Driving MSME Performance in the Digital Era: Financial Literacy and E-Commerce Adoption in Minahasa

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ABSTRACT

Purpose: This study aims to examine the role of financial literacy and e-commerce adoption in driving the performance of Micro, Small, and Medium Enterprises (MSMEs) in Minahasa Regency, North Sulawesi, within the context of the digital economy.

Design/Methodology/Approach: This research employs a quantitative approach using the Structural Equation Modeling–Partial Least Squares (SEM-PLS) method. Primary data were collected through structured questionnaires distributed to MSME actors selected using a stratified random sampling technique. Financial literacy was measured through indicators of basic financial knowledge, business financial management, financial planning and control, and investment knowledge. E-commerce adoption was assessed through platform utilization, digital marketing capability, operational management, and performance evaluation. MSME performance was measured through financial performance, operational performance, marketing performance, and business sustainability.

Findings: The results of the outer model evaluation indicate that the measurement model meets the criteria for validity and reliability. However, the inner model results show that financial literacy and e-commerce adoption do not have a significant effect on MSME performance. In addition, the interaction between financial literacy and e-commerce adoption also produces a negative but insignificant coefficient. The relatively low R-square value suggests that MSME performance is influenced by a broader business ecosystem, including infrastructure availability, access to capital, government policies, and market dynamics.

Research Implications: The findings highlight the importance of a holistic and integrative strategy in improving MSME performance. Efforts to strengthen MSMEs should not only focus on increasing financial literacy and adopting digital technologies but should also consider broader ecosystem factors that support business growth and sustainability.

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in economic development, particularly in emerging economies where they contribute significantly to employment generation and economic resilience. In Indonesia, MSMEs account for more than 60% of the national Gross Domestic Product (GDP) and absorb the majority of the workforce, making them a key driver of inclusive economic growth (Tambunan, 2019; OECD, 2021). At the regional level, MSMEs also serve as the backbone of local economies by supporting community livelihoods and promoting entrepreneurial activities. In Minahasa Regency, North Sulawesi, MSMEs operate across various sectors such as agriculture, trade, and manufacturing, contributing substantially to local economic activities. The rapid expansion of the digital economy has transformed the way businesses operate, creating both opportunities and challenges for MSMEs. Digital platforms, particularly e-commerce, have become essential tools for market expansion, customer engagement, and operational efficiency. The COVID-19 pandemic further accelerated the adoption of digital technologies as many businesses were forced to shift toward online channels to survive and remain competitive (Bai et al., 2021).

Previous studies suggest that digitalization through e-commerce adoption enables MSMEs to access wider markets, reduce transaction costs, and enhance business performance (Rahayu & Day, 2017; Kraus et al., 2021). However, despite the increasing availability of digital platforms, many MSMEs still face barriers in adopting e-commerce effectively due to limited digital capabilities and inadequate managerial skills.

One critical factor influencing MSME performance is financial literacy. Financial literacy refers to the knowledge and ability to understand financial concepts and apply them in managing financial resources effectively. Entrepreneurs with higher financial literacy are more capable of making informed financial decisions, managing cash flows, planning investments, and mitigating financial risks (Lusardi & Mitchell, 2014). Empirical studies indicate that financial literacy positively influences entrepreneurial performance and business sustainability because it enhances managerial capabilities and strategic decision-making (Eniola & Entebang, 2015; Ye & Kulathunga, 2019). In the context of MSMEs, financial literacy enables entrepreneurs to allocate resources efficiently and improve business competitiveness. In addition to financial literacy, technology adoption plays an increasingly important role in determining business success. The Technology Acceptance Model (TAM) developed by Davis (1989) explains that the adoption of new technologies is largely determined by perceived usefulness and perceived ease of use. This framework has been widely used to understand the adoption of digital platforms by small businesses. Later, Venkatesh et al. (2003) expanded this perspective through the Unified Theory of Acceptance and Use of Technology (UTAUT), emphasizing the importance of social influence and facilitating conditions in technology adoption. In the context of MSMEs, the adoption of e-commerce platforms can significantly transform business processes, including marketing, sales, supply chain management, and customer service.

From a strategic perspective, the Resource-Based View (RBV) theory argues that sustainable competitive advantage arises from the effective utilization of valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). Intangible resources such as financial literacy and digital capabilities can therefore be considered strategic assets that enable firms to improve performance and maintain competitiveness. Furthermore, the dynamic capabilities perspective highlights the ability of firms to integrate and reconfigure internal and external competencies to adapt to rapidly changing environments (Teece et al., 1997). In the digital era, the combination of financial literacy and technological capability may serve as a critical dynamic capability that supports MSME adaptability and growth. Despite the growing body of literature examining financial literacy and digital adoption among MSMEs, empirical findings remain inconsistent. Some studies report that financial literacy significantly improves MSME performance by enhancing financial management and strategic decision-making (Eniola & Entebang, 2015; Ye & Kulathunga, 2019). Similarly, research suggests that e-commerce adoption positively affects business performance by expanding market access and improving operational efficiency (Kraus et al., 2021; Nguyen et al., 2022). However, other studies reveal that the impact of financial literacy and digital adoption may vary depending on contextual factors such as infrastructure availability, institutional support, and market conditions (Bai et al., 2021; OECD, 2021). These inconsistencies indicate that the relationship between financial literacy, e-commerce adoption, and MSME performance is complex and influenced by the broader business ecosystem. Furthermore, empirical studies examining the interaction between financial literacy and e-commerce adoption remain limited, particularly in regional contexts within developing economies. Most previous studies have investigated these variables separately, leaving a gap in understanding how financial literacy may influence the ability of MSMEs to adopt digital technologies and how this interaction ultimately affects business performance. This gap is particularly relevant in regions such as Minahasa, where MSMEs face structural challenges including limited digital infrastructure, restricted access to

finance, and varying levels of entrepreneurial capability. Based on these considerations, this study aims to examine the role of financial literacy and e-commerce adoption in driving MSME performance in Minahasa Regency. Specifically, this research investigates whether financial literacy influences MSME performance, whether e-commerce adoption contributes to business performance, and whether e-commerce adoption mediates the relationship between financial literacy and MSME performance. By integrating financial literacy and technology adoption perspectives within the RBV framework, this study contributes to the literature by providing empirical evidence on how financial capability and digital transformation jointly influence MSME performance in the digital era.

The findings of this study are expected to provide theoretical contributions by expanding the understanding of the relationship between financial literacy, digital technology adoption, and MSME performance. In addition, the study offers practical implications for policymakers and practitioners by identifying key factors that can support the digital transformation and sustainable growth of MSMEs, particularly in regional economies.

LITERATURE REVIEW
Grand Theory

This study is grounded in several theoretical perspectives that explain the relationship between financial capability, technology adoption, and firm performance. One of the primary theoretical foundations is the Resource-Based View (RBV), which argues that firms achieve sustainable competitive advantage through the effective management of valuable, rare, inimitable, and non-substitutable resources (Barney, 1991). In the context of MSMEs, intangible resources such as financial literacy and digital capabilities can be considered strategic assets that enhance business competitiveness and performance. Entrepreneurs who possess strong financial knowledge and technological capabilities are better able to allocate resources efficiently and respond to market dynamics.

In addition, the Dynamic Capabilities Theory emphasizes the ability of firms to integrate, build, and reconfigure internal and external competencies to adapt to rapidly changing environments (Teece et al., 1997). In the digital era, MSMEs must continuously adjust their strategies to respond to technological changes and market competition. Financial literacy enables entrepreneurs to make strategic financial decisions, while the adoption of digital technologies such as e-commerce represents an organizational capability that supports business adaptation and growth.

Furthermore, the Technology Acceptance Model (TAM) provides an important framework for understanding the adoption of digital technologies by businesses. According to Davis (1989), perceived usefulness and perceived ease of use determine the intention to adopt new technologies. This theory has been widely applied in studies examining the adoption of digital platforms, including e-commerce among small businesses. Later, Venkatesh et al. (2003) expanded this perspective through the Unified Theory of Acceptance and Use of Technology (UTAUT), which highlights the role of social influence and facilitating conditions in technology adoption. These theoretical perspectives collectively explain how financial literacy and digital technology adoption may influence MSME performance.

Financial Literacy and MSME Performance

Financial literacy plays a critical role in enhancing the performance of micro, small, and medium enterprises (MSMEs). Entrepreneurs with higher levels of financial literacy possess stronger capabilities in financial planning, cash flow management, resource allocation, and investment decision-making. These capabilities enable business owners to identify growth opportunities, manage financial risks more effectively, and optimize business profitability. Previous studies have consistently shown that financial literacy contributes positively to SME

performance by improving managerial decision-making and financial management practices (Eniola & Entebang, 2015; Aribawa, 2016; Menike, 2019). In this context, financially literate MSME owners are more likely to implement effective financial strategies that enhance business sustainability and performance.

H1: Financial literacy has a positive and significant effect on MSME performance in Minahasa Regency

E-Commerce Adoption and MSME Performance

The adoption of e-commerce has increasingly become an important driver of business competitiveness in the digital economy. According to the value chain perspective (Porter, 2001), digital technologies can transform business activities by improving efficiency, strengthening market access, and enhancing customer engagement. Through e-commerce platforms, MSMEs can expand their market reach beyond geographical limitations, reduce transaction costs, and improve operational efficiency. Empirical studies also confirm that the adoption of digital platforms significantly contributes to business performance by enabling firms to reach wider markets and improve marketing effectiveness (Suryani et al., 2022; Indahsari et al., 2023). Therefore, the implementation of e-commerce is expected to positively influence the performance of MSMEs.

H2: E-commerce adoption has a positive and significant effect on MSME performance in Minahasa Regency

The Mediating Role of E-Commerce Adoption

The relationship between financial literacy and MSME performance may not always occur directly. From the perspective of the Resource-Based View (RBV) and Dynamic Capabilities Theory, intangible resources such as financial literacy must be translated into operational capabilities in order to generate measurable business outcomes (Teece et al., 1997). In this context, e-commerce adoption can function as an enabling mechanism that converts financial knowledge into practical business strategies. Entrepreneurs with strong financial literacy are more capable of evaluating digital investments and implementing technological innovations that support business growth. Consequently, e-commerce adoption may act as a mediating variable that strengthens the relationship between financial literacy and MSME performance by transforming financial capability into digital business practices.

H3: E-commerce adoption mediates the relationship between financial literacy and MSME performance in Minahasa Regency

METHODS

This study employs a quantitative approach with an explanatory research design to examine the causal relationships between financial literacy, e-commerce adoption, and MSME performance in Minahasa Regency. Data were collected through a survey method using structured questionnaires distributed to MSME owners operating in the region. The population of this study consisted of 3,926 MSMEs registered in Minahasa Regency based on data from the Central Bureau of Statistics of North Sulawesi in 2023. The sampling technique used probability sampling with a stratified random sampling approach to ensure proportional representation across business sectors and geographical areas. The minimum sample size was determined using the Slovin formula with a 5% margin of error, resulting in a target sample of 365 respondents. However, the final dataset consisted of 153 valid responses that met the research criteria. This sample size is considered adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM), which recommends a minimum sample size based on the number of indicators or at least 100 observations for complex models (Hair et al., 2014). Respondents were selected based on several criteria: (1) MSME owners who have operated

their businesses for at least two years, (2) businesses categorized as micro or small enterprises according to Indonesian MSME regulations, and (3) respondents willing to complete the questionnaire. The questionnaire items were adapted from previous studies and adjusted to the context of MSMEs in Minahasa Regency. Financial literacy was measured using four dimensions: basic financial knowledge, business financial management, financial planning and control, and investment knowledge. E-commerce adoption was measured through indicators related to platform utilization, digital marketing capability, operational management, and performance evaluation. MSME performance was assessed through four dimensions: financial performance, operational performance, marketing and sales performance, and business sustainability. All variables were measured using a five-point Likert scale. Data analysis was conducted using Structural Equation Modeling with the Partial Least Squares (PLS-SEM) approach. The analysis consisted of two stages. First, the measurement model was evaluated through tests of convergent validity, discriminant validity, and construct reliability. Second, the structural model was analyzed to test the research hypotheses and examine the relationships among variables.

RESULT AND DISCUSSION
Respondent Characteristics

This study involved 153 MSME owners in Minahasa Regency. The respondents represent various demographic and business backgrounds, including gender, business duration, and business sector. Understanding these characteristics is important to provide a contextual overview of the respondents participating in the study. Based on gender, the majority of respondents were male, accounting for 87 individuals (56.9%), while female respondents totaled 66 individuals (43.1%). In terms of business experience, most MSMEs had been operating for 2–5 years (41.8%), followed by 6–10 years (34.0%). Meanwhile, businesses operating for 11–15 years accounted for 15.0%, and those operating for more than 15 years accounted for 9.2%. Regarding business sector, the largest proportion of respondents was engaged in the trade sector (30.1%), followed by the culinary sector (24.8%), agriculture (20.3%), handicrafts (12.4%), services (7.8%), and small-scale industries (4.6%).

Table 1. Respondent Characteristics

Characteristics	Category	Frequency	Percentage
Gender	Male	87	56.9%
	Female	66	43.1%
Business Duration	2–5 years	64	41.8%
	6–10 years	52	34.0%
	11–15 years	23	15.0%
	>15 years	14	9.2%
Business Sector	Trade	46	30.1%
	Culinary	38	24.8%
	Agriculture	31	20.3%
	Handicraft	19	12.4%
	Services	12	7.8%
	Small Industry	7	4.6%
Total		153	100%

Measurement Model Evaluation (Outer Model)

The measurement model evaluation was conducted to assess the validity and reliability of the constructs used in this study. One of the key criteria in evaluating convergent validity is the Average Variance Extracted (AVE) value. According to the recommended threshold, a construct is considered to have adequate convergent validity if the AVE value exceeds 0.50, indicating that the construct explains more than half of the variance of its indicators.

Table 2. Convergent Validity Test Results (AVE)

Variable	Average Variance Extracted (AVE)	Description
MSME Performance	0.688	Valid
Financial Literacy	0.649	Valid
E-Commerce Adoption	0.742	Valid

Source: SmartPLS Output (2025)

The results of the convergent validity test show that all variables in this study have AVE values above the recommended threshold of 0.50. The MSME performance variable has an AVE value of 0.688, financial literacy has an AVE value of 0.649, and e-commerce adoption has the highest AVE value of 0.742. These results indicate that all constructs demonstrate good convergent validity, meaning that the indicators used are capable of adequately explaining their respective latent variables.

Structural Model Evaluation (Inner Model)
Coefficient of Determinant (R^2)

The structural model evaluation was conducted to examine the predictive power of the proposed research model. One of the key indicators used in this evaluation is the coefficient of determination (R-square), which reflects the proportion of variance in the dependent variable that can be explained by the independent variables included in the model.

Table 3. R-Square Test Results

Dependent Variable	R-square	Adjusted R-square
MSME Performance	0.097	0.079

Source: SmartPLS Output (2025)

The results show that the R-square value for MSME performance is 0.097, with an adjusted R-square of 0.079. This indicates that financial literacy and e-commerce adoption collectively explain 9.7% of the variance in MSME performance. Although the explanatory power of the model is relatively low, this finding suggests that MSME performance is influenced by various other factors beyond the variables examined in this study, such as market conditions, access to capital, infrastructure, managerial capability, and government support.

Hypothesis Testing (Bootstrapping Results)

The bootstrapping procedure was conducted to assess the significance of the hypothesized relationships between financial literacy, e-commerce adoption, and MSME performance. This method estimates the path coefficients and their significance levels through resampling, providing robust results for hypothesis testing in PLS-SEM.

Direct Effect

The direct effects analysis was conducted to evaluate the immediate impact of financial literacy and e-commerce adoption on MSME performance. This step assesses the significance and strength of each hypothesized path without considering mediation. The bootstrapping procedure with 5,000 resamples was used to obtain t-statistics and p-values for each path.

Table 4. Direct Effect

Construct	Original sample (O)	T statistics (|O/STDEV|)	P values	Info.
Financial Literacy → MSME Performance	0.169	1.252	0.210	H_1 Rejected
E-Commerce Adoption → MSME Performance	0.139	1.259	0.208	H_2 Rejected

Source: SmartPLS Output (2025)

Based on the bootstrapping analysis of the structural model, the path from financial literacy to MSME performance yielded a coefficient of 0.169, a t-statistic of 1.252, and a p-value of 0.210. These results indicate that the effect of financial literacy on MSME

performance in Minahasa Regency is not significant, leading to the rejection of Hypothesis 1 (H1). This suggests that even though MSME actors may have a relatively good understanding of financial concepts, this knowledge does not directly translate into improved business performance. Similarly, the path from e-commerce adoption to MSME performance showed a coefficient of 0.139, a t-statistic of 1.259, and a p-value of 0.208, which is also not significant. Therefore, Hypothesis 2 (H2) is rejected, indicating that e-commerce adoption by MSMEs has not yet provided a direct significant impact on their business performance.

Indirect Effect

The indirect effect, representing the mediating role of e-commerce adoption between financial literacy and MSME performance, was examined through bootstrapping analysis.

Table 5. Indirect Effect

Construct	Original sample (O)	T statistics (|O/STDEV|)	P values	Info.
Financial Literacy → E-Commerce Adoption → MSME Performance	-0.236	1.611	0.107	H$_2$ Rejected

Source: SmartPLS Output (2025)

The indirect effect of financial literacy on MSME performance through e-commerce adoption was examined using bootstrapping. The path coefficient is -0.236, with a t-statistic of 1.611 and a p-value of 0.107, indicating that the mediation effect is not statistically significant. This finding suggests that e-commerce adoption does not mediate the relationship between financial literacy and MSME performance in Minahasa Regency.

DISCUSSION

The results of this study indicate that neither financial literacy nor e-commerce adoption has a statistically significant direct or indirect effect on MSME performance in Minahasa Regency. Specifically, the direct paths from financial literacy and e-commerce adoption to performance were not significant, and the mediating role of e-commerce adoption between financial literacy and MSME performance was also unsupported. These findings suggest that the relationship between managerial capabilities and digital adoption with firm performance is more complex than hypothesized and may require additional enabling factors or contextual conditions.

From the perspective of the Resource-Based View (RBV), financial literacy and e-commerce adoption can be considered intangible resources that have the potential to contribute to competitive advantage (Barney, 1991). However, as the RBV asserts, the mere possession of valuable resources does not guarantee performance improvements unless these resources are effectively integrated, managed, and leveraged in ways that align with broader business processes and market demands. In the context of MSMEs in Minahasa, it appears that financial knowledge and digital adoption alone may not be sufficient to translate into measurable performance outcomes, possibly due to barriers such as weak infrastructure, limited access to financing, and insufficient managerial capabilities that hinder the effective utilization of these resources.

The Dynamic Capabilities Theory further explains this phenomenon by emphasizing the necessity for firms to integrate, build, and reconfigure internal and external competencies in response to environmental changes (Teece et al., 1997). Within this framework, financial literacy and e-commerce adoption should interact with other dynamic routines such as strategic decision making, marketing innovation, and adaptability to external shocks. The current findings imply that MSMEs may lack complementary capabilities required to transform financial knowledge and digital tools into strategic advantages. This is consistent with research by Ratnawati et al. (2024), which highlights that financial literacy often drives access to finance

and fintech adoption but requires additional support mechanisms to yield performance improvements in sustainable business outcomes.

Furthermore, the lack of significant effects challenges the assumption of unidirectional relationships proposed in technology acceptance models (TAM/UTAUT). While TAM suggests that perceived usefulness and perceived ease of use drive adoption (Davis, 1989; Venkatesh et al., 2003), MSME actors may still face external constraints that suppress the translation of adoption into performance. Empirical literature reveals that e-commerce adoption alone may not guarantee performance gains unless supporting infrastructure, digital skills, and market linkages are in place (Maulida & Santoso, 2022).

The results of this study contrast with several prior empirical works. Many studies have demonstrated positive effects of financial literacy and digital adoption on MSME performance. For example, Nugraheni, Darma, and Muhammad (2025) found that the combined adoption of digital technology and financial knowledge significantly promotes sustainable MSME performance, though the pathways may be mediated by additional factors such as organizational learning and market responsiveness. Other studies from Indonesia and beyond have identified direct positive influences of financial literacy and e-commerce adoption on small business outcomes (e.g., Lestari & Sartika, 2025; Sridamayanti et al., 2022). However, research also highlights contextual caveats. For instance, Indryana, Sujono, and Hamid (2024) showed that technological and financial literacy affects small business performance, but mediated by digital finance access, indicating that intermediary constructs can modify baseline relationships. Other studies further illustrate that financial literacy's impact on performance may be contingent on additional resources and behaviors. Ratnawati et al. (2024) emphasized the role of access to finance and fintech adoption as mediators for financial literacy's effect on sustainability performance, suggesting that performance outcomes require more than binary direct relationships. Similarly, Nuanced findings from the literature suggest that digital literacy and financial knowledge contribute positively to MSME outcomes when accompanied by enabling conditions such as skills training and supportive digital ecosystems (Iriani et al., 2024).

Overall, the findings of this study underscore the complex interplay of internal capabilities and external enabling factors. While RBV and Dynamic Capabilities Theory highlight potential pathways for achieving competitive advantage, MSMEs in Minahasa may require holistic supportive mechanisms—such as improved digital infrastructure, access to formal finance, managerial training, and policy support—to fully leverage financial literacy and digital adoption in enhancing performance. These insights contribute to a deeper understanding of MSME development in emerging market contexts, pointing to the importance of ecosystem integration rather than isolated adoption of knowledge or technology.

CONCLUSION

This study examined the effects of financial literacy and e-commerce adoption on MSME performance in Minahasa Regency. The results show that neither financial literacy nor e-commerce adoption has a significant direct or indirect impact on MSME performance. E-commerce adoption also does not mediate the relationship between financial literacy and performance. The findings suggest that financial knowledge and digital adoption alone are insufficient to improve MSME performance, highlighting the need for complementary resources, managerial skills, and supportive infrastructure. From a theoretical perspective, the results align with Resource-Based View (RBV) and Dynamic Capabilities Theory, emphasizing that resources must be effectively integrated to create competitive advantage. Practically, policymakers should adopt a holistic approach, combining financial literacy, digital skills development, and access to markets and finance to strengthen MSME performance.

Future research could explore additional mediators or moderators, such as access to capital, organizational learning, and market connectivity.

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