial literacy as strategic resources that influence firm performance. Second, it advances the Dynamic Capability Theory by empirically validating innovation capability as a key mechanism through which resources are transformed into sustainable performance outcomes (Teece, 2007, Strategic Management Journal). Third, this study integrates digital, financial, and sustainability perspectives into a unified framework, addressing the fragmentation in previous research that often examines these constructs separately. Finally, by focusing on rural MSMEs, this study provides contextual insights that are often overlooked in mainstream literature, which predominantly focuses on urban or large firms. Thus, this research offers a more holistic understanding of how resource-capability-performance relationships operate in resource-constrained environments. This study ultimately shifts the perspective from resource ownership to capability transformation as the key driver of sustainable performance.

Practical Implications

The findings of this study provide several practical implications for policymakers, practitioners, and development stakeholders. For policymakers, the results suggest that digitalization initiatives should not be implemented in isolation but must be complemented with financial literacy programs and innovation support mechanisms. Government interventions should focus on building an integrated ecosystem that enhances digital access, financial capability, and innovation capacity simultaneously. For MSME practitioners, the study emphasizes that adopting digital technologies alone is insufficient; business owners must actively leverage these technologies to develop innovative products, services, and processes. Financial literacy should also be prioritized, as it enables better decision-making and reduces the risks associated with innovation and investment. For development agencies and NGOs, the findings highlight the importance of designing holistic capacity-building programs that address multiple dimensions of MSME development, particularly in rural areas. Ultimately, sustainable economic development in rural regions depends on the ability of MSMEs to transform knowledge and technology into innovative and sustainable business practices.

Limitations of the Study

Despite its contributions, this study has several limitations that should be acknowledged. First, the use of a cross-sectional research design limits the ability to capture dynamic changes over time, particularly in rapidly evolving digital environments. Second, the data are collected using self-reported questionnaires, which may introduce common method bias and subjectivity in responses. Third, this study focuses on rural MSMEs in Indonesia, which may limit the generalizability of the findings to other contexts or countries. Fourth, the model includes only one mediating variable, while other potential mechanisms such as organizational learning or technological capability are not considered. These limitations provide opportunities for future research to further refine and expand the model.

Directions for Future Research

Future research is encouraged to explore several directions. First, longitudinal studies are needed to better understand how digital transformation, financial literacy, and innovation capability evolve over time and influence sustainable performance. Second, future studies may incorporate additional variables such as organizational learning, entrepreneurial orientation, or technological capability to provide a more comprehensive model. Third, comparative studies across regions or countries would be valuable to examine whether the findings hold in different institutional and economic contexts. Fourth, qualitative or mixed-method approaches could be used to gain deeper insights into the processes and challenges faced by rural MSMEs in adopting digital technologies and fostering innovation. Finally, future research should explore the role of external factors such as government support, infrastructure, and market conditions in shaping the relationship between resources, capabilities, and performance.

BIBLIOGRAPHY

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Bahtiar, H., Rabbany, L. R., & Bele, Y. F. (2025). Digital transformation towards sustainability: Challenges and opportunities for Indonesian MSMEs. *Jurnal Ekonomi dan Bisnis*. <https://ejournal.uksw.edu/jeb/article/view/13935>
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly*, 37(2), 471–482. <https://doi.org/10.25300/MISQ/2013/37:2.3>
- Bongomin, G. O. C., Ntayi, J. M., Munene, J. C., & Malinga, C. A. (2017). The relationship between access to finance and growth of SMEs in developing economies: Financial literacy as a moderator. *Journal of Small Business Management*, 55(S1), 177–192. <https://doi.org/10.1111/jsbm.12301>
- Calantone, R. J., Cavusgil, S. T., & Zhao, Y. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management*, 31(6), 515–524. [https://doi.org/10.1016/S0019-8501\(01\)00203-6](https://doi.org/10.1016/S0019-8501(01)00203-6)
- Dangelico, R. M., & Pujari, D. (2010). Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *Journal of Business Ethics*, 95(3), 471–486. <https://doi.org/10.1007/s10551-010-0434-0>
- Dewi, A. R. S., Hamid, N., Hamzah, B., & Syahid, M. (2025). Developing sustainable competitive advantage through digital-financial literacy model: Evidence from Indonesia's MSME. *Serumpun Journal*. <https://iesrjournal.com/index.php/serumpun/article/view/650>
- Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, 60(11), 2835–2857. <https://doi.org/10.1287/mnsc.2014.1984>
- Edward, O. T., Mukti, A. H., Misman, F. N., et al. (2024). Financial literacy and technology adoption for MSME sustainability. *Insight Journal*. <https://ir.uitm.edu.my/id/eprint/110293/>

- Elkington, J. (1997). Toward the sustainable corporation: Win-win-win business strategies for sustainable development. *Harvard Business Review*, 75(6), 90–100.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). *Journal of Business Research*.
- Harnida, M., Vasudevan, A., Mardah, S., & Fajriyati, I. (2024). MSMEs sustainability: The strategic role of digitalization and financial literacy. *Journal of Management and Entrepreneurship Research*. <https://www.ceeol.com/search/article-detail?id=1274909>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based SEM. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hurley, R. F., & Hult, G. T. M. (1998). Innovation, market orientation, and organizational learning. *Journal of Marketing*, 62(3), 42–54. <https://doi.org/10.1177/002224299806200303>
- Idrus, M. I. (2024). Enhancing MSME competitiveness through financial literacy. *Economics and Business Journal*. <http://www.ecbis.net/index.php/go/article/view/183>
- Khairani, R., Putri, T. O. D. S., & Ovami, D. C. (2025). Digital financial literacy and sustainable performance. *Applied Management Studies*. <https://nafasjournal.com/index.php/ams/article/view/55>
- Klapper, L., Lusardi, A., & Panos, G. A. (2015). Financial literacy and its consequences. *Journal of Financial Economics*, 116(2), 360–380. <https://doi.org/10.1016/j.jfineco.2014.10.004>
- Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.
- Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy. *Journal of Economic Literature*, 52(1), 5–44. <https://doi.org/10.1257/jel.52.1.5>
- Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2019). Digital innovation management. *MIS Quarterly*, 43(1), 223–238. <https://doi.org/10.25300/MISQ/2019/13698>
- OECD. (2020). *OECD/INFE 2020 international survey of adult financial literacy*. OECD Publishing.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for mediation analysis. *Behavior Research Methods*, 40(3), 879–891. <https://doi.org/10.3758/BRM.40.3.879>
- Probohudono, A. N., Suhardjanto, D., Aligarh, F., et al. (2025). MSME performance and innovation capability. *Social Sciences & Humanities Open*. <https://www.sciencedirect.com/science/article/pii/S2590291125005388>
- Purnomo, S., Purwandari, S., & Sentosa, I. (2026). Digital transformation and sustainable innovation. *TEM Journal*. https://www.temjournal.com/content/151/TEMJournalFebruary2026_190_201.pdf
- Rosyidiana, R. N., & Narsa, I. M. (2024). MSMEs and digitalization impact on performance. *Cogent Business & Management*. <https://doi.org/10.1080/23311975.2024.2342488>
- Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation. *Business Strategy and the Environment*, 20(4), 222–237. <https://doi.org/10.1002/bse.683>

- Sekaran, U., & Bougie, R. (2016). *Research methods for business* (7th ed.). Wiley.
- Teece, D. J. (2007). Explicating dynamic capabilities. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)
- Vial, G. (2019). Understanding digital transformation. *Journal of Strategic Information Systems*, 28(2), 118–144. <https://doi.org/10.1016/j.jsis.2019.01.003>
- Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation. *Long Range Planning*, 52(3), 326–349. <https://doi.org/10.1016/j.lrp.2018.12.001>
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171–180. <https://doi.org/10.1002/smj.4250050207>