



Digital Technology Adoption and Financial Literacy: The Moderating Role of Entrepreneurial Proactivity in MSME Performance

Arzal Syah^{1*}, Zainuddin², Muhammad Ikram S³, Andi Nurrahma Gaffar⁴, Dini Nurpratiwi⁵

¹²³⁴⁵Department of Sharia Accounting, Faculty of Islamic Economics and Business, Universitas Islam Negeri, Palopo, Indonesia

*Corresponding Author(s) Email: arzal_syah@uinpalopo.ac.id

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Abstract: This study examines the effects of digital technology adoption and financial literacy on MSME performance, with Proactive Entrepreneurial Behavior (PEB) as a moderating variable. Using a quantitative approach, data were collected from 98 MSME respondents and analyzed using PLS-SEM with SmartPLS 4.0. The results show that digital technology adoption does not significantly affect MSME performance ($\beta = 0.110$, $p = 0.444$), while PEB ($\beta = 0.156$, $p = 0.048$) and financial literacy ($\beta = 0.147$, $p < 0.001$) have significant positive effects. PEB does not significantly moderate the relationship between digital technology adoption and MSME performance ($\beta = 0.097$, $p = 0.058$), but significantly moderates the relationship between financial literacy and MSME performance ($\beta = 0.098$, $p = 0.005$). These findings highlight the importance of financial literacy and proactive entrepreneurial behavior in improving MSME performance.

Keywords: Digital Technology; Financial Literacy; MSME Performance.

Introduction

Micro, small, and medium enterprises represent a cornerstone of Indonesia's economic structure, making substantial contributions to national gross domestic product and providing employment opportunities for millions of citizens (Hamzah et al., 2020; Kusumastuti et al., 2022; Prabowo, 2022; Salsabillah et al., 2023). Statistical data from 2024 indicates that the MSME sector encompasses approximately 66 million business units, accounting for roughly 61% of Indonesia's GDP equivalent to IDR 9,580 trillion and employing about 97% of the national workforce, representing approximately 117 million workers (Shohibboniawan Wahyudi et al., 2024). Within

this research context, digitalization functions not merely as a global trend but as a strategic lens through which to examine the dynamics of MSME performance enhancement.

MSMEs possess significant potential to foster more equitable and inclusive economic development. However, the progression of the digital economy alongside the Fourth Industrial Revolution has introduced unanticipated challenges for small business operators. (Alifudin et al., 2024; Eliana et al., 2023; Gita Sari Dewi et al., 2023). Technological innovations, particularly those enabled by the Internet of Things, have permeated various aspects of everyday existence, including commercial activities (Suardi & Astuty, 2023; Vicci, 2024). The MSME business index reached unprecedented levels during the second quarter of 2024, largely attributable to seasonal influences including major religious observances and peak agricultural harvests that stimulated consumer demand (Heliani & Iskandar, 2024). Although there is repair in liquidity and profitability of MSMEs, challenges like Power buy society that has not fully recovery and increase price input goods still overshadowing (Hidayat et al., 2023; Wiardi & Saputra, 2022). The government continues its support for MSME expansion through substantial credit disbursement, with Bank Rakyat Indonesia serving as the primary lending institution, extending approximately IDR 1,095.64 trillion to the MSME segment by June 2024. (Andjarwati & Wulan, 2021; Manapa Sampetoding & Er, 2024). An ambitious digitalization initiative aims to integrate 30 million MSMEs into the digital ecosystem by 2024, potentially enhancing sector competitiveness and overall economic contribution. (TH. Tambuna et al., 2024).

Several significant obstacles impede MSME digital transformation. High implementation costs associated with digital technology adoption frequently present barriers for resource-constrained enterprises seeking to invest in necessary digital infrastructure. (Hendrawan et al., 2024). Furthermore, limited digital literacy among MSME operators poses substantial difficulties, as many lack the requisite knowledge or skills to effectively utilize technology (Papua et al., 2024). Inadequate infrastructure, particularly in remote areas, restricts access to essential technology and information needed for market adaptation (Afzal et al., 2023). Finally, insufficient institutional support in the form of training programs and supplementary facilities may exacerbate the digital divide between technology-adopting and non-adopting MSMEs (Indrawati et al., 2020). These challenges underscore the necessity for comprehensive approaches to assist MSMEs in overcoming barriers to effective digital-age competition.

This research holds particular significance given the substantial challenges MSMEs face in adapting to rapid technological advancement. First, this investigation provides insights into leveraging digital technology to enhance MSME competitiveness through digital marketing and operational efficiency improvements (Manapa Sampetoding & Er, 2024). Second, financial literacy is essential for MSME operators to manage their finances effectively, contributing to business sustainability (Namasswar et al., 2023). By incorporating proactive entrepreneurial behavior as a moderating variable, this research highlights the importance of entrepreneurial attitudes in adopting technology and implementing financial knowledge to achieve superior outcomes (Esvanti et al., 2024).

The Resource-Based View theory offers a valuable conceptual framework for understanding digital technology implementation and its relationship to MSME performance (Dionysus & Arifin, n.d.). RBV posits that organizational competitive advantage emerges from unique combinations of tangible and intangible resources (Kero & Bogale (Kero & Bogale, 2023). Within this theoretical perspective, financial literacy constitutes a crucial intangible resource enabling companies particularly MSMEs to achieve competitive superiority and enhanced financial performance (Daffa et al., 2024; Ernawati et al., 2024; Sellina & Zed, 2023).

Prior studies have tended to examine the direct influence of financial literacy or technology adoption on MSME performance separately, or have considered factors such as technology adoption costs, technology utilization, and government support (Ansori et al., 2022; Ernawati et al., 2024; Lestari et al., 2022). This research offers novelty by simultaneously testing the interconnections between Digital Technology, Financial Literacy, and MSME Performance with Proactive Entrepreneurial Behavior as a moderating variable a combination rarely examined in the Indonesian MSME context. Importantly, this research reveals that the moderating role of proactive behavior does not consistently strengthen the influence of digital technology on performance, contrasting with numerous previous studies that typically found significant effects. This finding provides a fresh perspective that entrepreneurial mental readiness does not automatically align with digital technology utilization capabilities. From a practical standpoint, these findings emphasize the importance of improving financial literacy and strengthening proactive behavior as priority strategies, while simultaneously demonstrating the need for more integrated digital technology implementation support. Consequently, this research enriches

academic literature while offering novel perspectives for designing more effective and contextual MSME empowerment policies and programs.

This study aims to understand the extent to which digital technology adoption can enhance operational efficiency, expand market reach, and improve MSME product and service quality. Additionally, this research seeks to identify how sound financial literacy can assist MSME operators in effectively managing their financial resources, ultimately generating positive impacts on business performance. An important research gap has emerged at this juncture, as numerous prior investigations have examined the influence of digital technology adoption or financial literacy separately on MSME performance (Amanah et al., 2024; Anisyah et al., 2021; Artika et al., 2023; Hapsari & Puspitasari, 2024). This research is significant because limited existing literature integrates digital technology, financial literacy, and proactive entrepreneurial behavior within a single analytical model. Digital technology and financial literacy do not automatically enhance MSME performance without the support of proactive entrepreneurial behavior. Therefore, this study addresses this gap by examining the role of proactive behavior in strengthening the impact of digitalization and financial literacy on MSME performance. Academically, this research offers novelty through the integration of these three variables; practically, it can serve as a foundation for government and relevant institutions to design MSME empowerment programs that emphasize both technical aspects and entrepreneurial behavior strengthening.

Literature Review

A. Digital Technology

Digital technology has become an integral component of contemporary business practices, including within the MSME sector (Putra et al., 2023). Growing adoption of digital platforms including e-commerce, social media, and internet based applications enables MSMEs to enhance marketing effectiveness, operational efficiency, and customer engagement (Tulong et al., 2024). From the perspective of the digital economy, technology-driven business models allow firms to compete in increasingly dynamic and competitive markets dominated by information and connectivity (Panduwinata et al., 2025).

Through the RBV lens, digital technology represents a strategic intangible asset that strengthens internal capabilities and facilitates sustainable competitive advantage creation. RBV proposes that organizational performance depends on effective utilization of valuable, rare, and

difficult-to-imitate resources. Within the MSME context, digital technologies enhance innovation capacity, production flexibility, and marketing management, enabling firms to expand market reach and optimize operational processes (Norbey Amaya, César Augusto Bernal-Torres, 2026; Probohudono et al., 2025).

Empirical studies consistently report positive associations between digital technology adoption and MSME performance. Prior research indicates that digital transformation contributes to increased revenue, improved efficiency, and enhanced product and service quality (Naibaho et al., 2025; Thi et al., 2025; Y. Umar, 2025). However, variations in MSME performance outcomes suggest that digital technology effectiveness depends on integration quality with business operations. Nevertheless, MSMEs actively adopting digital technologies and possessing adequate internet access tend to demonstrate higher competitiveness and superior performance. Based on theoretical arguments and empirical evidence, digital technology adoption is expected to significantly impact MSME performance.

H1: Digital technology has a significant positive effect on MSME performance.

B. Financial Literacy

Financial literacy encompasses an individual's knowledge and capabilities in managing financial aspects including budgeting, investment, borrowing, taxation, and financial planning. Inadequate financial literacy often termed financial illiteracy can constrain entrepreneurs' capacity to make effective financial decisions and jeopardize business sustainability (Merter & Balcioğlu, 2025). Prior research highlights that improved financial literacy enhances financial decision-making quality and contributes to overall economic welfare, emphasizing the importance of financial education in reducing financial risks and investment fraud (Sabirin, Benius, Sunaryo Neneng, Solikah Nurwati, 2023).

From the RBV perspective, financial literacy constitutes a critical intangible resource enabling firms particularly MSMEs to achieve competitive advantage and superior performance (Probohudono et al., 2025). RBV asserts that organizational success depends on effective utilization of valuable and difficult-to-imitate resources, including financial knowledge and managerial capabilities. Financially literate MSME owners are better positioned to allocate resources efficiently, manage risks, and plan long term business strategies.

Empirical evidence consistently supports the positive role of financial literacy in enhancing MSME performance. Previous studies demonstrate that financially literate

entrepreneurs exhibit improved investment decisions, stronger financial control, and higher business sustainability, ultimately leading to enhanced financial performance (Lestari et al., 2025; Molosiwa & Holland, 2025; Wati & Sianturi, 2025). These findings suggest that financial literacy functions as a strategic asset strengthening MSME competitiveness in dynamic markets. Based on theoretical reasoning and empirical findings, financial literacy is expected to significantly influence MSME performance.

H2: Financial literacy has a significant positive effect on MSME performance.

C. Proactive Entrepreneurial Behavior as a Moderating Variable

Proactive entrepreneurial behavior refers to an individual's capacity to take initiative in identifying and exploiting business opportunities while addressing challenges before they materialize. Prior research emphasizes that proactive behavior serves as a key mechanism strengthening relationships between external or internal factors such as environmental support, entrepreneurial intention, and business performance outcomes (Saihood & Al-Jader, 2021; Slomski et al., 2024; Tsou et al., 2023). Proactive entrepreneurs do not merely respond to challenges; they actively seek innovative solutions and implement strategies that enhance business competitiveness. Empirical findings indicate that individuals with proactive entrepreneurial behavior are more likely to achieve their goals, as they can rapidly adapt to market changes and leverage available opportunities (Astrini et al., 2020).

Within the RBV framework, proactive entrepreneurial behavior represents a significant moderating resource enhancing firm performance. RBV posits that sustainable competitive advantage emerges from unique, valuable, and difficult-to-imitate resources (Kero & Bogale, 2023). In the context of MSMEs, proactive behavior allows entrepreneurs to utilize resources more effectively, identify and exploit new opportunities, and manage risks efficiently (Gupron & Yandi, 2024; Van Ness et al., 2020). Such proactivity not only improves financial outcomes but also strengthens market positioning, facilitating sustainable competitive advantage (Ashsifa et al., 2023; Prihandono et al., 2021).

However, research also suggests that excessive proactivity sometimes reduce the positive impact of other resources. For example, proactive entrepreneurs who overly focus on personal initiatives underutilize social networks, which could otherwise enhance business performance (Aulia et al., 2024; Nasution et al., 2022). Therefore, effective entrepreneurship requires balancing proactive initiative with collaborative resource utilization to maximize business outcomes (Purba

& Balqiah, 2024; Yordan Hermawan Apidana & Dian Rusvinasari, 2024). Based on theoretical reasoning and empirical evidence, proactive entrepreneurial behavior is expected to moderate the effect of digital technology adoption on MSME performance, strengthening the positive relationship when proactivity is optimally applied.

H3: Digital Technology, through the moderating role of Proactive Entrepreneurial Behavior, has a significant positive effect on MSME performance.

H4: Financial Literacy Through the Moderating Role of Proactive Entrepreneurial Behavior has a significant influence on MSME Performance.

D. MSME Performance

The performance of Micro, Small, and Medium Enterprises (MSMEs) is a measurable outcome through various financial and non-financial indicators. Based on previous research, MSME performance includes sales growth, customer growth, and profit growth (Fadli et al., 2023; Hennyeyová et al., 2021). Sales growth reflects market acceptance of the products or services offered, and its increase has a direct impact on company revenue. Sales growth calculations generally compare total sales in the current period with the previous period, expressed as a percentage. This increase allows MSMEs to expand production capacity and strengthen their competitiveness in the market (Suardi & Astuty, 2023).

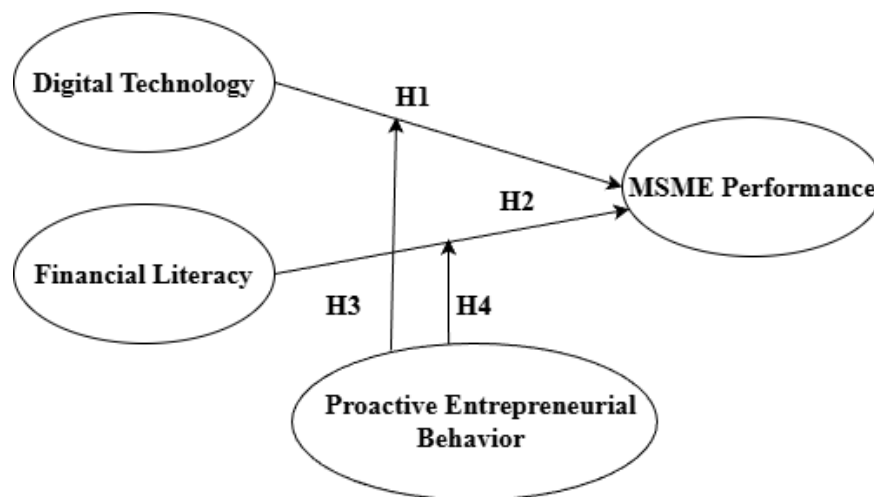
Customer growth indicates the number of new customers an MSME has successfully reached. An increase in the number of customers indicates the success of its marketing strategy and the quality of the products or services provided. In addition to increasing revenue, customer growth allows MSMEs to expand their market segment, thus contributing to business sustainability (Cakranegara et al., 2022; Natoil et al., 2023).

Profit growth is an indicator that demonstrates an MSME's ability to manage operational costs and generate profits from earned revenue. Positive profit growth not only provides additional capital for reinvestment but also reflects the efficiency of financial and operational management, serving as a measure of long-term success for MSMEs (Giovanni et al., 2022; Nikmah et al., 2020). In addition to financial aspects, MSME performance is also influenced by non-financial factors such as the skills, experience, and time commitment of business managers (Mukson et al., 2021). This suggests that MSME performance measurement must encompass all dimensions that influence operational effectiveness and business sustainability.

Within the Resource-Based View (RBV) framework, MSME performance is heavily influenced by the management of unique and valuable internal resources. The RBV emphasizes that to achieve competitive advantage, MSMEs need to leverage resources that are rare, difficult to imitate, and well-organized. Research shows that both tangible and intangible assets, such as managerial skills, product innovation, and social networks, contribute significantly to improving MSME performance (Kero & Bogale, 2023).

Thus, understanding MSME performance is important not only as a measure of outcomes but also as a key variable influenced by digital technology, financial literacy, and proactive entrepreneurial behavior, which then forms the basis for formulating research hypotheses.

Figure 1. Framework of Thought



Research Methodology.

This study employs a quantitative research approach using primary data to examine the effects of Digital Technology Adoption and Financial Literacy on MSME Performance, with Proactive Entrepreneurial Behavior as a moderating variable. The population consists of Micro, Small, and Medium Enterprise (MSME) actors in Indonesia. A total of 98 respondents were selected using purposive sampling based on the following criteria: (1) MSME owners or operators, (2) actively involved in managing their businesses, (3) utilizing digital technology in their business activities, and (4) monitoring their business performance.

Data were collected through a structured questionnaire using a four-point Likert scale, ranging from 1 = strongly disagree to 4 = strongly agree. The questionnaire measured four latent constructs: Digital Technology Adoption (DT), Financial Literacy (FL), Proactive Entrepreneurial

Behavior (PEB), and MSME Performance (KU). The indicators for each construct were adopted and adapted from relevant previous studies and were evaluated as reflective measurement constructs because the indicators represent manifestations of their respective latent variables.

Results

A. Validity and Reliability Testing

Before conducting hypothesis testing using Structural Equation Modeling Partial Least Squares (SEM-PLS), validity and reliability tests were performed to ensure the quality of the measurement instrument. Table 3. presents the results of validity and reliability testing conducted using SmartPLS 4.0.

Table 3. Validity and Reliability

Construct	Measurement Items	Loadings	Composite Reliability	AVE
Digital Technology	DT.1	0.792	0.833	0.559
	DT.2	0.663		
	DT.3	0.855		
	DT.4	0.661		
Financial Literacy	FL.1	0.639	0.884	0.718
	FL.2	0.876		
	FL.3	0.868		
	FL.4	0.894		
	FL.5	0.869		
Proactive Entrepreneurial Behavior	PEB.1	0.795	0.919	0.697
	PEB.2	0.848		
	PEB.3	0.897		
MSME Performance	KU.1	0.837	0.902	0.755
	KU.2	0.893		

Construct	Measurement Items	Loadings	Composite Reliability	AVE
	KU.3	0.877		

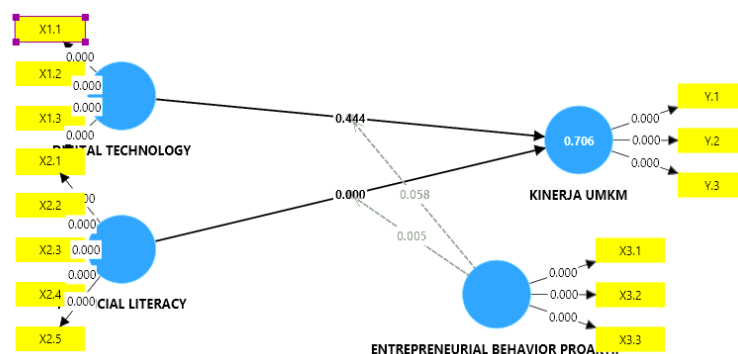
Source: Primary data processed with SmartPLS 4.0, 2026

The convergent validity assessment, evaluated through factor loadings and Average Variance Extracted (AVE), showed that although indicators DT.2 (0.663), DT.4 (0.661), and FL.1 (0.639) fell slightly below the recommended 0.70 threshold, they were retained as they contributed to overall construct validity, and all AVE values exceeded 0.50, confirming satisfactory convergent validity. Reliability testing using Composite Reliability (CR) and Cronbach's Alpha demonstrated that all constructs met the acceptable standards, with CR values >0.80 and Cronbach's Alpha >0.70, where Proactive Entrepreneurial Behavior recorded the highest CR (0.919), followed by MSME Performance (0.902), Financial Literacy (0.884), and Digital Technology (0.833). Additionally, classical assumption tests confirmed the model's robustness, with all Variance Inflation Factor (VIF) values below 3.3 indicating no multicollinearity issues, and f-squared values showing non-significant heteroscedasticity, ensuring the model was free from substantial bias.

B. Hypothesis Testing

Based on the SEM-PLS 4.0 analysis, hypothesis testing was conducted to examine the direct influence of Digital Technology (DT) and Financial Literacy (FL) on MSME Performance (KU), as well as the moderating role of Proactive Entrepreneurial Behavior (PEB) in strengthening these relationships. The analysis considered t-statistics, p-values, and path coefficient values according to standard SEM-PLS procedures.

Figure 2. PLS-SEM Path Model



Source: Processed through SEM PLS 4 by the author, 2026

The path diagram illustrates the structural relationships among the constructs in this study. The figure shows the direct paths from Digital Technology and Financial Literacy to MSME Performance, as well as the moderating paths involving Proactive Entrepreneurial Behavior. The path coefficients displayed in the figure represent the strength and direction of each hypothesized relationship.

Table 4. Hypothesis Testing

Relationship	STDEV	T Statistics	P Values	Hypothesis
DT → KU	0.110	0.765	0.444	H1: Rejected
PEB → KU	0.156	1.974	0.048	H2: Accepted
FL → KU	0.147	4.656	0.000	H3: Accepted
DT → PEB → KU	0.097	1.894	0.058	H4: Rejected
FL → PEB → KU	0.098	2.805	0.005	H5: Accepted

Source: Primary data processed with SmartPLS 4.0, 2026

The analysis revealed that Digital Technology has no significant direct effect on MSME Performance (H1 rejected: $\beta=0.110$, $p=0.444$). Proactive Entrepreneurial Behavior significantly influences MSME Performance (H2 accepted: $\beta=0.156$, $p=0.048$). Financial Literacy demonstrates the strongest positive effect (H3 accepted: $\beta=0.147$, $p=0.000$).

For moderating effects, Proactive Entrepreneurial Behavior does not moderate the Digital Technology-MSME Performance relationship (H4 rejected: $\beta=0.097$, $p=0.058$), but significantly moderates the Financial Literacy-MSME Performance relationship (H5 accepted: $\beta=0.098$, $p=0.005$). The model explains 62% of MSME Performance variance ($R^2=0.62$).

Discussion

The Effect of Digital Technology on MSME Performance

The analysis results demonstrate that Digital Technology (DT) has no significant effect on MSME Performance ($\beta = 0.110$, $t = 0.765$, $p = 0.444$). This finding indicates that the adoption of digital technology alone has not substantially improved the performance of MSMEs in this study sample. The rejection of H1 suggests that despite increasing digital technology adoption among Indonesian MSMEs, the expected performance improvements have not materialized significantly. As shown in Figure 2, the direct path from Digital Technology to MSME

Performance yielded the lowest path coefficient among the direct effects, visually confirming the weak relationship between these constructs.

Several factors contribute to this non-significant relationship. First, low digital literacy among MSME actors remains a critical barrier, as many entrepreneurs lack the necessary skills to effectively utilize digital tools for business optimization (Febriyani et al., 2024). Second, limited access to reliable internet infrastructure in various regions of Indonesia, particularly outside major urban centers, constrains the effective implementation of digital technologies (Idemudia et al., 2023). Third, minimal support from the government and financial institutions in terms of digital training programs and technology subsidies further exacerbates the challenges faced by MSMEs in leveraging digital technology for performance improvement.

This finding aligns with the *Resource Based View* (RBV) perspective, which emphasizes that company performance is more dependent on internal resource management and organizational capabilities rather than simply adopting new technologies (Jihan et al., 2026; Lubis, 2022). From the RBV standpoint, digital technology constitutes a tangible resource that requires complementary intangible assets such as digital skills, organizational readiness, and managerial competencies to generate sustainable competitive advantage. Without these complementary capabilities, technology adoption remains superficial and fails to translate into measurable performance outcomes.

The non significant effect of digital technology on MSME performance is consistent with previous research indicating that technology adoption alone does not guarantee performance improvement. Studies have shown that the effectiveness of digital transformation depends heavily on the absorptive capacity of organizations and their ability to integrate technology with existing business processes (Faiz et al., 2024; Nur et al., 2025; F. Umar et al., 2024). The findings suggest that Indonesian MSMEs still be in the early stages of digital adoption, where technology is primarily used for basic operational functions rather than strategic business development.

The Effect of Proactive Entrepreneurial Behavior on MSME Performance

Proactive Entrepreneurial Behavior (PEB) has been shown to significantly influence MSME Performance ($\beta = 0.156$, $t = 1.974$, $p = 0.048$). The acceptance of H2 confirms that entrepreneurial proactivity strengthens the ability of MSME actors to exploit business opportunities and adapt to market changes. As depicted in Figure 2, the direct path from Proactive Entrepreneurial Behavior to MSME Performance demonstrates a positive and significant relationship, with the path

coefficient indicating a meaningful contribution to performance outcomes. This finding underscores the importance of proactive behavior as a critical determinant of business success in the dynamic and competitive MSME sector.

Entrepreneurial proactivity encompasses several key dimensions, including opportunity recognition, initiative-taking, and forward-looking strategic actions. MSME actors who exhibit proactive behavior tend to anticipate market trends, identify emerging customer needs, and implement innovative solutions before competitors. This proactive approach enables businesses to gain first-mover advantages, differentiate themselves in the marketplace, and respond more effectively to environmental uncertainties (Christall Ziva, 2024).

However, the findings also suggest that excessive proactivity can potentially weaken the effectiveness of social networks and business operations. Entrepreneurs who are overly proactive pursue too many opportunities simultaneously, leading to resource dispersion and reduced focus on core business activities. Additionally, excessive proactivity might strain business relationships with partners, suppliers, and customers, particularly if the entrepreneur frequently changes strategies or business directions without adequate consultation. This nuanced finding highlights the importance of balanced proactive behavior, where entrepreneurs maintain a forward-looking orientation while preserving the stability of their business networks and operational efficiency (Crant, 2024; Satwika & Suhariadi, 2025).

From the RBV perspective, proactive entrepreneurial behavior can be considered a valuable intangible resource that contributes to firm performance through enhanced strategic agility and market responsiveness. The findings support the view that managerial capabilities, including the ability to anticipate and act upon opportunities, are essential resources that enable MSMEs to achieve superior performance outcomes (Yakob et al., 2021).

The Effect of Financial Literacy on MSME Performance

Financial Literacy (FL) demonstrates a highly significant effect on MSME Performance ($\beta = 0.147$, $t = 4.656$, $p = 0.000$). The acceptance of H3 with the highest t-statistic among the direct effects indicates that financial literacy plays a crucial role in enhancing MSME performance. As illustrated in Figure 2, the path from Financial Literacy to MSME Performance is the strongest direct path in the model, visually confirming the substantial contribution of financial knowledge to business success. This finding provides strong empirical evidence that financial knowledge and skills are fundamental determinants of business success in the MSME sector.

Financial literacy enables MSME actors to manage cash flow effectively, plan budgets strategically, and make informed financial decisions. Entrepreneurs with higher financial literacy are better equipped to understand financial statements, evaluate investment opportunities, access appropriate financing sources, and mitigate financial risks. These capabilities contribute directly to improved business performance through better resource allocation, cost control, and financial planning (Marlizar, 2025; Molosiwa & Holland, 2025; Sarlawat et al., 2025).

The significant effect of financial literacy aligns with RBV theory, which argues that managerial skills and financial knowledge constitute important intangible resources that differentiate successful enterprises from less successful ones. From this theoretical perspective, financial literacy represents a form of human capital that enables MSME owners to make strategic decisions that optimize resource utilization and create value. The findings suggest that investments in financial literacy education and training can yield substantial returns in terms of improved MSME performance (Mujahidin et al., 2022).

This result is consistent with previous research demonstrating that financial literacy significantly influences business performance across various contexts. Studies have shown that financially literate entrepreneurs are more likely to maintain proper financial records, separate business and personal finances, and make sound investment decisions (Mujahidin et al., 2022). The highly significant relationship between financial literacy and MSME performance in this study underscores the need for targeted interventions to enhance financial knowledge among MSME actors in Indonesia.

The Moderating Role of Proactive Entrepreneurial Behavior on Digital Technology and MSME Performance

The moderating effect of Proactive Entrepreneurial Behavior on the relationship between Digital Technology and MSME Performance was not significant ($\beta = 0.097$, $t = 1.894$, $p = 0.058$). The rejection of H4 indicates that entrepreneurial proactivity has not been able to strengthen the impact of digital technology on performance, despite its direct positive effect on performance outcomes. In Figure 2, the moderating path from Digital Technology through Proactive Entrepreneurial Behavior to MSME Performance is depicted with a dashed line, visually representing the non-significant moderating relationship.

Several explanations account for this non-significant moderating effect. First, implementation constraints related to digital technology adoption remain substantial,

including inadequate infrastructure, limited technical support, and insufficient digital skills among MSME actors. Even proactive entrepreneurs struggle to overcome these systemic barriers, limiting the potential of proactivity to enhance technology-performance relationships (Nurul & Lubis, 2024). Second, low internal readiness of MSMEs to integrate digital technology with existing business processes prevent proactive behavior from fully leveraging technology's potential. Internal readiness encompasses organizational culture, employee skills, and operational systems that must be aligned to maximize the benefits of technology adoption (Anatan, 2023; Manapa Sampetoding & Er, 2024).

The non-significant moderating effect does not diminish the importance of either digital technology or proactive behavior individually. Instead, it suggests that these two factors operate independently in influencing MSME performance, with proactivity unable to bridge the gap between technology adoption and performance outcomes (Anatan, 2023; Cheung, 2025; Manapa Sampetoding & Er, 2024). This finding highlights the need for comprehensive interventions that simultaneously address digital infrastructure, skills development, and organizational readiness to enable proactive entrepreneurs to fully benefit from technology adoption.

The Moderating Role of Proactive Entrepreneurial Behavior on Financial Literacy and MSME Performance

The moderating effect of Proactive Entrepreneurial Behavior on the relationship between Financial Literacy and MSME Performance was significant ($\beta = 0.098$, $t = 2.805$, $p = 0.005$). The acceptance of H5 indicates that the combination of good financial literacy and proactive behavior significantly improves MSME performance, as entrepreneurs can effectively apply their financial knowledge in business practices (Setyawan & Gitayuda, 2024; Yakob et al., 2021). In Figure 2, the moderating path from Financial Literacy through Proactive Entrepreneurial Behavior to MSME Performance is shown as a significant interactive relationship, visually confirming the complementary effect of these two constructs.

This significant moderating effect suggests that financial literacy and proactive entrepreneurial behavior are complementary resources that jointly contribute to enhanced business performance. Entrepreneurs who possess both financial knowledge and proactive tendencies are better positioned to identify financial opportunities, make sound financial decisions, and implement strategic financial management practices (Rapina et al., 2023). The

combination enables MSME actors to not only understand financial concepts but also actively apply them to improve business operations and performance.

From the RBV perspective, the interaction between financial literacy and proactive behavior creates a synergistic resource combination that generates superior performance outcomes. Financial literacy provides the knowledge base for effective financial management, while proactive behavior ensures that this knowledge is actively applied to pursue opportunities and solve business challenges (Kero & Bogale, 2023). This synergy highlights the importance of developing both cognitive capabilities (financial knowledge) and behavioral dispositions (proactivity) to maximize MSME performance.

The findings align with previous research indicating that proactive behavior enhances the effectiveness of managerial capabilities, including financial management skills (Setyawan & Gitayuda, 2024; Yakob et al., 2021). Entrepreneurs who proactively seek financial information, monitor financial performance, and make strategic adjustments based on financial insights are more likely to achieve superior business outcomes. This interaction effect provides important insights for the design of MSME development programs, suggesting that interventions should address both knowledge and behavioral aspects to achieve optimal results.

Research Implications

This study demonstrates that financial literacy significantly enhances MSME performance through proactive entrepreneurial behavior, while digital technology adoption alone is insufficient without complementary internal capabilities. Theoretically, these findings refine the Resource-Based View by revealing proactive behavior as a strategic resource that strengthens financial knowledge's impact, though its moderating effect on technology adoption remains constrained by inadequate infrastructure. Practically, MSME owners should prioritize financial literacy and balanced proactive behavior before technology investment, while policymakers should design integrated programs combining financial training, digital infrastructure, and entrepreneurial capacity building, particularly targeting women entrepreneurs for sustainable MSME growth.

Conclusion

The study concludes that digital technology insignificantly affects MSME performance (H1 rejected), confirming technology alone is insufficient without internal readiness. Financial literacy positively and significantly influences MSME performance (H2 accepted), enabling strategic

resource management. Proactive entrepreneurial behavior does not moderate the technology-performance relationship (H3 rejected) but significantly moderates financial literacy's influence on performance (H4 accepted). Overall, MSME performance depends on managerial knowledge, internal readiness, and adaptive behavior, consistent with RBV theory.

For practitioners, prioritize digital and financial literacy development and balanced proactive behavior before technology adoption. For policymakers, provide infrastructure improvements, integrated training, entrepreneurship education, and equitable capital access. Future researchers should explore additional moderating variables (organizational culture, capital access), conduct longitudinal studies, use larger and more geographically diverse samples, and employ qualitative approaches to better understand digital technology adoption effectiveness among Indonesian MSMEs.

Limitations of the Study

This study has several limitations. The small sample of 98 respondents from South Sulawesi limits generalizability. The cross-sectional design prevents causal inferences, while self-reported data may introduce response bias. The study also excluded other influential factors like organizational culture and capital access, and measured only basic digital technology usage without distinguishing strategic integration levels. Future research should use larger, geographically diverse samples, longitudinal designs, objective performance measures, and include additional contextual variables for more comprehensive insights.

Recommendations for Future Research

Future research should expand sample size and geographic coverage, employ longitudinal and mixed-method designs, and incorporate additional variables such as organizational culture, capital access, government support, and digital infrastructure quality. Researchers should differentiate digital technology sophistication levels, conduct comparative studies across MSME sectors and business sizes, and examine demographic variations to enable more targeted policy interventions.

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