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The Effect of Innovation, Business Adaptability, and Financial Literacy on Sustainability with Empowerment as a Moderating Variable

Muhammad Alwi Permana^{1*}, Yunizar¹, Sutisna¹

¹ Universitas Padjadjaran, Sumedang, Indonesia

* Corresponding author: Muhammad Alwi Permana
(muhammad18269@mail.unpad.ac.id)

Abstract

The sustainability of food and beverage Micro, Small, and Medium Enterprises (MSMEs) is challenged by rapid market changes, digital transformation, intense competition, and limited innovation, adaptability, and financial management capacity. This study aims to examine the effect of product innovation, business adaptability, and financial literacy on the sustainability of food and beverage MSMEs, with MSME empowerment as a moderating variable. The research adopts a quantitative explanatory approach using a survey method. Data were collected through structured questionnaires distributed to food and beverage MSME owners in Bandung Regency and analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The results show that business adaptability has a significant and strong positive effect on MSME sustainability, while product innovation and financial literacy do not have a significant direct effect. MSME empowerment has a significant direct effect on sustainability and selectively moderates the relationship between business adaptability and sustainability, but does not moderate the effects of product innovation and financial literacy. These findings indicate that MSME sustainability is primarily driven by adaptive capabilities, which are strengthened through effective empowerment programs. The study highlights the importance of integrating adaptability and empowerment strategies to support sustainable MSME development.

Keywords

Business Adaptability, Financial Literacy, MSME Empowerment, Product Innovation, Sustainability.

1. Introduction

The contemporary business landscape has become increasingly dynamic and competitive, driven by rapid technological advancement, digital disruption, and rising consumer expectations. Global economic integration has intensified competition beyond geographical boundaries, making innovation and competitiveness essential prerequisites for long-term business survival (Gao et al., 2023). This situation has profound implications for Micro, Small, and Medium Enterprises (MSMEs), which play a crucial role as employment absorbers and engines of local economic growth, particularly in developing economies such as Indonesia (Reimann et al., 2021). Despite their strategic importance, MSMEs often face structural constraints, including limited resources, managerial capabilities, and adaptability to changing market environments.

The development of the digital economy presents significant opportunities for MSMEs to broaden their market access, enhance operational effectiveness, and build stronger relationships with customers through the utilization of digital platforms and technological tools (Deb et al., 2024). However, these advantages cannot be maximized without adequate internal capabilities. MSME actors are required to demonstrate high levels of business adaptability, continuously generate product innovations that align with evolving consumer preferences, and apply solid financial literacy in planning, managing, and evaluating their business activities (Kotler & Keller, 2022). Within this framework, business sustainability is not shaped by a single factor in isolation. Instead, it depends on how well MSMEs can strategically integrate innovation, financial management competence, and adaptive capabilities into a unified, mutually reinforcing system, particularly in responding to dynamic market conditions and rising environmental uncertainty.

Empirical observations indicate that many MSMEs struggle to maintain long-term viability due to weak innovation performance and limited responsiveness to market changes. A significant number of enterprises continue to offer conventional products with minimal differentiation, despite increasing competitive pressure and expanding access to digital technology (Bruce et al., 2023). Moreover, inadequate adaptability, manifested in resistance to new business models, technologies, and consumer behaviour shifts, renders MSMEs vulnerable to external shocks such as economic crises or regulatory changes. This gap between available opportunities and actual organizational capabilities highlights the urgency of strengthening adaptive capacity as a core element of MSME resilience (Wardana et al., 2023).

Beyond innovation and adaptability, financial literacy emerges as a critical foundation for sustainable MSME development. Adequate financial knowledge enables entrepreneurs to manage cash flows, assess risks, and make rational investment decisions, thereby enhancing business resilience and continuity (Doli & Ghazali, 2024). When combined with effective empowerment programs such as skills development, access to resources, and institutional support, financial literacy can reinforce innovation efforts and adaptive behavior. Therefore, MSME empowerment functions not merely as external assistance, but as a strategic mechanism that strengthens internal capabilities and supports sustainable business performance in highly competitive and digitized markets (Sulistiyono, 2022; Quansah et al., 2022).

Based on the background of the problem, this study aims to examine the sustainability of food and beverage MSMEs in Bandung Regency by analyzing the direct effects of product innovation, business adaptability, and financial literacy, as well as the direct influence of MSME empowerment on business sustainability. In addition, this research seeks to investigate the moderating role of MSME empowerment in strengthening or weakening the relationship between product innovation, business adaptability, and financial literacy and the long-term sustainability of MSMEs in the food and beverage sector in Bandung Regency.

2. Literature Review and Hypothesis Development

2.1. The Effect on Business Sustainability

Product innovation refers to a firm's ability to develop and introduce new or improved products that offer distinct value through enhancements in design, functionality, packaging, materials, or brand storytelling in response to changing consumer preferences. For MSMEs, this involves converting creative ideas into marketable solutions that boost customer satisfaction and competitive advantage, supporting long-term growth (Patma et al., 2021; Kurniawan et al., 2023). Business adaptability denotes a firm's capacity to respond effectively to internal and external changes, such as market volatility, technological disruption, and shifting consumer behavior. From a dynamic capabilities perspective, adaptability enables MSMEs to reconfigure resources, adjust strategies, and seize opportunities, thereby strengthening resilience and sustainability in uncertain environments (Garrido-Moreno et al., 2024).

Financial literacy encompasses the knowledge, skills, and attitudes that enable MSME owners to manage financial resources effectively and make informed decisions. For MSMEs, financial literacy is critical for budgeting, cash-flow management, risk assessment, accessing formal financial services, and maintaining a clear distinction between personal and business finances to support long-term financial planning. Empirical evidence suggests that strong financial literacy improves the quality of financial decisions and strengthens business resilience, particularly under economic uncertainty (Irawan, 2020; Zutshi et al., 2021; Octavianus & Taufan, 2024). Business sustainability refers to a firm's ability to sustain long-term operations, generate economic value, and respond to environmental and social dynamics. In the MSME context, sustainability is reflected in stable income, customer loyalty, operational efficiency, and the capacity to withstand external shocks, driven by internal capabilities such as innovation, adaptability, and sound financial management (Irawan et al., 2020; Satria et al., 2025).

H1: Product innovation has a significant effect on business sustainability.

H2: Business adaptability has a significant effect on business sustainability.

H3: Financial literacy has a significant effect on business sustainability.

H4: MSME empowerment has a significant effect on business sustainability.

2.2. MSME Empowerment as a Moderating Variable

MSME empowerment is a systematic and continuous process aimed at enhancing the capacity, independence, and competitiveness of small businesses through skills development, access to resources, and institutional support. Empowerment goes beyond financial assistance by strengthening managerial capabilities, entrepreneurial confidence, and the ability to leverage market opportunities. Effective empowerment initiatives enable MSMEs to improve innovation performance, financial practices, and strategic adaptability, thereby reinforcing long-term sustainability. Empirical evidence indicates that empowered MSMEs are more resilient and better equipped to compete in dynamic business environments (Tedjasuksmana, 2021; Aulia & Arimurti, 2023).

Product innovation supports business sustainability by enabling differentiation and responsiveness to market changes, and its impact becomes stronger when MSMEs receive empowerment support that enhances managerial capability and resource access (Almulhim, 2020). Likewise, business adaptability contributes to long-term sustainability, with its effectiveness amplified through empowerment mechanisms that foster resilience and strategic flexibility (Wahyuningtiyas & Sudarmiatin, 2024). Financial literacy also improves financial decision-making and

performance stability, but empowerment programs that expand financial capability and inclusion further reinforce its contribution to sustainability (Hapsoro & Iswara, 2019). Empirical evidence from mentoring-based development programs indicates that structured mentoring and support significantly enhances entrepreneurial competencies and MSME performance, thereby reinforcing internal strategic orientation and contributing to long-term sustainability outcomes (Herawati et al., 2025). MSME empowerment acts as a strategic moderating variable that strengthens the influence of innovation, adaptability, and financial literacy on sustainable business outcomes.

H5: MSME empowerment moderates the effect of product innovation on business sustainability.

H6: MSME empowerment moderates the effect of business adaptability on business sustainability.

H7: MSME empowerment moderates the effect of financial literacy on business sustainability.

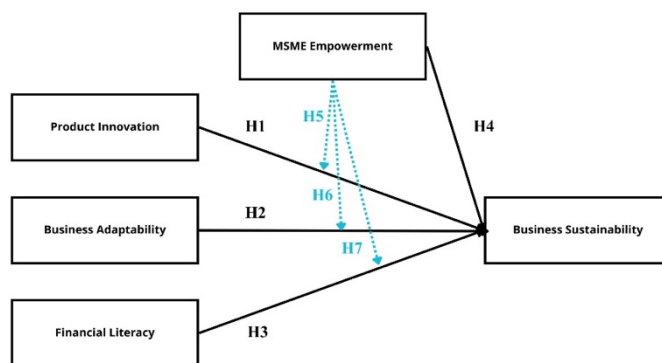


Figure 1. Conceptual Framework

Figure 1 presents the conceptual model of this study, where product innovation, business adaptability, and financial literacy are proposed as primary factors influencing MSME business sustainability. These internal capabilities are assumed to contribute directly to the ability of firms to maintain long-term performance and competitiveness. Furthermore, MSME empowerment is positioned not only as an independent factor affecting sustainability but also as a moderating variable that strengthens the effects of innovation, adaptability, and financial literacy on sustainable outcomes. The model highlights that MSME sustainability is shaped by the interplay between internal strategic capabilities and the reinforcing role of empowerment initiatives.

3. Methods

To investigate the causal links between the variables, this study uses an explanatory research approach in conjunction with a quantitative associative design (Hair et al., 2017; Sugiyono, 2019). MSME empowerment is positioned as a moderating element, while business sustainability is the dependent variable. Product innovation, business adaptability, and financial literacy are considered independent variables. The study focused on MSMEs in the food and beverage industry in Bandung Regency, which has 23,675 business units. Primary data was gathered directly from MSME owners or managers using questions created based on verified indicators as part of a systematic survey approach (Sugiyono, 2021). In a positivist quantitative framework, this method allows the study to investigate both direct and moderating effects among variables.

From the population, a sample of 155 MSMEs was determined using the Slovin formula with an acceptable margin of error and selected through probability sampling to ensure representativeness (Creswell & Creswell, 2023). Data were collected using a structured questionnaire measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with items adapted from established and validated studies. The collected data were analyzed using descriptive statistics and inferential analysis through Structural Equation Modeling–Partial Least Squares (SEM-PLS). The analysis was conducted using SmartPLS 4 software to assess both the measurement model (outer model) and the structural model (inner model), including the evaluation of direct and moderating effects among variables.

The capacity of this analytical method to simultaneously examine moderating effects and intricate interactions among latent variables led to its selection (Hair et al., 2021). This study aims to evaluate both measurement and structural models in order to provide solid empirical evidence regarding the contribution of financial literacy, business adaptability, and product innovation to MSME sustainability. Additionally, it evaluates how MSME empowerment fortifies these relationships in a dynamic and competitive business environment.

4. Results

MSMEs in Bandung Regency, West Java, are the focus of this study. They were chosen because of the industry’s high activity level, fierce competition, and quick reaction to shifting consumer trends. Bandung Regency represents a strategic and relevant research setting as one of the regions with the largest concentration of MSMEs in Indonesia, characterized by diverse socio-economic and geographic conditions ranging from urban to semi-rural areas. Food and beverage MSMEs in this region are predominantly micro and small-scale businesses with limited capital, simple production technologies, and informal management structures, often relying heavily on the owner’s individual capabilities. While these enterprises offer a wide variety of culinary products reflecting local culture and creativity, they commonly face constraints in product differentiation, innovation depth, business adaptability, and financial management. Innovation tends to be incremental and reactive, business adaptation to digital and market changes remains slow, financial literacy is generally limited, and empowerment programs have not yet been optimally translated into sustained capacity building.

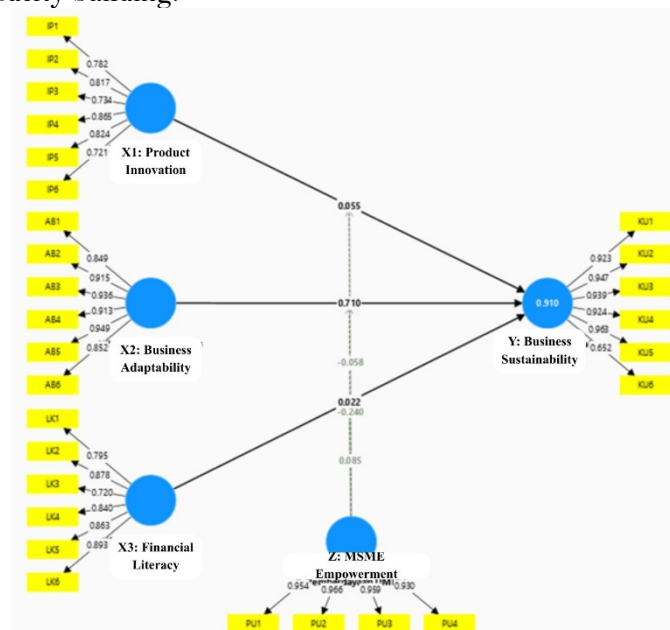


Figure 2. Outer Model Results

According to Figure 2, which displays the outer model results, all indicators across the latent variables show outer loading values above the necessary minimum threshold, demonstrating that the convergent validity requirements have been satisfactorily satisfied. The indicators of product innovation, business adaptability, and financial literacy demonstrate strong and consistent contributions in representing their respective constructs, as reflected by their relatively high loading values. Similarly, the indicators measuring business sustainability and MSME empowerment consistently capture their underlying constructs, confirming that the research instrument is appropriately designed and well aligned with the context of food and beverage MSMEs in Bandung Regency. As the outer model requirements are fulfilled, all indicators are considered valid for further analysis, allowing the study to proceed to the evaluation of the inner model and subsequent hypothesis testing.

Table 1. Average Variance Extracted (AVE) Values

Variable	AVE
Product Innovation (X1)	0.628
Business Adaptability (X2)	0.816
Financial Literacy (X3)	0.695
Business Sustainability (Y)	0.806
MSME Empowerment (Z)	0.908

According to Table 1, which displays the Average Variance Extracted (AVE) values, every study variable is greater than the suggested minimum threshold of 0.50, meaning that every construct passes the convergent validity requirement. MSME empowerment (Z) records the highest AVE value, demonstrating that its indicators strongly represent the underlying construct. Business adaptability (X2) and business sustainability (Y) also show high AVE values, reflecting excellent indicator representation, while financial literacy (X3) and product innovation (X1) display adequate AVE levels, confirming that their indicators sufficiently explain construct variance. These findings validate the measurement model's validity and suitability for additional reliability evaluation and structural (inner model) testing.

Table 2. Cross Loading Value

Item	Business Adaptability	Product Innovation	Business Sustainability	Financial Literacy	MSMEs Empowerment
AB1	0.949	0.367	0.742	0.485	0.467
AB2	0.936	0.474	0.833	0.571	0.572
AB3	0.915	0.537	0.921	0.61	0.605
AB4	0.914	0.512	0.857	0.588	0.605
AB5	0.852	0.462	0.875	0.594	0.565
AB6	0.848	0.392	0.782	0.524	0.492
IP1	0.469	0.861	0.532	0.673	0.641
IP2	0.360	0.825	0.449	0.653	0.669
IP3	0.349	0.822	0.377	0.653	0.61
IP4	0.458	0.770	0.527	0.729	0.675
IP5	0.425	0.743	0.482	0.727	0.713
IP6	0.353	0.727	0.419	0.574	0.631
KU1	0.442	0.481	0.963	0.57	0.584
KU2	0.468	0.476	0.947	0.597	0.618
KU3	0.700	0.526	0.939	0.61	0.606
KU4	0.482	0.438	0.924	0.566	0.584
KU5	0.616	0.527	0.923	0.598	0.645
KU6	0.531	0.512	0.652	0.833	0.877
LK1	0.471	0.656	0.574	0.895	0.686
LK2	0.541	0.527	0.622	0.878	0.832

Item	Business Adaptability	Product Innovation	Business Sustainability	Financial Literacy	MSMEs Empowerment
LK3	0.465	0.518	0.486	0.864	0.611
LK4	0.508	0.671	0.562	0.843	0.782
LK5	0.552	0.643	0.564	0.790	0.743
LK6	0.58	0.686	0.617	0.718	0.836
PU1	0.575	0.604	0.602	0.826	0.964
PU2	0.589	0.609	0.604	0.849	0.961
PU3	0.589	0.679	0.571	0.887	0.952
PU4	0.584	0.669	0.548	0.88	0.933

According to Table 2, each indicator loads more heavily on its corresponding concept than on other model constructs, suggesting that discriminant validity is good. This pattern demonstrates that each indication effectively separates the latent variable it represents and that there is no discernible overlap between the constructs. Thus, all variables are appropriate for further structural (inner model) analysis, and the findings show that the measurement model is fully stated.

Table 3. Construct Reliability Evaluation Values

Variable	Cronbach's Alpha	Composite Reliability
Product Innovation (X1)	0.881	0.910
Business Adaptability (X2)	0.954	0.964
Financial Literacy (X3)	0.911	0.931
Business Sustainability (Y)	0.949	0.961
MSME Empowerment (Z)	0.966	0.975

Table 3 shows that all structures exhibit Composite Reliability and Cronbach's Alpha values above the suggested cutoff of 0.70, indicating good internal consistency across the measurement scales. The most dependable indicators are those for MSME empowerment (Z), which is remarkably stable, followed by business sustainability (Y) and business adaptability (X2). These results confirm that the research instrument is reliable and suitable for subsequent structural model testing and analysis of relationships among variables.

Table 4. R Square

Items	Value
Variable	Business Sustainability
R-square	0.910
Adjusted R-square	0.906

Table 4 shows that the structural model has very strong explanatory power, as evidenced by the R-squared value of 0.910 and the adjusted R-squared value of 0.906 for business sustainability. These results suggest that approximately 91.0% of the variance in the sustainability of food and beverage MSMEs is explained by product innovation, business adaptability, financial literacy, and the moderating role of MSME empowerment, while the remaining variance is influenced by factors outside the model. The strong relationship between the R-square and modified R-square values further indicates that the model is robust in describing the sustainability of MSME businesses and is well-defined, free from overestimation caused by extra factors.

Table 5. Results of Bootstrapping and Hypothesis Testing

No.	Hypothesized Path	Original Sample	Sample Mean	Standard Deviation	t-statistic	p-value
1	Product Innovation (X1) → Business Sustainability (Y)	0.055	0.055	0.071	0.785	0.433
2	Business Adaptability (X2) → Business Sustainability (Y)	0.710	0.717	0.071	10.061	0.000
3	Financial Literacy (X3) → Business Sustainability (Y)	0.022	0.018	0.107	0.209	0.834
4	MSME Empowerment (Z) → Business Sustainability (Y)	0.377	0.375	0.125	3.015	0.003
5	MSME Empowerment (Z) × Product Innovation (X1) → Business Sustainability (Y)	-0.058	-0.060	0.043	1.350	0.177
6	MSME Empowerment (Z) × Business Adaptability (X2) → Business Sustainability (Y)	-0.240	-0.222	0.089	2.684	0.007
7	MSME Empowerment (Z) × Financial Literacy (X3) → Business Sustainability (Y)	0.085	0.076	0.092	0.918	0.358

Table 5 presents the results of hypothesis testing for both direct and moderating relationships. Product innovation does not have a significant effect on business sustainability, indicating that innovation efforts alone are not sufficient to ensure long-term business continuity when they are not strategically integrated. In contrast, business adaptability shows a strong and significant positive influence on sustainability, underscoring the importance of MSMEs' ability to respond effectively to market dynamics, technological change, and shifting consumer preferences. Financial literacy also does not demonstrate a significant direct effect, suggesting that financial knowledge without effective application in strategic and operational decisions may not substantially improve sustainability outcomes. Meanwhile, MSME empowerment has a significant positive effect on business sustainability, highlighting the vital role of training, mentoring, and access to resources in strengthening resilience and competitiveness.

In terms of moderating effects, MSME empowerment does not significantly moderate the relationship between product innovation and sustainability, nor does it moderate the relationship between financial literacy and sustainability. This implies that empowerment does not meaningfully strengthen or weaken the influence of these two variables on sustainable performance. However, MSME empowerment significantly moderates the relationship between business adaptability and sustainability, indicating that empowerment enhances the effectiveness of adaptive capabilities in driving long-term business performance. The findings emphasize that sustainability is primarily driven by adaptability, with empowerment serving as a strategic mechanism that reinforces this adaptive capacity.

5. Discussion

The findings indicate that the effects of the independent variables on the sustainability of food and beverage MSMEs in Bandung Regency are not uniform. Product innovation and financial literacy do not show a significant direct effect on business sustainability, whereas business adaptability demonstrates a strong and significant influence. The insignificance of product innovation suggests that innovations undertaken by MSMEs tend to be partial, reactive, and not yet integrated into long-term business strategies, limiting their ability to generate sustainable competitive advantages. This result is consistent with Christiana et al. (2021), Muriithi (2022), Ardy et al. (2023), Solikha et al. (2023), and Handoyo (2023), who argue that innovation without clear differentiation and managerial reinforcement only yields temporary advantages.

In contrast, business adaptability emerges as a key determinant of MSME sustainability. The ability of business actors to adjust to changes in consumption patterns, digital technologies, and competitive market dynamics significantly enhances the likelihood of sustained business performance. These findings support the Resource-Based View, which emphasizes that internal capabilities particularly adaptive capacity constitute a source of sustainable competitive advantage (Barney et al., 2021). Meanwhile, financial literacy does not exhibit a significant direct effect, indicating that conceptual financial knowledge alone does not automatically contribute to business sustainability unless it is effectively translated into strategic and operational decision-making.

The findings reveal that MSME empowerment has a significant direct effect on the sustainability of food and beverage MSMEs. Empowerment programs such as entrepreneurship training, business mentoring, facilitation of access to finance, and technological support are proven to enhance the capacity of business actors to manage and develop their enterprises sustainably. Empowerment not only improves technical and managerial competencies but also strengthens MSME resilience in coping with market pressures and changes in the business environment. These results are in line with studies by Suswadi et al. (2023), which indicate that empowerment initiatives based on capacity building and institutional support contribute positively to MSME resilience and sustainability. Therefore, MSME empowerment can be viewed as a strategic instrument that functions not merely as a supporting factor, but also as a key driver of long-term business sustainability particularly when combined with strong business adaptability.

The moderation test results indicate that MSME empowerment does not moderate the relationship between product innovation and financial literacy with business sustainability, but it plays a significant moderating role in the relationship between business adaptability and business sustainability. The insignificance of moderation in product innovation suggests that, despite receiving empowerment programs, the innovations undertaken by MSMEs remain incremental and easily imitated, and therefore are not strong enough to generate long-term sustainability impacts. This finding is consistent with Ilham et al. (2024), who emphasize that product innovation requires clear market orientation and differentiation strategies to meaningfully contribute to business sustainability. MSME empowerment does not enhance the impact of financial literacy on sustainability but significantly strengthens business adaptability, making adaptive capabilities more effective through mentoring, resource access, and institutional support, which enables more structured and sustainable operational strategies.

These findings imply that policymakers, business support institutions, and MSME stakeholders should prioritize programs that enhance business adaptability alongside empowerment initiatives. Rather than focusing solely on innovation or financial literacy training, efforts should be directed toward fostering adaptive capabilities, providing targeted mentoring, and facilitating access to resources that

enable MSMEs to respond proactively to market and technological changes. By aligning empowerment strategies with internal capabilities, stakeholders can more effectively promote long-term sustainability and competitive advantage for food and beverage MSMEs in Bandung Regency.

6. Conclusion

Based on the analysis, the sustainability of food and beverage MSMEs in Bandung Regency is shaped by a complex interaction between internal capabilities and external support mechanisms. Business adaptability is the only internal variable with a significant direct effect on business sustainability, while product innovation and financial literacy do not show a significant direct impact. This indicates that the ability of MSMEs to respond effectively to market changes, technological developments, and consumer preferences is the primary determinant of long-term business continuity. Incremental innovation and administrative financial literacy alone are insufficient to support sustainability without strategic integration into adaptive business practices. These findings highlight the importance of synergy between internal adaptive capacity and external empowerment programs. Policymakers and practitioners should focus on strategies that enhance MSMEs' adaptability and design practical, continuous, and integrated empowerment initiatives to enable MSMEs to build resilience, maintain competitiveness, and achieve long-term sustainability.

However, this study is limited to food and beverage MSMEs in Bandung Regency, which may affect the generalizability of the results. Additionally, financial literacy was measured conceptually and administratively, potentially underestimating its practical influence on strategic decision-making. Future research is encouraged to expand across sectors and regions to improve generalizability and to explore additional external variables, such as marketing networks, access to finance, and government policies. Further studies could also examine more applied measures of financial literacy to better understand their role in supporting MSME sustainability.

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Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.



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