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Financial Capability, Digital Finance, and the Sustainable Performance of Village-Owned Enterprises: Evidence from Rural Indonesia

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ABSTRACT

This study examines how financial capability and digital financial practices contribute to the sustainable performance of village-owned enterprises (BUMDesa) within the context of rural development in Indonesia. Drawing on data collected from enterprise managers in Lamongan Regency, the analysis explores how financial literacy and financial technology shape financial attitudes and financial intelligence, and how these behavioral capabilities translate into enterprise profitability. Financial resilience is further considered as a conditioning factor affecting the strength of these relationships. Using a Partial Least Squares Structural Equation Modelling (PLS-SEM) approach, the results indicate that financial literacy plays a foundational role in strengthening both financial attitudes and financial intelligence, which in turn significantly enhance enterprise performance. Financial technology improves managerial capability through behavioral and cognitive pathways, although its direct effect on profitability remains limited. The findings also show that financial resilience reinforces the positive effects of financial capability on performance, suggesting that resilience is critical for sustaining enterprise outcomes under uncertain rural conditions. The study highlights that improving the performance of village-owned enterprises requires more than institutional support or financial resources alone. Instead, sustainable outcomes depend on the development of financial capability, the effective use of digital tools, and the ability of enterprises to adapt to economic disturbances. These insights provide practical implications for rural development policy, particularly in designing integrated interventions that link financial education, digital inclusion, and resilience-building in local economic institutions.

1. INTRODUCTION

Regional autonomy in Indonesia has transformed the role of local governments and villages in managing development and economic resources in Indonesia. The decentralization framework formally transfers greater authority over planning, budgeting, and resource management to sub-national actors, with the expectation that decisions will better reflect local priorities and potentials [1]. Within this context, villages are no longer viewed solely as administrative units but as strategic economic entities capable of mobilizing local assets, fostering entrepreneurship, and reducing rural poverty. One of the key institutional instruments created to support this mandate is the Village-Owned Enterprise (Badan Usaha Milik Desa/BUMDesa), which functions as a business entity owned and managed by the village community to optimize local resource utilization and generate sustainable income.

Recent policies on village funds and village original income have further strengthened the role of Village-Owned Enterprises in rural development. Village funds are designed to finance infrastructure, social services, and productive economic activities, with BUMDesa frequently positioned as the primary vehicle for transforming these funds into income-generating projects [2]. Empirical evidence shows that village funds and BUMDesa performance can significantly contribute to rural development outcomes when they are managed transparently and professionally and when business units are aligned with local competitive advantages [2]. Simultaneously, BUMDesa are increasingly promoted as platforms for stimulating rural entrepreneurship, encouraging innovation, and integrating villages into broader value chains [3]. However, realizing this potential requires not only institutional support but also adequate managerial capacity, financial literacy, and effective use of technology at the village level.

The Lamongan District in East Java illustrates both the opportunities and challenges of this agenda. The district has 462 Village-Owned Enterprises spread across 27 sub-districts, consisting of 304 entities with pioneer status, 63 with developing status, and 95 with advanced status [4]. BUMDesa operate in diverse sectors such as financial services, village markets, tourism, drinking water management, reservoirs, animal husbandry, rental services, and trade. The scale and variety of these enterprises suggest a substantial potential contribution to the regional economy, employment creation and local revenue. Nevertheless, achieving consistent

profitability and sustainable growth depends on how effectively these entities manage their finances and adapt to rapidly changing financial and technological environments.

Evidence from Lamongan's Community Empowerment Service indicates that many BUMDesa still face basic financial management constraints. Most Village-Owned Enterprises in the district continue to prepare financial reports manually and rarely apply financial technology in their transactions or accounting processes [4]. Most financial records are maintained using simple Microsoft Excel spreadsheets with limited use of specialized accounting or financial applications. This pattern indicates gaps in technological adoption and financial and technological intelligence, which may hinder timely decision-making, transparency, and the ability to monitor profitability. In the context of the rapid expansion of financial services, digital payments, and fintech solutions in Indonesia, such limitations can weaken the competitive position of BUMDesa relative to other rural and urban enterprises.

Financial literacy has emerged as a critical determinant of the performance of Village-Owned Enterprises. Studies in East Java show that higher levels of financial literacy among BUMDesa managers are associated with better enterprise performance, more prudent financial decision-making, and improved accountability in the use of village funds [5]. Literate managers are more capable of understanding financial products, evaluating investment opportunities, managing risks and designing appropriate business models. However, financial literacy alone may not suffice. The way managers translate knowledge into daily behavior, reflected in their financial attitudes and intelligence, can determine whether literacy is effectively converted into profitability. Financial attitude shapes preferences toward saving, borrowing, investing, and risk, whereas financial intelligence reflects the ability to analyze financial information and make sound judgments under uncertainty.

Simultaneously, the diffusion of financial technology alters how rural enterprises interact with markets, customers, and financial institutions. The use of digital payment systems, online banking, and fintech platforms can increase efficiency, reduce transaction costs, and provide new revenue generation channels. However, low technological capability and resistance to change may prevent BUMDesa from fully exploiting these tools, again linking technology adoption to the underlying levels of financial intelligence and attitude.

Another factor that may influence the impact of literacy, technology, and financial behavior on enterprise outcomes is financial resilience. Financial resilience reflects an entity's ability to absorb shocks, maintain liquidity, and adapt to adverse economic conditions. For Village-Owned Enterprises operating in volatile rural markets, resilience can determine whether temporary shocks translate into persistent losses or can be managed without jeopardizing operations. Therefore, it is plausible that financial resilience strengthens or weakens the relationship between financial attitudes, financial intelligence, and profitability.

Against this backdrop, the present study aims to analyze the influence of financial literacy and financial technology on financial attitude and financial intelligence, and how these, in turn, affect the profitability of Village-Owned Enterprises in Lamongan District. In addition, it examines whether financial resilience moderates the relationship between financial attitudes, financial intelligence, and profitability. By focusing on the behavioral and technological channels through which literacy and resilience shape enterprise performance, this study seeks to extend the literature on regional autonomy, local resource management, and rural entrepreneurship, while providing practical insights for policymakers and village governments seeking to enhance the effectiveness of BUMDesa as drivers of local economic development.

2. LITERATURE REVIEW

2.1 Regional autonomy, village governance, and local resource management

Decentralization has reshaped rural development architecture in many countries, including Indonesia. Regional autonomy policies transfer a significant portion of decision-making authority and resource control from the central to local governments, with the expectation that local institutions are better positioned to understand and respond to community needs. Bebbington et al. [6] showed that the effectiveness of such reforms depends heavily on local capacity, village governance arrangements, and the broader political economy in which rural actors operate. When village institutions possess adequate managerial capabilities and accountability mechanisms, decentralization can enhance participation, legitimacy, and developmental outcomes. However, in the absence of these conditions, new forms of elite capture and inequality may emerge.

Within this broader decentralization agenda, local resource management has become a key area of institutional experimentation. Turner [7] highlighted how community-based natural resource management seeks to link rights, resources, and rural livelihoods by devolving control over land and natural assets to local communities. Similar dynamics are evident in the transformation of self-governing institutions for common-pool resources, where negotiated autonomy is used to adapt traditional governance arrangements to new economic and political conditions [8]. These studies collectively underline that local institutions are not merely administrative units but are central actors in the governance of resources, markets, and social welfare [9].

In Indonesia, regional autonomy has been accompanied by reforms in village governance, designed to enhance village autonomy and participation. Setiawan and Hadi [1] argued that the new regulatory framework formally recognizes villages as legal entities with the authority to plan, budget, and manage local development, including establishing economic enterprises. Nonetheless, they caution that local resource management is shaped by power relations, bureaucratic practices, and the uneven distribution of technical capacity. More recent work on rural development transformation in China similarly shows that specialization, professional management, and social governance innovations are key to unlocking rural potential [10]. These insights are relevant for Indonesia's villages, which face similar pressures to professionalize management while remaining socially embedded in their communities [11].

Against this backdrop, Village-Owned Enterprises (BUMDesa) are a logical institutional innovation. They embody attempts to combine local ownership with more formalized business practices, allowing villages to mobilize local resources for economic gain while financing public services. Kania et al. [3] conceptualized BUMDesa as hybrid organizations that integrate community participation,

entrepreneurship, and public goals. Hilmawan et al. [2] further showed that village funds, BUMDesa operations, and village original income are interlinked pillars of rural development, with the performance of BUMDesa crucial for turning fiscal transfers into sustained local revenue. The literature on regional autonomy and local resource management provides the institutional foundation for examining how financial capabilities and technology adoption within BUMDesa affect their profitability and contribution to regional economies.

2.2 Village-owned enterprises and the rural/regional economy

BUMDesa have been promoted as key vehicles for stimulating rural entrepreneurship, diversifying village economies, and reducing dependence on agriculture. Kania et al. [3] demonstrated that these enterprises can catalyze new forms of rural entrepreneurship by leveraging local assets, such as tourism potential, agricultural supply chains, or basic service provision, while using a collective ownership structure that aligns business activities with community interests. Properly governed BUMDesa can create local employment, provide essential services, and strengthen social cohesion by involving villagers in decision making.

The role of village funds and BUMDesa in employment creation was examined empirically by Arifin et al. [12]. Using data from Indonesia, they found that village funds and the presence of BUMDesa have significantly positive effects on rural employment, particularly in non-agricultural activities. This evidence supports the argument that BUMDesa are not merely financial instruments but productive enterprises that can shift the structure of local economies toward more diversified and resilient configurations. Hilmawan et al. [2] complemented this perspective by linking BUMDesa performance to village original income and rural development indicators, suggesting that profitability at the enterprise level feeds back into the fiscal capacity of villages to invest in infrastructure and social services.

Comparative experiences from other countries reinforce the importance of village-level enterprises but also highlight potential pitfalls. The history of township and village enterprises (TVEs) in China provides a notable example. Kung and Lin [13] analyzed the decline of TVEs during China's economic transition and argue that shifts in property rights, competition from private firms, and governance challenges led to their reduced roles. Their findings illustrate that collective enterprises can be highly dynamic drivers of rural industrialization; however, they are vulnerable if governance and incentives are not well aligned. For Indonesian BUMDesa, this experience underscores the need for strong financial management, professional business practices, and adaptability to market changes.

Taken together, the literature suggests that BUMDesa have the potential to act as engines of rural and regional development, but this potential is contingent on their internal capabilities. Profitability is a critical dimension of performance, as it determines whether BUMDesa can sustain its operations, reinvest in business units, and contribute to village finances. Therefore, understanding the determinants of BUMDesa profitability requires moving beyond institutional design to examine the financial literacy, technological capabilities, and behavioral attributes of managers and staff.

2.3 Financial literacy, financial technology, and rural enterprises

Financial literacy is widely recognized as a key determinant of entrepreneurial behavior and enterprise performance. It encompasses knowledge of financial concepts, budgeting and accounting skills, and the ability to evaluate financial products and risks. Nugroho et al. [5] provided direct evidence in the context of Indonesian Village-Owned Enterprises: they show that higher levels of financial literacy among BUMDesa managers are associated with improved performance, demonstrating that knowledge and skills in financial management translate into better business outcomes. Their study highlights that financial literacy affects planning, investment decisions, and the monitoring of financial results, all of which are central to a firm's profitability.

At the household and small-enterprise levels, financial literacy interacts with digital transformation. Li et al. [14] examined Chinese rural households and found that digital transformation and financial literacy jointly influence rural entrepreneurship. Digital tools expand access to information, markets, and financial services; however, their effective use depends on users' ability to understand and evaluate financial choices. Wu and Wu [15] similarly showed that digital inclusive finance increases household entrepreneurship by easing credit constraints and reducing transaction costs, yet the degree of benefit is heterogeneous and partly mediated by financial capability. These studies imply that in rural enterprises such as BUMDesa, financial literacy not only directly affects managerial decisions but also shapes whether and how digital financial technology is adopted.

Fintech and digital finance have become central themes in rural development policies. Zhang and Pang [16] provided evidence that digital finance promotes entrepreneurship at both city and household levels in China. By lowering the barriers to credit, payments, and savings, digital finance can stimulate new business formation and growth. However, these benefits are not automatic. Nugraha et al. [17] showed that fintech adoption among Indonesian SMEs is driven by perceived usefulness, ease of use, and trust, but is constrained by limited digital skills and infrastructural barriers. Agrawal et al. [18] reinforced this point in the context of rural women in India, identifying multiple challenges to fintech adoption, including low digital literacy, social norms, and inadequate support.

These studies have important implications for Village-Owned Enterprises. First, they suggest that fintech (X2) is a strategic resource that can improve efficiency in transactions, financial reporting, and access to financial services. Second, they highlight that the effectiveness of technology adoption is conditioned by financial literacy (X1) and related competencies. In contexts like Lamongan, where BUMDesa often still rely on manual or basic Excel-based accounting, the literature implies a substantial untapped potential to improve profitability through more advanced financial technology. Simultaneously, the barriers documented in the fintech literature indicate that simply providing technology is insufficient; understanding attitudes toward technology, risk, and finance is essential.

2.4 Financial attitude and financial intelligence

Financial attitudes and financial intelligence are central behavioral constructs that help explain how literacy and

technology translate into concrete financial decisions. Financial attitudes refer to the psychological tendencies and evaluative beliefs that individuals hold regarding money, saving, debt, risk, and financial planning. Rasheed and Siddiqui [19] showed that owner-managers' financial attitudes, particularly their openness to inclusive finance and formal financial products, significantly influence financial decision-making in SMEs. They argue that attitudes shaped by personal experience, education, and firm characteristics can either facilitate or hinder engagement with formal financial systems. Similarly, Goswami et al. [20] analyzed financial risk attitudes among handloom microentrepreneurs and found that socioeconomic and psychological factors drive different levels of risk tolerance, which in turn affect investment and borrowing decisions.

Financial attitudes are closely linked to financial knowledge and behavior. Jaya and Rathod [21] demonstrated that, among rural households in India, financial behavior, attitudes, and knowledge jointly influence overall financial literacy. Their findings suggest that literacy is not purely cognitive; it is embedded in behavioral dispositions and daily practices. Kumar et al. [22] extended this logic by showing that financial socialization, literacy, attitude, and behaviour collectively predict financial well-being among rural villagers in India. These studies provide a theoretical basis for treating financial attitudes (Z1) as an important mediating mechanism through which financial literacy and technology adoption influence enterprise performance: literate managers who hold positive, future-oriented attitudes are more likely to make prudent savings, investment, and risk-management decisions, thereby enhancing profitability [23].

Financial intelligence is a related but distinct construct that captures the ability to interpret financial information, analyze alternatives, and make sound decisions under uncertainty. Although the term is used less consistently across studies, it aligns with the notion of financial capability or higher-order financial skills. Cherotich et al. [24], for example, found that financial knowledge and related competencies significantly improve the performance of women farm enterprises in Kenya. Their results imply that beyond basic literacies, the ability to apply knowledge analytically, through budgeting, cost–benefit analysis, and financial planning, drives enterprise success. Liu et al. [25] investigated Chinese rural households and showed that financial literacy enhances entrepreneurship partly by relaxing credit constraints and influencing risk preferences, again pointing to the importance of cognitive processing of financial information.

In the context of Village-Owned Enterprises, financial intelligence may involve the capacity of managers to read financial statements, evaluate investment projects, design pricing strategies, and anticipate cash-flow dynamics. When combined with appropriate financial attitudes, such intelligence allows managers to leverage both literacy and technology more effectively. Therefore, the literature supports modelling financial attitudes and financial intelligence as mediating variables that connect financial literacy and technology to profitability: X1 and X2 contribute to shaping Z1 and Z2, which then directly influence Y through day-to-day financial decision-making.

2.5 Financial resilience

Financial resilience captures an entity's capacity to absorb shocks, maintain its essential functions, and recover from disturbances. While much of the literature focuses on households and communities, recent studies have increasingly examined resilience at the level of firms and local economies. Steiner and Atterton [26] argued that rural businesses play a crucial role in community resilience by providing employment, services, and social networks, and their survival or failure can significantly affect local adaptive capacity. In a follow-up study, Steiner and Atterton [26] showed that rural enterprises contribute to local resilience not only through economic functions but also through their embeddedness in local institutions and informal support networks.

At the firm level, financial resilience is conceptualized as the ability to manage cash flow, diversify income sources, and access external support during crises. Nassuna et al. [27] examined how financial resilience enables businesses to grow amidst adversities, demonstrating that resilience strategies, such as maintaining savings, building relationships with financial institutions, and embracing innovation, help firms withstand shocks and exploit emerging opportunities. Nguyen et al. [28] focused on rural businesses during the COVID-19 pandemic and found that resilience depends on a combination of internal capabilities, network ties, and adaptive strategies, including digitalization and product diversification.

For small and medium-sized enterprises, Legenzova et al. [29] proposed a dynamic approach to financial resilience that emphasizes preparedness for market disturbances. They highlight that resilience is not a static attribute but a process that involves anticipation, absorption, and adaptation. Financially resilient SMEs tend to monitor risks, maintain liquidity, and invest in capabilities that allow them to adjust their operations when conditions change [30]. These insights are highly relevant for BUMDesa operations in volatile rural markets, where shocks can arise from commodity price fluctuations, natural disasters, or policy changes.

Within the conceptual model of this study, financial resilience (M) is posited as a moderating variable that influences the strength of the relationships between financial attitudes, financial intelligence, and profitability. The literature provides a clear rationale for this specification. Positive financial attitudes and high financial intelligence enhance the quality of financial decisions, but their impact on profitability may be limited if enterprises lack resilience to withstand shocks. Conversely, in highly resilient enterprises, sound financial decisions are more likely to result in sustained profitability because firms can survive downturns and capitalize on periods of recovery. Therefore, the moderating role of resilience is consistent with empirical evidence that resilient firms are better able to convert capabilities into tangible performance benefits during crises [29].

2.6 Conceptual framework and hypothesis development

The reviewed literature provides a coherent foundation for the study's conceptual framework (Figure 1). Regional autonomy and village governance reforms have created institutional space for Village-Owned Enterprises to manage local resources and contribute to rural development [6]. BUMDesa are expected to act as entrepreneurial entities that enhance employment, generate local revenue, and support village welfare [12]. However, achieving these goals depends on financial capabilities and adaptability.

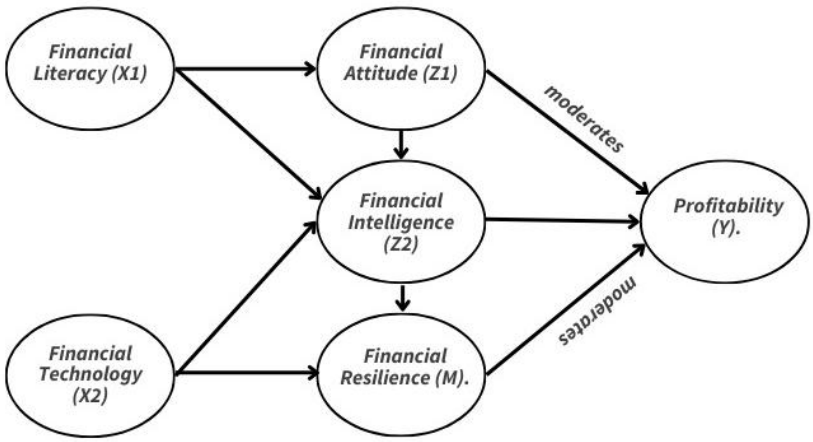

Figure 1. Conceptual framework

Empirical findings indicate that financial literacy is a key determinant of performance in rural enterprises and BUMDesa [24, 25]. Digital finance and fintech offer new opportunities for efficiency and market access; however, their impact is mediated by literacy, trust, and local conditions [18]. These insights support the modelling of financial literacy (X1) and financial technology (X2) as primary exogenous variables influencing BUMDesa behavior.

The behavioral literature shows that financial attitudes and financial intelligence are critical channels through which knowledge and technology affect outcomes [24, 25]. Managers' attitudes toward risk, savings, and formal finance shape their willingness to adopt new tools and engage in prudent financial practices, while financial intelligence determines their ability to interpret financial information and design effective strategies to manage their finances. Therefore, it is theoretically plausible to treat financial attitude (Z1) and financial intelligence (Z2) as mediators linking X1 and X2 to profitability (Y).

The resilience literature suggests that the benefits of good financial behavior and intelligence are contingent on a firm's capacity to withstand shocks [29]. Financially resilient BUMDesa are better positioned to translate sound financial decisions into sustained profitability, particularly in turbulent environments. This justifies modelling financial resilience (M) as a moderator that strengthens or weakens the effects of Z1 and Z2 on Y.

This study proposes a moderated mediation model in which financial literacy and financial technology influence financial attitude and financial intelligence, which in turn affect the profitability of Village-Owned Enterprises, while financial resilience conditions the strength of the latter relationships. This framework addresses a clear gap in the existing literature: although prior studies have examined financial literacy, digital finance, and resilience separately, few have integrated these constructs in the specific context of BUMDesa operating under regional autonomy. The study contributes both theoretically, by linking institutional, behavioral, and resilience perspectives, and practically, by identifying leverage points for improving the financial performance of Village-Owned Enterprises in rural Indonesia.

3. RESEARCH METHOD

This study is grounded in an extensive review of the theoretical and empirical literature, which revealed several unresolved issues related to the financial management of village-owned enterprises. These gaps were then formulated as research problems and translated into a set of testable variables. The exogenous variables in the model are Financial Literacy (X1) and Financial Technology (X2). The mediating variables are Financial Attitude (Z1) and Financial Intelligence (Z2), while Profitability (Y) is specified as the endogenous outcome variable. Financial Resilience functions as a moderating variable (M), influencing the strength of the relationship between the mediators and profitability [31].

The conceptual framework was developed using a combination of deductive and inductive reasoning. The study draws on established theories of financial behavior, digital finance, and rural enterprise performance to specify the expected relationships between the constructs. Inductively, insights from previous empirical studies on village-owned enterprises and rural businesses informed the refinement of the model, ensuring its relevance to the Indonesian context. Based on this synthesis, a conceptual model was drawn that underpins the formulation of hypotheses, which were subsequently subjected to empirical testing [31].

This study adopts a quantitative approach, as the primary objective is to examine the causal influence of Financial Literacy and Financial Technology on Financial Attitude, Financial Intelligence, and Profitability, and to assess the moderating role of Financial Resilience in these relationships. A quantitative design allows for the estimation of the magnitude and direction of each effect and enables the simultaneous testing of the complex network of relationships specified in the structural model. In this way, the study not only identifies whether relationships exist but also diagnoses their relative strength among the constructs of interest [31].

The target population comprised all Village-Owned Enterprises (BUMDesa) located in Lamongan Regency. Population data were obtained from the District Community Empowerment Office, which maintains an official register of active BUMDesa. Using this frame ensures that every enterprise has a known and non-zero probability of being selected. Because the research aims to generalize the findings to all BUMDesa in the regency, it is essential that the sample accurately represents this population.

Sampling was conducted to obtain a manageable, yet statistically valid, subset of the population. The enterprises in Lamongan are relatively homogeneous in terms of their institutional form and regulatory environment, and the overall population size is below 1,000 units. Under such conditions, a probability sampling strategy based on simple random

sampling is appropriate, as it gives each enterprise an equal chance of being included in the study and reduces selection bias [32]. The minimum required sample size was determined using the Slovin formula with a 5 percent margin of error, which is commonly used when population variability is not precisely known but a reasonable level of precision is desired. The resulting sample size is sufficient for the application of multivariate analysis techniques, such as Partial Least Squares Structural Equation Modelling (PLS-SEM).

Data were collected using a structured questionnaire distributed to the managers or directors of the sampled BUMDesa. The instrument was designed to capture perceptions and self-reported behaviors related to financial literacy, the use of financial technology, financial attitudes, financial intelligence, financial resilience, and profitability. All constructs were measured using multi-item Likert-type scales adapted from the relevant literature and adjusted to the local context, ensuring content validity. Prior to full deployment, the questionnaire was pretested with several respondents to check clarity, translation, and response time [31].

For data analysis, this study employed the Partial Least Squares (PLS) approach to structural equation Modelling. PLS-SEM is particularly suitable when the primary objective is prediction and theory development rather than strict theory confirmation, when models are complex with many constructs and indicators, and when sample sizes are relatively small. Unlike covariance-based SEM, PLS-SEM imposes less stringent distributional assumptions and can handle non-normal data sets. It is also capable of estimating models that combine reflective and formative measurement specifications, which is useful for capturing multifaceted constructs such as FinTech or financial resilience.

In PLS-SEM, the model is composed of an inner (structural) and outer (measurement) model. The structural model specifies the relationships among latent variables (e.g., the paths from Financial Literacy and Financial Technology to Financial Attitude, Financial Intelligence, and Profitability, and the moderating effects of Financial Resilience). The measurement model links each latent variable to its corresponding observed indicator. PLS estimates the latent variable scores as linear combinations of their indicators using a system of weight relations. Through an iterative algorithm, the procedure generates three types of parameter estimates: (1) weights, used to compute latent variable scores; (2) loadings and path coefficients, which indicate the strength of the relationships between indicators and constructs and among constructs; and (3) means and intercepts, which position the latent variables and indicators on their respective scales [31, 33].

The PLS-SEM analysis was conducted in two main stages. First, the measurement model was evaluated to ensure reliability and validity. This involves examining the indicator loadings, internal consistency reliability, convergent validity, and discriminant validity. Indicators that do not meet the recommended thresholds may be removed to improve the quality of the measurement model. Second, once acceptable measurement properties are established, the structural model is assessed. The key evaluation criteria include the significance and size of path coefficients, the coefficient of determination (R^2) for endogenous constructs, effect sizes (f^2), and predictive relevance (Q^2). The moderating role of Financial Resilience is tested by including interaction terms between Financial Resilience and the relevant mediator variables and examining their effects on Profitability [31, 33].

4. RESULT AND DISCUSSION

4.1 Measurement model and structural model

The data in this study were analyzed using PLS-SEM implemented through SmartPLS 3.0 software. PLS-SEM was selected because it is suitable for complex models that combine multiple latent constructs, mediation, and moderation, and because it is robust to relatively small samples and non-normal data distributions [31]. Within the PLS framework, the model is divided into a measurement component, often referred to as the outer model, and a structural component, commonly called the inner model. The outer model specifies the relationships between the latent variables and their indicators, whereas the inner model captures the relationships among the latent variables.

The analysis began with an assessment of the outer or measurement models. In this study, all latent constructs were operationalized reflectively; therefore, their indicators were expected to be manifestations of the underlying variables. For reflective constructs, the evaluation focuses on convergent validity, discriminant validity, and reliability. Convergent validity assesses whether the indicators of the same construct share a high proportion of variance. In SmartPLS, this is examined through the loading factor of each indicator and the average variance extracted. The rule of thumb applied in this research is that standardized loadings should exceed 0.70 and the AVE for each construct should be greater than 0.50, indicating that more than half of the variance in the indicators is captured by the latent variable rather than by the measurement error [31]. Indicators that did not meet these criteria were considered for removal to improve the quality of the measurement model, provided that their removal did not compromise content validity.

Discriminant validity was evaluated to ensure that the constructs were empirically distinct from one another (see Figure 2). This is important because indicators that correlate too highly with other constructs may suggest conceptual overlap or poor measurement specification. Discriminant validity was assessed using cross-loadings and the Fornell-Larcker criterion. For cross loadings, each indicator should load highest on its own construct compared with all other constructs, and in this study, cross loading values greater than 0.70 on the intended construct and lower values on other constructs were taken as evidence of discriminant validity [31]. After convergent and discriminant validity were established, construct reliability was examined using composite reliability coefficients, with values above 0.70 indicating satisfactory internal consistency.

Once the measurement properties were deemed adequate, attention was turned to the inner or structural model. The structural model specifies the hypothesized causal relationships among Financial Literacy, Financial Technology, Financial Attitude, Financial Intelligence, Financial Resilience, and Profitability. The quality of the structural model was first evaluated using the coefficient of determination, or R square, for the endogenous constructs. R square represents the proportion of variance in an endogenous variable that is explained by its predictors and serves as an indicator of the model's explanatory power [31].

In this study, three endogenous constructs were of particular

interest: Financial Attitude, Financial Intelligence, and Profitability. Figure 3 shows the Inner Model.

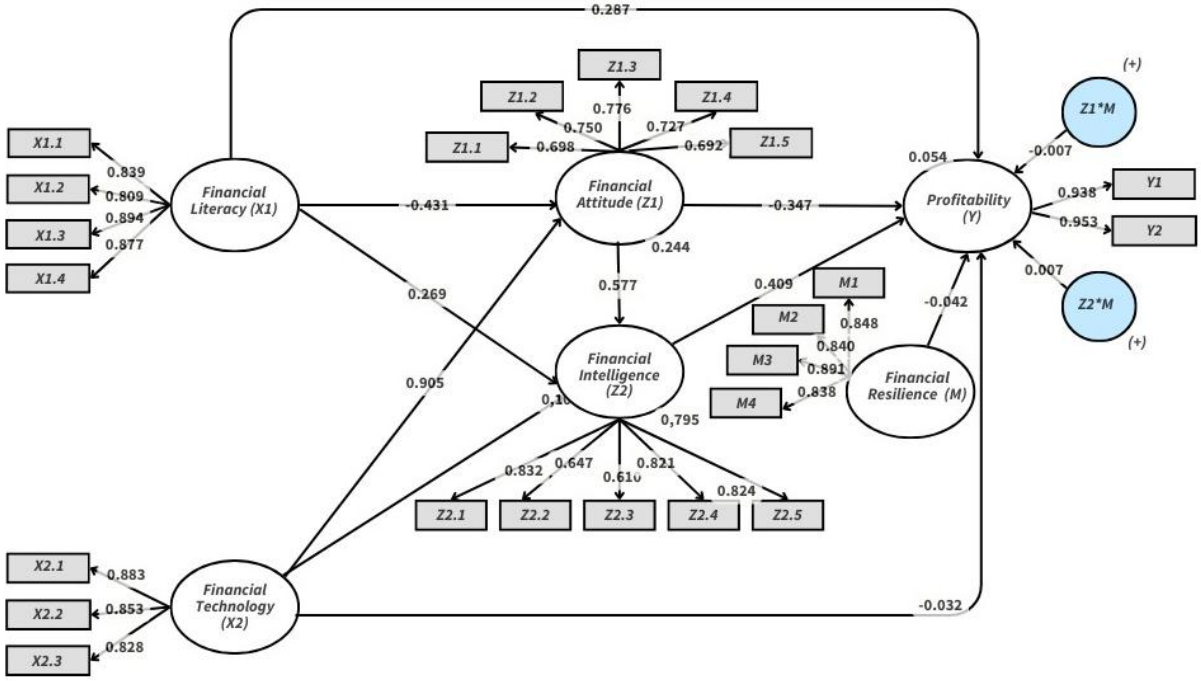

Figure 2. Measurement model (outer model)

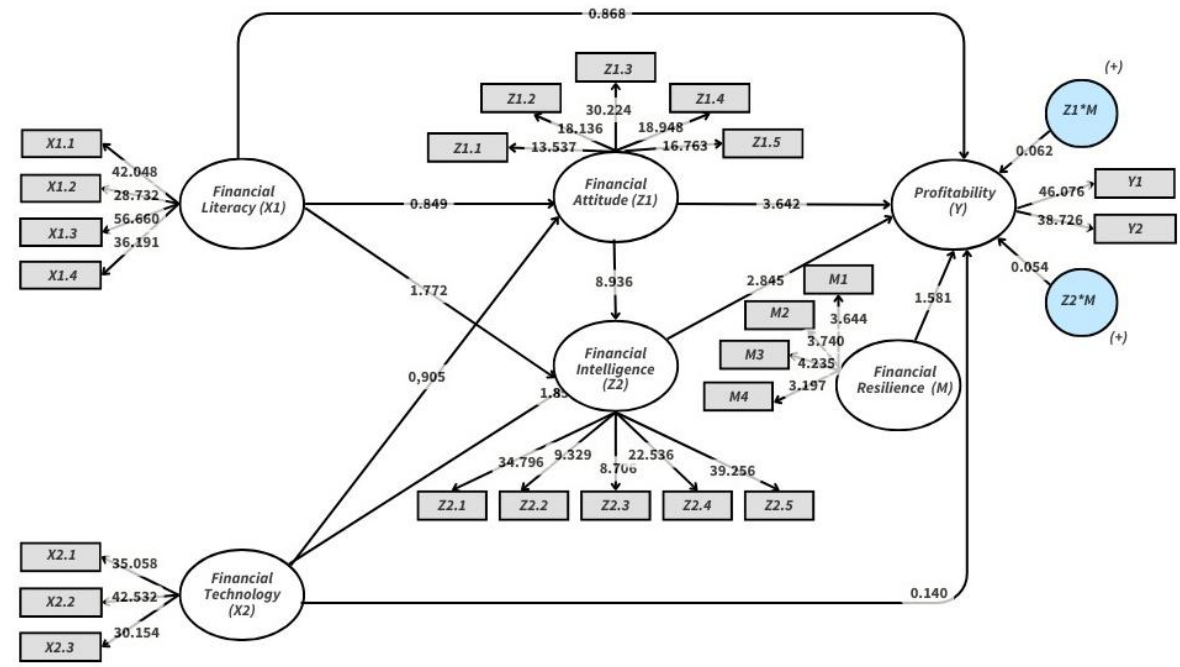

Figure 3. Structural model (inner model)

The adjusted R-squared for the path explaining Financial Attitude was 0.237. This indicates that Financial Literacy and Financial Technology jointly accounted for 23.7 percent of the variance in Financial Attitude, while the remaining 76.3 percent was influenced by other factors not included in the model. In line with common guidelines, this level of explanatory power is interpreted as moderate. For Financial Intelligence, the adjusted R square reached 0.792, meaning that Financial Literacy and Financial Technology explained 79.2 percent of the variance in this construct. This is considered a substantial or strong level of explanatory power and suggests that these two capabilities are the central determinants of the financial intelligence of Village Owned Enterprise managers. In contrast, the adjusted R-square for profitability was only 0.022, indicating that Financial Literacy and Financial Technology directly explained only 2.2 percent of the variance in profitability. This very low value suggests that profitability is shaped by a wide range of other factors and that the direct effect of the two financial capabilities on profit is weak when mediating mechanisms and moderators are not considered. The dominance of unobserved factors in explaining profitability also underscores the complexity of financial performance in village-owned enterprises [31].

4.2 Hypothesis testing

Bootstrapping procedures were employed to test the hypotheses specified in the structural model. Bootstrapping is

a resampling technique that draws a large number of subsamples from the original dataset with replacement to estimate the sampling distribution of the path coefficients. Through this process, standard errors, t-values, and p-values were obtained for each hypothesized relationship. A significance level of 5 percent was adopted; hence, relationships with p-values below 0.05 and t-values above 1.96 were considered statistically significant [31]. Both direct and indirect effects were examined to capture the mediation mechanisms, while the moderating role of Financial Resilience was tested through interaction terms.

Regarding the direct effects, the results revealed several important patterns. Financial Literacy had a significant positive impact on Financial Attitude, with a t-value of 2.849 and a p-value below 0.05, indicating that managers with higher levels of financial literacy tend to form more constructive financial attitudes. Financial Literacy also has a significant positive influence on profitability, with a t value of 2.537, suggesting that firms whose managers possess better financial knowledge and skills tend to achieve higher profit ratios. Moreover, Financial Literacy significantly affected Financial Intelligence, evidenced by a t-value of 2.364, confirming that literacy translates into more advanced financial reasoning and analytical abilities.

FinTech displayed a strong and significant positive effect on Financial Attitude [34]; the corresponding t-value of 5.829 indicates that the adoption and use of digital financial tools can shape how managers think about and respond to financial matters. FinTech also significantly influenced Financial Intelligence, with a t-value of 3.044, suggesting that access to and experience with financial technologies enhance the ability to process financial information and make sound financial decisions. However, the direct effect of Financial Technology on Profitability was not significant; the t value of 0.140 and the p value of 0.889 imply that, in this context, digital financial tools on their own do not directly translate into improved profitability.

Behavioral mediators also play important roles. Financial Attitude had a significant positive influence on profitability, with a t-value of 3.642. This means that managers who hold prudent, security-oriented, and responsible financial attitudes tend to lead enterprises that generate higher profits. Financial Intelligence was also a significant predictor of profitability, as indicated by a t-value of 2.845. Managers who are more adept at distinguishing between assets and liabilities, interpreting financial reports, and planning for long-term sustainability achieve better financial outcomes. In addition, Financial Attitude significantly influenced Financial Intelligence, with a t-value of 8.936, highlighting a sequential process in which more positive attitudes encourage deeper engagement with financial information, thus fostering greater financial intelligence [31].

4.3 Discussions

The findings of this study confirm the central argument of the literature review: the financial performance of village-owned enterprises is not determined by institutional design alone, but by the financial capabilities, technological readiness, and behavioral characteristics of their managers operating within a decentralized governance framework. Regional autonomy has provided villages with a formal mandate to manage resources and run enterprises. However, earlier work warned that outcomes would depend on local capacity and the quality of village governance rather than on legal change per se [6, 8]. The strong effects of financial literacy, financial attitude, and financial intelligence on profitability in Lamongan's BUMDesa suggest that these micro-level capabilities are one of the mechanisms through which local capacity, highlighted in those studies, translates into economic performance. Where managers understand financial concepts, hold prudent attitudes, and can interpret financial information, village autonomy is more likely to produce development gains, echoing the more recent emphasis on specialization and professionalization in rural governance [10].

The positive and significant influence of financial literacy on profitability, financial attitude, and financial intelligence aligns closely with previous evidence from rural enterprises and households. Nugroho et al. [5] showed that financial literacy improves the performance of village-owned enterprises in East Java, while Cherotich et al. [24] found that financial knowledge enhances the profitability of women-owned farm enterprises in Kenya. Similarly, Liu et al. [25] and Li et al. [14] demonstrated that financial literacy encourages rural entrepreneurship in China by easing credit constraints and improving risk assessments. The present results reinforce these findings in the Indonesian BUMDesa context: literacy is not merely an individual asset but a strategic resource for collectively owned village enterprises (COVEs). The significant paths from literacy to financial attitude and intelligence also resonate with behavioral work, showing that knowledge, attitudes, and behavior are mutually reinforcing components of financial capability [21, 22]. Managers who are financially literate are more likely to value savings, avoid excessive risks, and invest in productive assets. They are also better equipped to distinguish between assets and liabilities and to plan for long-term profitability.

The role of fintech is more nuanced. Consistent with the digital finance literature, financial technology has a strong positive effect on financial attitudes and financial intelligence, but no direct impact on profitability. Studies on digital inclusive finance in China report that digital tools stimulate entrepreneurship and income mainly by relaxing credit constraints and enabling more efficient transactions, with the magnitude of benefits depending on users' capabilities and contexts [15, 16]. Nugraha et al. [17] and Agrawal et al. [18] emphasized that fintech adoption in rural areas is limited by digital literacy, trust and infrastructural barriers; technology can improve performance only when it is effectively integrated into business processes. Therefore, the absence of a direct effect of financial technology on profitability in Lamongan's BUMDesa is not surprising. Many enterprises still rely on basic Excel-based accounting, and the potential of digital tools to improve profitability appears to be realized mainly through their impact on managers' mindsets and analytical capabilities rather than through immediate cost or revenue effects. This reinforces the idea that technology is an enabler, rather than a standalone driver of performance.

The results also highlight the behavioral pathways through which capabilities affect financial performance. Financial attitude and financial intelligence exert significant positive effects on profitability, and financial attitude strongly predicts financial intelligence. These relationships are consistent with studies showing that attitudes toward money, risk, and formal finance shape whether small entrepreneurs engage with financial institutions and adopt sound financial practices [20]]. When managers value financial security and long-term

stability, they are more inclined to scrutinize financial reports, adopt budgeting practices, and seek information, which, in turn, builds financial intelligence. The significant path from attitude to intelligence observed in this study echoes the idea of behavioral escalation, where attitudes motivate learning and analytical engagement [21, 22]. In practical terms, this suggests that training programs for BUMDesa should not only transfer technical knowledge but also work on shifting beliefs and norms around savings, debt, and investment.

The strong relationship between financial intelligence and profitability echoes the findings that higher-order financial skills play a crucial role in enterprise performance. Cherotich et al. [24] showed that enterprise owners who can budget, analyze costs and evaluate investments achieve better outcomes. In Lamongan, managers who can clearly distinguish assets from liabilities and understand the implications of different financing options generate higher asset and equity returns. This supports the conceptualization of financial intelligence as the key mechanism through which both literacy and technology are translated into effective resource allocation, particularly in complex collective enterprises such as BUMDesa.

The moderating role of financial resilience provides an important extension to the existing theory. The study finds that financial resilience strengthens the positive effects of both financial attitudes and financial intelligence on profitability. This is consistent with research on rural businesses and SMEs that conceptualizes resilience as a dynamic capability allowing firms to anticipate, absorb, and adapt to shocks [27]. Nguyen et al. [28] showed that resilient rural enterprises were better able to withstand the COVID-19 shock, especially when they combined robust networks, financial buffers and adaptive strategies. In the BUMDesa studied here, resilience is closely linked to social capital and the ability to leverage community support and local network. The interaction results suggest that even sophisticated financial analysis and prudent attitudes will not translate into stable profitability if enterprises lack the resilience to cope with market volatility, disasters, or policy changes. Conversely, enterprises with high resilience can convert good financial decisions into sustained profits, which in turn reinforces their contribution to the village's original income and employment, as emphasized in the work on BUMDesa and village funds [12].

At a broader level, the findings can be situated within the debates on the role of village enterprises in rural development. Kania et al. [3] described BUMDesa as vehicles for rural entrepreneurship and local value creation, while Arifin et al. [12] and Hilmawan et al. [2] documented their contributions to employment and village revenue. However, experiences from China's TVEs show that collective enterprises can decline when governance and incentive structures are weak or when they fail to adapt to changing markets [13]. The present study suggests that one route to sustaining BUMDesa in the long term is to build financial capabilities, embed digital tools in daily practice, and strengthen their financial resilience. This aligns with the emphasis on negotiated autonomy and local institutional adaptation highlighted in earlier work on community-based resource management [6, 8].

Finally, the very low R^2 for profitability underscores that the financial performance of BUMDesa is shaped by many factors beyond the financial and behavioral variables considered here. Market access, sectoral focus, quality of local governance, and broader macroeconomic conditions are all likely to be important. Nevertheless, by identifying financial literacy, technology-enabled capabilities, attitudes, intelligence, and resilience as significant predictors of profitability, this study adds a critical micro-level dimension to the literature on village governance and rural enterprises. This shows that empowering BUMDesa is not only a matter of transferring funds or issuing regulations but also of investing in the financial human capital and resilience of the people who manage these enterprises so that the promise of regional autonomy and village-level entrepreneurship can be more fully realized.

5. CONCLUSION

This study examined how financial literacy, financial technology, financial attitude, financial intelligence, and financial resilience jointly shape the profitability of village-owned enterprises in Lamongan Regency. The findings show that financial literacy is a foundational capability that significantly enhances financial attitudes and financial intelligence and contributes directly to profitability, confirming that knowledge of saving, investment, and basic financial concepts is not merely an individual asset but a strategic resource for village enterprises. Fintech, while not directly improving profitability, plays an important enabling role by strengthening financial attitudes and intelligence, indicating that digital tools yield benefits primarily when they are embedded in sound behavioral and analytical practices rather than adopted in isolation. The strong effects of financial attitude and financial intelligence on profitability highlight the central importance of managerial behavior, particularly the ability to differentiate assets from liabilities, manage risks prudently, and plan for long-term sustainability. Crucially, financial resilience amplifies the positive impact of both attitude and intelligence on profitability, underscoring that even well-informed and analytically capable managers require resilient financial structures, social capital, and adaptive capacity to convert good decisions into stable profits. Together, these results extend the existing theories of rural enterprises and village governance by demonstrating that institutional instruments such as BUMDesa can contribute effectively to local economic development only when supported by adequate financial capabilities and resilience at the organizational level. Simultaneously, the low explanatory power of the model for profitability indicates that market conditions, governance quality, and other structural factors remain important and should be incorporated in future research. For policymakers and practitioners, this study implies that efforts to strengthen BUMDesa should prioritize integrated interventions that simultaneously build financial literacy, promote the meaningful adoption of financial technology, and enhance financial resilience.

AUTHOR CONTRIBUTIONS

H.H. conceived the study, developed the research design, and coordinated data collection. R.P. contributed to the theoretical framework, literature review, and manuscript drafting. N.M.S. performed the data analysis, interpretation of results, and revised the manuscript critically for important intellectual content. S.P.M. provided expertise in the health economics and veterinary perspectives, contributed to the discussion, and ensured methodological rigor. A.C. assisted

with statistical validation, prepared tables and figures, and contributed to editing and final formatting of the manuscript. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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