MULTIFINANCE
Jurnal Ekonomi, Manajemen Dan Perbankan

Altin Riset Publishing
http://altinriset.com/journal/index.php/multifinance
E-ISSN: 3024-8175
Vol.4, No. 2, November 2026

FINANCIAL LITERACY AND SME SUSTAINABILITY PERFORMANCE: THE MEDIATING ROLES OF ENTREPRENEURIAL COMPETENCE AND FINANCIAL RESILIENCE IN THE MADURA COASTAL REGION

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Abstract

Coastal micro, small, and medium-sized enterprises (MSMEs) face sustainability challenges because business income is exposed to seasonal fluctuations and access to financial education may be limited. Drawing on the Knowledge-Based View (KBV) and the Triple Bottom Line (TBL), this study examines the association between financial literacy and MSME sustainability performance and tests the mediating roles of entrepreneurial competence and financial resilience, separately and sequentially. An explanatory cross-sectional survey was conducted among 196 MSME owners in the coastal areas of Bangkalan, Sampang, Pamekasan, and Sumenep, Madura, Indonesia. Participants were selected purposively, and data were collected using a five-point Likert-scale questionnaire. The proposed relationships were analysed using partial least squares structural equation modelling (PLS-SEM) in SmartPLS 4.1.1.8. Following indicator screening, 11 of the initial 26 indicators were retained. The final sustainability-performance construct represented only social and environmental indicators, whereas financial resilience was represented by two indicators of operational continuity. Financial literacy was positively associated with entrepreneurial competence and financial resilience. Entrepreneurial competence was positively associated with both financial resilience and sustainability performance and mediated the relationships between financial literacy and these outcomes. The direct association between financial literacy and sustainability performance was weak and supported only at the 10% one-tailed level. Financial resilience was not significantly associated with sustainability performance; consequently, its individual and sequential mediation effects were unsupported. Entrepreneurial competence emerged as the strongest pathway linking financial knowledge to the measured sustainability outcomes. The findings should be interpreted in light of the restricted final measurement of sustainability performance.

Keywords: entrepreneurial competence; financial literacy; financial resilience; MSME sustainability performance; coastal MSMEs

Introduction

Micro, Small, and Medium Enterprises (MSMEs) are widely recognized as the foundation of the regional economy and a vital resource for Indonesia's economic sustainability (Safitri & Wijaya, 2026). MSMEs account for up to 89.04% of the national workforce (Nursini, 2020) and nearly 99% of all business units (Safitri & Wijaya, 2026). SMEs' contribution to GDP has exceeded 60%. This significant contribution highlights the role of MSMEs as engines of growth that generate competitive economic value from local resources

(Botezatu & Hosszu, 2020). However, this significant contribution stands in stark contrast to MSMEs' ability to sustain their businesses. The global business closure rate for MSMEs ranges from 70% to 80%, according to Dzomonda (2022). While Arsawan et al. (2020) emphasize that the core of this vulnerability lies in the inability to adaptively manage resources and knowledge in response to changes in the business environment, Idris et al. (2023) point to a consistent pattern in which many MSMEs are able to grow in the early stages but lose their competitiveness over time.

One of the clearest examples of this inability to manage resources is weak financial management. Susan (2020) found that the inability of MSMEs to manage cash flow due to a lack of managerial and financial expertise is a major factor contributing to their failure to survive beyond the initial stage. Hendratni & Wulandjani (2024) found that financial management in most microenterprises remains disorganized and lacks proper record-keeping, while Idris et al. (2023) demonstrated that SME owners generally make financial decisions impulsively without careful consideration. These trends point to a fundamental problem: the low level of financial literacy among business owners. Within the Knowledge-Based View (KBV) framework, Ye & Kulathunga (2019) view financial literacy as a knowledge resource that serves as the foundation for value creation and business sustainability, rather than merely passive information. This perspective supports the KBV's central argument that information is the most difficult competitive advantage to imitate (Curado & Bontis, 2006). Consequently, a lack of financial knowledge represents a deficiency in one of the most essential resources.

The 2025 National Survey on Financial Literacy and Inclusion (SNLIK) found that the financial literacy index for rural residents was only 59.60 percent, more than 11 percentage points lower than that of urban areas (70.89 percent). This further complicates the issue. As a result, MSMEs in rural and coastal areas which actually have the greatest need for financial literacy, actually have the most limited access to financial services and education (Lyons et al., 2020). However, financial literacy alone does not guarantee a company's long-term business sustainability. According to Zouitini et al. (2026), financial literacy can only enhance sustainability and resilience if it is translated into tangible capabilities through entrepreneurial competencies (Man et al., 2002 in Pulka, 2021). This is necessary to develop financial resilience, the ability to maintain financial stability in the face of external shocks (Hamoud et al. 2022; Josefa et al. 2025). This resilience is crucial because the inherent resource constraints of MSMEs (constraints resulting from their small scale) inevitably limit their ability to withstand business shocks (Nongnuch et al., 2026). Sustainability itself is understood as the integration of economic, social, and environmental performance, as outlined in the Triple Bottom Line (TBL) framework (Elkington, 2001; Bakkar et al., 2023).

This is particularly evident among small businesses along the Madura coastline. The sustainability of businesses in this region, which largely depend on marine resources and coastal-based economic activities is influenced by weather, seasons, the availability of marine products, and shifts in demand. Business owners' incomes vary, business risks are high, and the main obstacle to expansion for many companies is a lack of capital, which is exacerbated by low levels of formal education among the workforce (Fauziyah et al., 2024). Fauziyah et al. (2024) also explain that seasonal income requires careful financial planning so that business owners can allocate their earnings during the off-season.

Theoretical Framework

This study combines the Triple Bottom Line (TBL) and the Knowledge-Based View (KBV) into an integrated conceptual framework that describes how information is transformed into capabilities and ultimately into sustainability performance. According to the KBV, knowledge is a strategic resource, but it only yields benefits when integrated into and utilized in organizational activities (Grant, 2014; Curado & Bontis, 2006). In this context, financial resilience is the capacity to maintain stability in the face of shocks (Josefa et al., 2025; Nongnuch et al., 2026), entrepreneurial competence is the implementation mechanism that transforms knowledge into business decisions and actions (Zouitini et al., 2026), and financial literacy is a knowledge resource (Ye & Kulathunga, 2019). Meanwhile, TBL offers a framework for understanding the desired outcomes through economic, social, and environmental performance dimensions (Elkington, 2001). The knowledge-integration argument is foundational to the Knowledge-Based View (Grant, 1996), while the broader financial-literacy literature treats financial knowledge as an economically consequential capability (Lusardi & Mitchell, 2014; OECD, 2020).

The connection between these two theories lies in the need to convert knowledge into actions that support the achievement of the three pillars of sustainability. Financial knowledge can help MSME actors manage resources and maintain cash flow stability. However, achieving social and environmental performance also requires the ability to build relationships with customers and suppliers and to manage resources responsibly. Therefore, entrepreneurial competence is viewed as a critical capability that enables financial knowledge to be applied more broadly in business management. On the other hand, financial resilience plays a role in maintaining a business's ability to continue operating when facing pressures and uncertainties. Financial resilience, in turn, essentially functions as a liquidity buffer that ensures business continuity during shocks (Alonso et al., 2020 in Josefa et al., 2025; Bakkar et al., 2023). Due to its protective and short-term nature, financial resilience may not be sufficient to comprehensively strengthen the social and environmental pillars. Thus, entrepreneurial competence and financial resilience are viewed as two forms of knowledge conversion with distinct functions, and this study examines whether they truly bridge the gap between financial literacy and sustainability performance.

According to KBV, financial literacy serves as a strategic knowledge resource that supports entrepreneurs' cognitive abilities (Grant, 2014; (Ye & Kulathunga, 2019). Financial literacy is expected to enhance entrepreneurial competence because this cognitive capacity serves as the foundation for identifying market opportunities, solving problems, and making innovative tactical decisions. Entrepreneurs with financial literacy can transform this understanding into practical, applicable knowledge (Zouitini et al., 2026). Findings from Saudi Arabia and Morocco reinforce that this perspective has a positive and very strong impact on entrepreneurial skills (Hamoud et al., 2022; Suparno & Saptono, 2018 in Zouitini et al., 2026). Furthermore, financial literacy is believed to enhance financial resilience by equipping entrepreneurs with the rational ability to manage cash flow, set aside funds for emergencies, and anticipate risks (Josefa et al., 2025). Further cross-country studies indicate that such technical knowledge reduces cognitive biases and helps stabilize savings, thereby serving as a foundation for business resilience (Sabri et al., 2026; Rumtutuly & Patty, 2026; Siddiqui & Rokade, 2024; Lyons et al., 2020). Furthermore, financial literacy is considered to promote the

sustainability of MSMEs, as analytical skills in assessing capital reduce the likelihood of long-term operational failure (Ye & Kulathunga, 2019). Various studies on different MSMEs indicate that consistent record-keeping and disciplined budgeting are key factors contributing to operational sustainability (Bakkar et al., 2023; Kurniasari et al., 2025; Ridhwan et al., 2026). Nevertheless, achieving cognitive financial literacy does not automatically guarantee business resilience or sustainability unless it is supported by access to capital, behavioral assistance, and the transformation of capabilities into measurable outcomes (Aassouli & Ahmed, 2023; Widiantari et al., 2024). Previous research has also shown that this knowledge does not always have a direct impact on sustainability commitments in the environmental and social dimensions (Bakkar et al., 2023). Evidence synthesized specifically for SMEs also links financial literacy with organizational capabilities and business performance (Graña-Alvarez et al., 2024).

According to the KBV, entrepreneurial competence represents the capability of business actors to integrate knowledge into strategic decision-making, while financial resilience is the capability that supports a business's ability to withstand shocks (Hamoud et al., 2022; Nongnuch et al., 2026). Entrepreneurial competence is expected to strengthen financial resilience because stronger managerial skills enable entrepreneurs to coordinate resources effectively when facing losses or crises. Possessing these competencies has been identified as a crucial factor shaping entrepreneurs' ability to survive in various vulnerable regions (Zouitini et al. 2026; Hamoud et al. 2022; Jr & Flores, 2025). Entrepreneurial competencies are also considered to enhance the sustainability performance of MSMEs, as the combination of leadership skills with the ability to recognize opportunities facilitates progress toward the Triple Bottom Line (TBL) (Elkington, 2001). These human resource capabilities consistently improve organizational performance across various sectors (Sumiati et al., 2026; Saleh et al. 2022; Muchtadin, 2022). Therefore, financial resilience is believed to support sustainable performance because entrepreneurs with liquidity reserves can maintain economic, social, and environmental sustainability without compromising the operational continuity of their businesses during a crisis. Such resilience has proven to be the foundation for operational success and long-term competitive adaptation (Josefa et al., 2025; Nongnuch et al., 2026). Nevertheless, not all aspects of core competencies exert a consistent and significant influence on the resilience and sustainability of MSMEs, particularly when business owners operate without institutional support (Fazal et al., 2021; Sakib et al., 2022; Hussen et al., 2021). Under severe systemic pressure, financial resilience often serves only as a short-term liquidity buffer (a survival mechanism) and is therefore not yet strong enough to comprehensively strengthen the pillars of sustainable performance (Alonso et al., 2020 in Josefa et al., 2025; Duarte et al., 2020; Tunio et al., 2022). The competency-based view of SME competitiveness likewise positions entrepreneurial competencies as a link between owner-manager characteristics and firm performance (Man et al., 2002).

In explaining the roles of single and chain mediation, KBV posits that strategic knowledge does not always lead to a competitive advantage if it is not accompanied by adequate mechanisms for implementation and resource management. Therefore, entrepreneurial competence and financial resilience are positioned as two mechanisms that bridge the influence of financial literacy on the sustainability performance of MSMEs. Entrepreneurial competence is proposed to mediate the effect of financial literacy on financial resilience and sustainability performance because this ability enables business owners to

translate financial understanding into concrete managerial actions. Business owners with a strong understanding of finance become more analytical when formulating strategies, thereby enhancing their ability to weather crises (Hamoud et al., 2022; Zouitini et al., 2026; Jr & Flores, 2025). These internal resources reinforce one another in enhancing resilience, which ultimately improves business sustainability (Padi et al., 2025; Muchtadin, 2022). At the same time, financial resilience is also expected to serve as a mediator linking financial literacy and entrepreneurial competence to sustainability performance. Liquidity stability must first be established to create a buffer against shocks (Rumtutuly & Patty, 2026; Sabri et al., 2026). This resilience then provides entrepreneurs with a low-pressure operational environment, where they can allocate resources in accordance with the TBL framework (Josefa et al., 2025). More specifically, entrepreneurial competence and financial resilience are proposed to act as mediating variables, in a sequential chain, in the influence of financial literacy on the sustainability performance of MSMEs. Financial knowledge is first assimilated into operational expertise, which is then applied in practice to reduce risk and stabilize business cash flow. Once stability is achieved, MSMEs are able to optimally balance profitability with social and environmental sustainability (Zouitini et al., 2026; Ali et al., 2025). This sequential mediation mechanism is based on the understanding that financial literacy does not always have a consistent direct relationship with business resilience or sustainability. Therefore, applying financial knowledge to operational activities is crucial so that these knowledge resources can yield more tangible results (Lestari et al., 2024; Widiantari et al., 2024; Sumidartini & Muhyi, 2022 dalam Zouitini et al., 2026).

Various studies have linked the sustainable performance of MSMEs to financial literacy, entrepreneurial competence, and financial resilience, but generally within separate models. Zouitini et al. (2026) identified entrepreneurial competence as the sole mediator, Ye & Kulathunga (2019) examined risk attitudes and access to capital, and Hamoud et al. (2022) investigated entrepreneurial resilience. The results were inconsistent. Widiantari et al. (2024) in their study of Indonesian MSMEs, found no significant direct effect, whereas Ye & Kulathunga (2019) and Hamoud et al. (2022) reported positive direct effects. Josefa et al. (2025) emphasize that studies examining financial resilience and entrepreneurial competence as chained mediators remain very limited.

However, the main gap is not merely the absence of a combination of these variables, but rather the lack of a theoretical explanation of how financial knowledge is converted into sustainability performance, as well as which TBL pillars are addressed by each form of conversion. Previous studies have tended to treat sustainability as a single outcome and rarely considered that the pathways through which knowledge leads to the economic, social, and environmental pillars may differ. The context of coastal MSMEs in Madura highlights this issue, as seasonal income and limited financial education make it difficult for knowledge alone to generate sustainability without the ability to apply it (Fauziyah et al., 2024).

This study makes theoretical contributions in three ways. First, it integrates KBV and TBL such that KBV explains the process of knowledge conversion, while TBL explains the outcomes achieved. Second, this study distinguishes the role of entrepreneurial competence as a mechanism for knowledge application and financial resilience as a protective capability. Third, this study tests these propositions among ecologically and seasonally vulnerable coastal MSMEs. Practically, the results can serve as a basis for policymakers and MSME mentors in

designing training programs that go beyond financial literacy. Based on this, the objective of this study is to examine how financial literacy influences the sustainability performance of coastal MSMEs in Madura, as well as how entrepreneurial competence and financial resilience mediate this relationship, both individually and in a chain.

Research Method

This study employs a quantitative approach with an explanatory design and cross-sectional data to test the relationships among the variables in the proposed model. The subjects of this study are MSMEs in the coastal areas of Madura Island, spread across four regencies: Bangkalan, Sampang, Pamekasan, and Sumenep. The study population consists of all MSME operators located in the coastal areas of these four regencies. The minimum sample size was estimated in G*Power 3.1.9.7 using an effect size of 0.15, $\alpha = .05$, statistical power of .80, and three predictors; the resulting minimum was 77 respondents (Cohen, 1988).

Table 1. Sample Distribution by Regency

Regency	Number of Respondent	%
Bangkalan	73	37.24
Sampang	42	21.43
Pamekasan	35	17.86
Sumenep	46	23.47
Total	196	100

Source: Primary Data; 2026.

The population of this study consists of MSME owners operating businesses in the coastal areas of Madura Island. The research area was determined based on the proximity of business locations to the coast; thus, MSMEs located far from the coast or in non-coastal areas were excluded from the study. The sample size was not determined based on population proportion because detailed data on the number of MSMEs meeting the study criteria in the coastal areas of Madura Island were not yet available from the relevant agencies. Therefore, the sample size was determined through a statistical power analysis to establish the minimum number of respondents. Using G*Power 3.1.9.7, the minimum sample size was calculated based on an effect size of 0.15 (Cohen, 1988 in Hair et al., 2017), a significance level of 0.05, a power of 0.80, and the three predictors of the endogenous construct that received the most incoming arrows, resulting in a minimum sample size of 77 respondents. The sample was then selected through purposive sampling using the following criteria: (1) MSME owners located in the coastal areas of Madura Island, and (2) businesses that had been operating for more than one year and were still active at the time the study was conducted. This process yielded 196 respondents, as shown in Table 1. Primary data were collected using a 1–5 Likert-scale questionnaire administered in person to MSME owners or managers who met the study criteria. The distribution of respondents was not proportional across districts because the number and distribution of coastal areas, as well as the concentration of MSMEs, varied by district.

Data were collected through field research at MSMEs located in the coastal region of Madura over the course of approximately one month. During the data collection process, the

researchers provided explanations and guidance to respondents whenever they encountered questions that were not fully understood. Data analysis was conducted using Partial Least Squares–Structural Equation Modeling (PLS-SEM) with SmartPLS 4.1.1.8 (Hair et al., 2017) because this model accommodates both single and chained mediation. The measurement model was evaluated in two stages. Convergent validity was tested using confirmatory factor loadings (outer loadings) with a cutoff of 0.60 (Hair et al., 2022), while discriminant validity was evaluated using the Heterotrait–Monotrait Ratio (HTMT) with a cutoff below 0.90 (Henseler et al., 2015). The structural model was then evaluated using the coefficient of determination (R^2), effect size (f^2), and path coefficients, which were tested using the bootstrapping method. Effect sizes were classified as small (starting at 0.02), moderate (starting at 0.15), and large (starting at 0.35) (Cohen, 1988 in Hair et al., 2017). Hypothesis testing used a one-tailed significance level of 10%, meaning that the research hypothesis is supported if the t-value exceeds 1.282, and the mediating effect was assessed through a specific indirect effect.

Research Instrument

The instrument consists of a closed-ended questionnaire using a 1–5 Likert scale. This study measures four reflective constructs: financial literacy, entrepreneurial competence, financial resilience, and the sustainability performance of MSMEs. Prior to distribution, the instrument's design was refined based on preliminary information gathered from informal discussions with residents living near coastal areas, as well as the researchers' experiences visiting several coastal tourist destinations. Based on this process, several indicators were adjusted, yielding the following results:

Table 2. Variable Indicators

Variable	Dimension/Indicator	Number of Items	Source of Adaption
Financial Literacy	1. Managing daily finances 2. Saving 3. Managing debt	5	(Ye & Kulathunga, 2019; Sabri et al., 2026)
Entrepreneurial Competencies	1. Opportunity Competencies 2. Relationship Competencies 3. Organizing Competencies	5	(Saleh et al., 2022)
Financial Resilience	1. Ability to manage a decline in income 2. Financial flexibility 3. Readiness to face a crisis 4. Ability to operate under external pressure 5. Ability to adapt to market changes	7	(Lasut, 2026)
SME Sustainability Performance	Economy: 1. Local workforce & supplies 2. Productivity & efficiency 3. Revenur & customer satisfaction	9	(Chege & Wang, 2020; Saleh et al., 2022)

	Environment: 4. Wate management 5. Reducing environmental impact Social: 6. Occupational safety & health 7. Community relations		
Total		26 Indicators	

Source: Data compiled by the researcher, 2026

Results

Of the 196 respondents, those who met the sampling criteria were MSME owners in the coastal region of Madura, and their characteristics are summarized in Table 2. In terms of age, the respondents were predominantly business owners aged 37 and older (61.23%), followed by those aged 31–36 (20.92%), 26–30 (10.71%), and 18–25 (7.14%). Based on the length of operation, 117 respondents (59.69%) have been running their respective businesses for more than three years, while 79 respondents (40.31%) have been in operation for three years or less. Given this composition, it appears that coastal businesses in Madura are generally managed by business owners who are of mature age and, for the most part, have been in operation for a considerable period of time.

Table 3. Characteristics of Respondents (n = 196)

Characterstics	**Category**	**Total (People)**	**Percentage**
Age	18 – 25 years	14	7.14
	26 – 30 years	21	10.71
	31 – 36 years	41	20.92
	≥ 37 years	120	61.23
Total		196	100%
Length of Business Operation	>1 year	79	40.31
	>3 years	117	59.69
Total		196	100%
Gender	Male	47	23.98
	Female	149	76.02
Total		196	100%

Highest Level of Education	No schooling	6	3.06
	Elementary school	53	27.04
	Junior high school	55	28.06
	High school	67	34.18
	Bachelor's degree	15	7.65
Total		196	100%
Type of Business	Food business	89	45.41
	Street vendor	7	3.57
	Small eatery	61	31.12
	Grocery store	38	19.39
	Home furnishings	1	0.51
Total		196	100%

Source: Processed primary data, 2026

Table 3 shows that the majority of respondents were women whose highest level of education was high school. In terms of business type, the food industry was the most common, followed by food stalls and grocery stores. In terms of location, the largest number of respondents came from Bangkalan Regency. This was influenced, among other factors, by the coastal area in that region, which is close to the campus and bustling with community activity. This bustling activity has spurred the growth of businesses that meet daily needs, making it easier to reach MSMEs in the area during data collection.

Measurement Model Assessment

The initial instrument consisted of 26 indicators: five for financial literacy, five for entrepreneurial competence, seven for financial resilience, and nine for sustainability performance. The indicators were progressively screened using three criteria: outer loading ≥ 0.60 (Hair et al., 2022), average variance extracted (AVE) ≥ 0.50, and HTMT < 0.90 (Henseler et al., 2015; Hair et al., 2021). A summary of the indicators that were removed and retained is presented in Table 4, while the outer loading values at each stage are presented in Table 5. Prior to testing, five indicators were excluded because their responses were identical to those of other indicators (same standard deviation and perfect correlation), which triggered a singular matrix problem: FL2, FR2, FR3, FR6, and SP5.

Table 4. Summary of Indicators That Have Been Removed and Retained

Construct	Initial Indicator	Removed (reason)	Retained
Financial Literacy (FL)	5	FL2 (duplicate); FL1 (AVE < 0.50)	FL3, FL4, FL5
Entrepreneurial Competencies (EC)	5	EC5 (loading 0.590); EC3 (HTMT > 0.90)	EC1, EC2, EC4
Financial Resilience (FR)	7	FR2, FR3, FR6 (duplicate); FR4 (0.128); FR7 (0.090)	FR1, FR5
Sustainability Performance (SP)	9	SP5 (duplicate); SP1 (−0.109); SP3 (−0.360); SP4 (−0.435); SP7 (0.580); SP2 (HTMT > 0.90)	SP6, SP8, SP9
Total	26	15 indicators	11 indicators

Source: Primary data analyzed dengan SmartPLS 4.1.1.8.

The screening of indicators was conducted in stages, with each stage eliminating only those indicators that violated the criteria. Of the initial 26 indicators, 15 were eliminated for three reasons. First, five indicators (FL2, FR2, FR3, FR6, SP5) had response patterns identical to those of other indicators, resulting in a singular matrix problem. Second, seven indicators (EC5, FR4, FR7, SP1, SP3, SP4, SP7) had loadings below the 0.60 threshold, including three sustainability performance indicators with negative loadings. Third, three indicators (FL1, EC3, SP2) were excluded because they violated the AVE or HTMT criteria, even though their loadings were adequate. The exclusion of this third group was primarily due to the fact that the HTMT between sustainability performance and entrepreneurial competence initially reached 0.945.

Ultimately, all constructs met the criteria of $\rho c \geq 0.70$ and $AVE \geq 0.50$; however, meeting these thresholds indicates statistical adequacy rather than conceptual completeness. Financial resilience was ultimately measured using two indicators (FR1 and FR5) that capture a business's ability to continue operating when revenue declines or business conditions change; thus, this construct better reflects a business's operational continuity than all aspects of financial resilience. Sustainability performance was measured using three indicators representing the environmental (SP6) and social (SP8 and SP9) dimensions, while none of the indicators for the economic dimension passed the screening. Thus, sustainability performance in this study is understood as sustainability performance in the social and environmental dimensions. Cronbach's alpha for financial literacy (0.537) was also below 0.70; the reliability of this construct was assessed primarily through ρc (0.762) and AVE (0.517), which met the criteria.

Table 5. Confirmatory Factor Loadings by Screening Stage

Construct	Indicator	Stage 1	Stage 2	Stage 3	Final Loading	Decision
FL	FL1	0.702	0.684	0.673	–	Deleted (AVE)
	FL3	0.662	0.668	0.676	0.667	Retained
	FL4	0.694	0.714	0.725	0.769	Retained

	FL5	0.729	0.719	0.709	0.719	Retained
EC	EC1	0.827	0.814	0.811	0.833	Retained
	EC2	0.734	0.764	0.768	0.775	Retained
	EC3	0.717	0.736	0.736	–	Deleted (HTMT)
	EC4	0.765	0.798	0.797	0.852	Retained
	EC5	0.590	–	–	–	Deleted (Stage 1)
FR	FR1	0.833	0.866	0.867	0.863	Retained
	FR4	0.128	–	–	–	Deleted (Stage 1)
	FR5	0.910	0.918	0.917	0.921	Retained
	FR7	0.090	–	–	–	Deleted (Stage 1)
SP	SP1	−0.109	–	–	–	Deleted (Stage 1)
	SP2	0.610	0.658	0.702	–	Deleted (HTMT)
	SP3	−0.360	–	–	–	Deleted (Stage 1)
	SP4	−0.435	–	–	–	Deleted (Stage 1)
	SP6	0.724	0.735	0.742	0.765	Retained
	SP7	0.622	0.580	–	–	Deleted (Stage 2)
	SP8	0.699	0.690	0.688	0.757	Retained
	SP9	0.768	0.783	0.798	0.821	Retained

Source: Primary data analyzed using SmartPLS 4.1.1.8.

Table 6. Results of the Construct Reliability and AVE Evaluation

Construct	**Number of indicators**	**Cronbach's alpha**	**ρa**	**ρc**	**AVE**	**√AVE**
Financial Literacy (FL)	3	0.537	0.540	0.762	0.517	0.719
Entrepreneurial Competencies (EC)	3	0.757	0.764	0.861	0.674	0.821
Financial Resilience (FR)	2	0.747	0.782	0.886	0.796	0.892
Sustainability Performance (SP)	3	0.681	0.687	0.824	0.610	0.781

Source: Primary data analyzed using SmartPLS 4.1.1.8. Criteria: ρc ≥ 0.70 and AVE ≥ 0.50 (Hair et al., 2021).

Table 7. Discriminant Validity Based on HTMT

Pairs of construct	Initial HTMT	Final HTMT	Notes
FL – EC	0.550	0.521	Acceptable (< 0.90)
FR – EC	0.590	0.554	Acceptable (< 0.90)
FR – FL	0.709	0.709	Acceptable (< 0.90)
SP – EC	0.945	0.877	Beginning > 0.90; finally accept (< 0.90)
SP – FL	0.472	0.511	Acceptable (< 0.90)
SP – FR	0.459	0.445	Acceptable (< 0.90)

Source: Primary data analyzed using SmartPLS 4.1.1.8. The initial HTMT values are those before EC3 and SP2 were removed. Criteria: HTMT < 0.90 (Henseler et al., 2015)

Structural Model Assessment

This structural model explains 11.6% of the variance in entrepreneurial competence, 29.0% of the variance in financial resilience, and 41.6% of the variance in sustainability performance (Table 7). The explanatory power is most evident in sustainability performance, whereas entrepreneurial competence is explained only marginally by financial literacy. This indicates that entrepreneurial competence is also influenced by factors outside the model. Effect sizes (f^2) are classified as small (≥ 0.02), moderate (≥ 0.15), and large (≥ 0.35), and values below 0.02 are considered to have no significant impact (Hair et al., 2021). The effect of entrepreneurial competence on sustainability performance is quite large (0.474). The impact of financial literacy on financial resilience is classified as moderate (0.159), while its effect on entrepreneurial competence (0.131) and the effect of entrepreneurial competence on financial resilience (0.111) are classified as small, approaching the moderate range. The direct effects of financial literacy (0.014) and financial resilience (0.001) on sustainability performance are not significant.

Table 8. Coefficient of Determination (R2) and Effect Size (f2)

Construct/Path	R^2 or f^2	Adjusted R^2	Category
Panel A. Coefficient of Dtermination			
Entrepreneurial Competencies (EC)	0.116	0.111	Mild
Financial Resilience (FR)	0.290	0.282	Mild to moderate
Sustainability Performance (SP)	0.416	0.407	Moderate
Panel B. Effect Size			
FL → EC	0.131		Small (nearing medium)
FL → FR	0.159		Medium
FL → SP	0.014		No substantive impact
EC → FR	0.111		Small (nearing medium)
EC → SP	0.474		Large
FR → SP	0.001		No substantive impact

Source: Primary data analyzed using SmartPLS 4.1.1.8. FL = financial literacy; EC = entrepreneurial competence; FR = financial resilience; SP = sustainability performance

Direct and Indirect Effects

The relationships among the variables were tested using bootstrapping with a one-tailed significance level of 10%. A relationship was considered supported under the study's prespecified one-tailed 10% criterion when the t-value exceeded 1.282 and $p < .10$. This relatively permissive threshold is reported transparently; results meeting only this threshold should be interpreted as weak or exploratory evidence. The results showed that financial literacy had a significant effect on entrepreneurial competence ($\beta = 0.341$) and financial resilience ($\beta = 0.357$). Its effect on sustainability performance was only significant at the 10% one-tailed significance level ($\beta = 0.103$; $t = 1.452$; $p = 0.073$) and was not significant at the 5% level. Given the very small effect size ($f^2 = 0.014$), these results can only be interpreted as weak evidence.

Entrepreneurial competence, on the other hand, has a significant effect on financial resilience ($\beta = 0.299$) and on sustainability performance ($\beta = 0.590$). Conversely, financial resilience was not found to significantly affect sustainability performance ($\beta = 0.026$; $p = 0.358$).

In the indirect path, entrepreneurial competence was found to mediate the effect of financial literacy on sustainability performance ($\beta = 0.201$; $p < 0.001$) and on financial resilience ($\beta = 0.102$; $p = 0.002$). Regarding financial resilience, the direct effect of financial literacy remained significant, indicating that the mediation by entrepreneurial competence was partial. Regarding sustainability performance, the direct effect was significant only at the 10% level and not significant at the 5% level; thus, the mediation tends toward full mediation—this finding should be interpreted with caution. Conversely, the three pathways involving financial resilience were not significant. These three are the effect of financial literacy on sustainability performance ($\beta = 0.009$), the effect of entrepreneurial competence on sustainability performance ($\beta = 0.008$), and the chained path from financial literacy through entrepreneurial competence to financial resilience ($\beta = 0.003$). Thus, of the eleven relationships tested, seven are supported.

Table 9. Bootstrapping Results for Direct and Indirect Effects

Hypothesis	Path	Coefficient	T-statistic	p-value	Decisions
H1	FL → EC	0.341	4.408	0.000	Accepted
H2	FL → FR	0.357	4.235	0.000	Accepted
H3	FL → SP	0.103	1.452	0.073	Weakly supported (10%)
H4	EC → FR	0.299	3.879	0.000	Accepted
H5	EC → SP	0.590	9.061	0.000	Accepted
H6	FR → SP	0.026	0.365	0.358	Rejected
H7	FL → EC → FR	0.102	2.820	0.002	Accepted
H8	FL → EC → SP	0.201	3.862	0.000	Accepted

H9	FL → FR → SP	0.009	0.355	0.361	Rejected
H10	EC → FR → SP	0.008	0.344	0.365	Rejected
H11	FL → EC → FR → SP	0.003	0.319	0.375	Rejected

Source: Primary data analyzed using SmartPLS 4.1.1.8. Significance threshold: t > 1.282 (10% significance level, one-tailed).

Discussion

The Impact of Financial Literacy

Financial literacy has been shown to foster entrepreneurial competence. Entrepreneurs who regularly manage their daily finances, save money, and manage debt are generally more meticulous in identifying opportunities, maintaining relationships with customers and suppliers, and managing their business resources. These results align with the KBV framework's notion that new knowledge gains value only after it is converted into capabilities (Grant, 2014), and are consistent with the findings of Hamoud et al. (2022), Zouitini et al. (2026), and Hasan et al. (2024). The effect size is relatively small, and financial literacy explains only 11.6% of the variance in entrepreneurial competence. This indicates that financial literacy is just one of several sources of competence, alongside experience, networks, and the business owner's educational level.

Financial literacy has been shown to strengthen financial resilience. Coastal MSMEs experience income that fluctuates with the seasons, so a business's ability to weather lean seasons depends heavily on habits such as saving, managing expenses, and exercising caution when taking on debt. These findings support the Financial Capability Theory, which views financial capability as the foundation for resilience (Rumtutuly & Patty, 2026). Similar results were reported by Josefa et al. (2025), Sabri et al. (2026), and Siddiqui & Rokade (2024), while Lyons et al. (2020) linked financial literacy to saving habits as a pillar of financial resilience.

The direct effect of financial literacy on sustainability performance is relatively weak. This finding reinforces the cautionary view of Widiantari et al. (2024) that financial literacy alone does not significantly determine business sustainability. These results are also consistent with those of Bakkar et al. (2023), who found that the impact of financial literacy varies across different dimensions of sustainability. The effect size is so small that it can be considered negligible. One possible reason is that coastal MSMEs have generally been in operation for a long time, but their income remains relatively limited. Consequently, financial knowledge does not directly lead to improved economic, social, and environmental performance. This implies that standalone financial literacy training is insufficient to enhance the sustainability of coastal MSMEs.

The Influence of Entrepreneurial Competence and Financial Resilience

Entrepreneurial competence has been shown to strengthen financial resilience. Business owners who are skilled at identifying opportunities and managing resources will find it easier to adjust costs, restructure business operations, and seek alternative sources of income when sales decline. This aligns with the findings of Hamoud et al. (2022), Zouitini et al. (2026) and Jr & Flores (2025). Fazal et al. (2021) also note that the contribution of each competency

dimension varies. These differences indicate that entrepreneurial competencies must be viewed holistically.

Entrepreneurial competence is the strongest determinant of sustainable performance (β = 0.590; f^2 = 0.474), whereas financial resilience has no significant effect (β = 0.026). This difference can be understood by examining the functions of both. Financial resilience, as measured by the two indicators in this study, describes a business's ability to continue operating when revenue declines or business conditions change. This ability is defensive in nature that is, it keeps the business from shutting down (Alonso et al., 2020 in Josefa et al., 2025; Duarte et al., 2020; Tunio et al., 2022). Sustainability performance, on the other hand, requires active decisions regarding how a business is run, specifically, how to treat customers and suppliers and how to utilize materials and resources. In the KBV framework, new knowledge generates a competitive advantage when translated into action (Grant, 2014), and that translation is driven by entrepreneurial competence, not by the ability to survive. In other words, a business can survive without becoming more sustainable: survival addresses whether the business is still operating, while sustainability addresses how the business operates.

The context of MSMEs along the Madura coast highlights this distinction. Respondents were predominantly small business owners in the food industry and small eateries (approximately 76% of the sample), the majority of whom were women (76.02%), and 58.16% had a junior high school education or lower. Businesses of this kind are accustomed to dealing with income that fluctuates with the seasons and periods of scarcity, so their ability to survive is likely relatively uniform across operators (Fauziyah et al., 2024). When nearly all operators have similar survival capabilities, financial resilience no longer distinguishes one business from another in terms of sustainability performance. What sets them apart is the ability to recognize opportunities, build relationships, and organize the business. In small businesses that rely heavily on regular customers and relationships with local suppliers, it is the quality of these relationships that underpins social performance, while decisions regarding material use and waste management underpin environmental performance (Hamoud et al., 2022; Zouitini et al., 2026).

Financial resilience was not found to have a significant impact on sustainability performance. Most previous studies have tended to find a positive effect (Josefa et al., 2025; Hamoud et al., 2022; Nongnuch et al., 2026). This finding is distinct and represents a novel contribution to the literature, as it suggests that a business's ability to remain financially resilient does not necessarily lead to the sustainability performance of coastal MSMEs. Alonso et al. (2020), in Josefa et al., (2025), Duarte et al. (2020), and Tunio et al. (2022) also noted a similar point: resilience often serves merely as a means for businesses to survive. Several factors may explain these findings. First, financial resilience plays a greater role in maintaining business continuity when facing pressure or uncertainty, so it tends to be defensive in nature. Meanwhile, sustainability performance requires a more proactive approach to developing the business while also addressing social and environmental aspects. Second, the characteristics of coastal MSMEs, which are accustomed to dealing with seasonal changes, may result in relatively similar levels of financial resilience among business operators, meaning these differences are not yet sufficient to produce significant variations in sustainability performance. Third, the measurement of the financial resilience construct in the final model uses only two

indicators, so it does not yet fully capture the comprehensive financial resilience capabilities of MSME operators.

The Influence of Entrepreneurial Competence and Financial Resilience

Entrepreneurial competence mediates the influence of financial literacy on financial resilience and sustainability performance. Regarding financial resilience, this mediation is partial because the direct effect remains significant. Regarding sustainability performance, the direct effect of financial literacy is weak (significant only at the 10% level), so nearly the entire effect is channeled through entrepreneurial competence. This means that competence serves as the primary channel that transforms financial knowledge into business sustainability. These findings align with the KBV framework proposed by Grant (2014). Zouitini et al. (2026), Hamoud et al. (2022), and Jr & Flores (2025) also report consistent findings. Furthermore, these results are consistent with the view of Padi et al. (2025) that financial literacy and competencies are complementary. This mediation also explains why the direct effect of financial literacy on sustainability performance is weak: financial knowledge only functions when applied through the owner's ability to manage the business. Regarding financial resilience, the results of this study differ from those of Lestari et al. (2024) who found no direct effect of financial literacy on resilience. This study, in contrast, found a significant direct effect as well as partial mediation.

The research results indicate that financial resilience has not been able to act as a mediator, either directly or through a chain mediation relationship. This is due to a break in the relationship at the final stage, meaning that financial resilience is unable to translate its influence into improved sustainability performance. Although financial literacy and entrepreneurial competence contribute to financial resilience, these factors alone are not sufficient to drive business sustainability. This finding aligns with Sumidartini and Muhyi (2022) as cited in Zouitini et al. (2026) who emphasize that knowledge must be translated into operational actions to benefit a business. Thus, in the context of coastal MSMEs in Madura, the influence of financial literacy on business sustainability is more evident through entrepreneurial competence than through financial resilience.

Implications

The findings have theoretical and practical implications. Theoretically, the results distinguish knowledge application from business continuity: entrepreneurial competence was strongly associated with the measured social and environmental sustainability outcomes, whereas the two-indicator financial-resilience construct was not. This pattern is consistent with a Knowledge-Based View interpretation in which knowledge creates value when translated into managerial action. However, because the final sustainability construct excluded all economic indicators, the findings cannot establish effects on the complete Triple Bottom Line.

For coastal MSME owners, financial-management knowledge should be combined with the ability to identify business opportunities, maintain relationships with customers and suppliers, and organize business resources effectively. Accordingly, local governments, cooperatives and SME agencies, and other support institutions may integrate financial-literacy programmes with applied entrepreneurship training and business mentoring. Such programmes can combine cash-flow planning and debt management with opportunity recognition, customer and supplier relationship management, and day-to-day business organization. Practical

exercises and mentoring may be more useful than relying exclusively on classroom-based financial education. These recommendations are implications of the observed associations; the cross-sectional design does not establish that the proposed interventions will cause improved performance.

Conclusion

The results of the study indicate that financial literacy serves as a source of knowledge that supports the development of entrepreneurial competencies and financial resilience among MSMEs in coastal Madura. However, the direct effect of financial literacy on sustainability performance is relatively weak. Entrepreneurial competencies were found to be the strongest mechanism in the research model, both through their direct effect on sustainability performance and their role in mediating the relationship between financial literacy and sustainability performance. Meanwhile, although financial literacy and entrepreneurial competence influence financial resilience, the effect of financial resilience on sustainability performance was not found to be significant. Thus, the role of financial resilience as a mediator, whether acting alone or in a chain has not yet received empirical support. These findings indicate that entrepreneurial competence plays a more prominent role than financial resilience in explaining the sustainability performance of MSMEs based on the indicators used in this study.

Limitations and Future Research

This study has several limitations. First, its cross-sectional design does not establish temporal ordering or causal relationships. Second, the measures rely on business owners' self-reports and may be affected by response and common-method biases. Third, purposive sampling limits statistical generalizability beyond the participating coastal MSMEs. Fourth, indicator screening reduced the original 26-item instrument to 11 retained indicators. Financial resilience was represented by only two indicators, while sustainability performance was represented by three indicators covering social and environmental aspects; no economic-dimension indicator remained. Consequently, the sustainability construct does not operationalize the complete Triple Bottom Line, and the null association between financial resilience and sustainability performance should not be generalized to a comprehensive sustainability construct.

Future research should validate a more comprehensive measurement model that retains theoretically essential indicators across the economic, social, and environmental dimensions and captures financial resilience through multiple facets, including liquidity buffers, access to emergency finance, cash-flow adaptability, and recovery capacity. Longitudinal designs would help establish temporal relationships, while mixed-methods research could explain how seasonal income, market access, gender, business sector, and local institutional support shape the conversion of financial knowledge into sustainable practices. Replication across coastal and non-coastal regions, with probability-based or stratified sampling where feasible, would help assess the transferability of the findings.

CRediT Author Statement

Dwi Putri Kartika Candra: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft. **M. Boy Singgih Gitayuda:** Supervision, Conceptualization, Methodology, Writing – Review & Editing. **Ilham Maulana:** Supervision,

Validation, Writing – Review & Editing. **Purnamawati:** Supervision, Validation, Writing – Review & Editing.

Declarations

Ethics approval: The source manuscript does not include an ethics approval number or a formal decision from an institution.

Informed consent: Not applicable to the analysis of publicly accessible online reviews, while adhering to the ethical requirements of the relevant institution and journal.

Data availability: The dataset of reviews can be obtained by contacting the author via the provided email address.

Conflict of interest: The author declares no conflict of interest in this research.

Funding: The author received no funding from any source.

Acknowledgments: The author expresses gratitude to colleagues and various parties who supported this research.

Use of Artificial Intelligence (AI)

During manuscript preparation, the authors used an AI-assisted language tool solely to support language editing, grammar refinement, and improvement of readability. The tool was not used to generate research data, determine study eligibility, conduct the substantive synthesis, or produce findings. The authors critically reviewed and verified all AI-assisted edits and take full responsibility for the accuracy, originality, and integrity of the manuscript. Authors should amend this statement if AI was used for any additional purpose.

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