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Financial and Digital Literacy as Drivers of SMEs' Competitive Advantage: The Mediating Role of Human Capital

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Abstract

Introduction/Main Objectives: The increasing digital transformation and business competition require SMEs to possess strong financial and digital capabilities to maintain competitiveness. This study aims to examine the effects of financial literacy and digital literacy on SMEs' competitive advantage, with human capital acting as a mediating variable. **Background Problems:** Despite the rapid growth of SME digitalization in Indonesia, many SMEs still face challenges in financial management, technology utilization, and human resource development, leading to low competitiveness. This study addresses the question of whether human capital mediates the relationship between financial literacy, digital literacy, and competitive advantage**.** **Novelty:** This study integrates financial literacy and digital literacy within a single framework and examines the mediating role of human capital, providing a more comprehensive explanation of SMEs' competitive advantage. **Research Methods:** A quantitative approach was employed using survey data collected from SME owners in Java, Indonesia. The data were analyzed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS). **Finding/Results:** The results indicate that financial literacy and digital literacy positively influence competitive advantage. Human capital also partially mediates the relationships between financial literacy and competitive advantage, as well as between digital literacy and competitive advantage. **Conclusion:** The findings suggest that strengthening financial literacy, digital literacy, and human capital simultaneously can enhance SMEs' competitive advantage. These results provide practical implications for policymakers and SME development programs in promoting sustainable business competitiveness**.**

Keywords: *Financial literacy; Digital literacy; Human capital; Competitive advantage; SMEs*
JEL Classification: M13; O15; D83

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INTRODUCTION

Micro, Small, and Medium Enterprises (SMEs) play a strategic role in supporting Indonesia's economic growth, particularly in Java, as the center of national economic activity. SMEs not only contribute to employment absorption but also serve as a primary driver of the community's production, distribution, and consumption activities. Indonesia's economic growth, which has continued to move positively in recent years, demonstrates that the SME sector remains an important foundation for maintaining national economic stability.

Amid the development of the digital economy, business competition has become increasingly competitive and requires SMEs to possess a high capacity for adaptation. SME actors no longer compete solely on the aspects of price and product quality, but also on the ability to utilize digital technology, manage financial information, and build sustainable business innovation. Increasingly digital changes in consumer behavior encourage SMEs to undertake business transformation in order to maintain their existence and create a competitive advantage.

The phenomenon of SME digitalization in Indonesia shows fairly rapid development, particularly following the pandemic and the increasing use of digital transactions. Bank Indonesia recorded that the growth of digital payment transactions and the use of QRIS has increased significantly in recent years. This condition reflects that digitalization has become an important part of the economic activities of the community and business actors. Nevertheless, not all SMEs are able to optimize these digital opportunities due to limited technological capability and the low readiness of their human resources.

In addition to the challenges of digitalization, low financial literacy remains a major issue for many SMEs in Java. Some business actors still experience difficulties in financial record-keeping, cash flow management, investment planning, and making business decisions based on financial information. Such conditions make SMEs vulnerable to business sustainability problems, especially when facing market changes and economic pressures.

Another phenomenon shows that many SMEs have used digital technology in their marketing activities as well as in payment transactions, but have not yet been able to integrate that technology with business management systems optimally. Academic discussions regarding SME digitalization also show that a large proportion of micro-business actors still face obstacles in using digital financial record-keeping applications due to limited technological capability and the complexity of the systems used.

Financial literacy is one of the important factors in enhancing the ability of SMEs to manage resources effectively and efficiently (Destianty, 2026). Financial literacy helps business actors understand the concepts of capital management, financial planning, risk control, and more rational business decision-making. Previous research conducted by Bidasari et al. (2023) and Jannah et al. (2023) showed that financial literacy has a positive effect on SME performance and on the ability of businesses to maintain business sustainability.

Digital literacy is also becoming an increasingly important aspect in enhancing the competitiveness of SMEs. Digital literacy is not only related to the ability to use technology, but also encompasses the ability to access information, utilize digital platforms, conduct online marketing, and develop technology-based business innovation. Mastery of digital technology enables SMEs to reach broader markets, improve operational efficiency, and accelerate the business decision-making process. Several previous studies conducted by

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Bidasari et al. (2023); (Huda et al. (2023), and Maulana & Suyono (2023) found that digital literacy has a positive effect on the competitive advantage of SMEs.

The competitive advantage of SMEs can be built through the ability of a business to create value that differs from that of its competitors. In the context of SMEs in Java, competitive advantage is determined not only by products and prices, but also by the quality of human resources, innovation capability, technological adaptation, and the effectiveness of business management. Therefore, strengthening financial literacy and digital literacy becomes a strategic necessity for enhancing the competitive position of SMEs in the digital economy era.

Nevertheless, the successful implementation of financial literacy and digital literacy is strongly influenced by the quality of the human capital possessed by SME actors. Human capital reflects the knowledge, skills, experience, creativity, and adaptive capability of individuals in facing changes in the business environment. The higher the quality of human capital, the greater the ability of SMEs to optimize the use of technology and financial management to enhance business competitiveness (Khusnah & Soewarno, 2024).

Previous research has generally focused more on the direct effect of financial literacy and digital literacy on SME performance, profitability, or financial inclusion. Some studies have also focused only on the use of financial technology and payment digitalization as the main variables. However, research that simultaneously integrates financial literacy and digital literacy in building the competitive advantage of SMEs remains relatively limited.

The empirical gap is also evident from the results of previous studies, which show inconsistency in the effect of financial literacy on the competitive advantage of SMEs. Several studies conducted by Nohong et al. (2019); Pradiska et al. (2024); Kisin & Setyahuni (2024) found a positive and significant effect, whereas other studies conducted by Fitria et al. (2021); Kusuma et al. (2021), Putri (2022); Huda et al. (2023) showed insignificant results. Research on digital literacy and the competitive advantage of SMEs has also produced inconsistent findings. Several previous studies conducted by Maulana & Suyono (2023), Huda et al. (2023); found that digital literacy has a positive effect on the competitive advantage of SMEs, whereas the study conducted by Anisawati et al. (2026) found that digital literacy has no effect on the competitive advantage of SMEs. These differing results indicate the need to develop a more comprehensive research model by incorporating a mediating variable to explain the relationships among variables more thoroughly. The mediating variable proposed in this study is the variable human capital.

Human capital can scientifically serve as a mediating variable between financial literacy and digital literacy and the competitive advantage of SMEs, because the financial knowledge and digital capability possessed by business actors do not automatically create competitiveness without the capacity of human resources capable of implementing that knowledge in business activities (Khusnah & Soewarno, 2024). Financial literacy helps SME actors understand capital management, cost control, and business decision-making, while digital literacy enhances the ability to utilize technology, digital marketing, and access to market information. Such knowledge will be more effective when supported by quality human capital in the form of skills, experience, creativity, and the adaptive capability of business actors. Thus, human capital becomes the mechanism that transforms literacy into business capabilities of strategic value.

From the perspective of the Resource-Based View (RBV), human capital is a strategic resource capable of creating competitive advantage because it is unique, difficult to imitate, and provides added value to the business (Barney, 1991). SME actors with high human capital tend to be more capable of optimizing the use of financial and digital literacy to improve operational efficiency, product innovation, service quality, and responsiveness to market changes. Therefore, the effect of financial literacy and digital literacy on competitive advantage does not occur only directly, but also through the improvement of human capital quality, which enables SMEs to build sustainable competitiveness.

The selection of Java as the research location is based on the fact that this region is the largest concentration center of SMEs in Indonesia, with a level of business competition and digital technology adoption that is relatively high. In addition, Java has economic characteristics that are diverse, making it a relevant context for testing the effect of financial literacy and digital literacy on the competitive advantage of SMEs through human capital. This study is expected to provide an empirical overview of strategies for strengthening the competitiveness of SMEs in the era of digital transformation.

Based on the above description, this study aims to analyze the effect of financial literacy and digital literacy on the competitive advantage of SMEs in Java, with human capital as a mediating variable. This study is expected to contribute theoretically to the development of the SME management literature and resource-based theory, while also providing practical recommendations for the government, SME support institutions, and business actors in designing strategies to enhance competitiveness through strengthening human resource capacity, financial literacy, and digital transformation**.**

RESEARCH METHOD

This study employed a quantitative research approach to examine the effects of financial literacy and digital literacy on the competitive advantage of SMEs, with human capital serving as a mediating variable. The study focused on SME owners and managers in Java, Indonesia, where SMEs represent an important component of economic activity and face increasing demands for digital transformation. Primary data were collected through a structured questionnaire administered to SME owners and managers. The questionnaire measured four main constructs: financial literacy, digital literacy, human capital, and competitive advantage. The measurement indicators consisted of eight indicators for financial literacy, three indicators for digital literacy, five indicators for human capital, and nine indicators for competitive advantage.

The collected data were analyzed using Structural Equation Modeling based on Partial Least Squares (SEM-PLS). The analysis involved evaluation of the measurement model (outer model) and structural model (inner model). The outer model was assessed through convergent validity and reliability using indicator loading values, Cronbach’s alpha, and composite reliability. The structural model was evaluated using the coefficient of determination (R^2) and Q^2 predictive relevance. Hypothesis testing was conducted using path coefficients and p-values. The mediating role of human capital was assessed by examining the direct and indirect effects and was classified according to the mediation procedure proposed by Hair et al. (2017).

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RESULTS AND DISCUSSION

The evaluation of the PLS model was carried out by evaluating two models, namely the measurement model *(outer model)* and the structural model *(inner model)* (Permana & Mudiyanti, 2021). The next step is to evaluate the *outer model* through validity and reliability tests.

Convergent validity can be seen from the measurement of the correlation between the indicator value and its construct value (loading factor) with the criterion that the value of the loading factor of each indicator > 0.70 can be considered valid, and that a P-value < 0.05 is considered significant. Table 1 below presents the results of the convergent validity testing in this study:

Table 1. Combined Loading and Cross Loading

Variable	Indicator	Loading	P-value
Financial Literacy	**FL1**	**0.634**	**<0.001**
	FL2	0.856	<0.001
	FL3	0.853	<0.001
	FL4	0.875	<0.001
	FL5	0.853	<0.001
	FL6	0.785	<0.001
	FL7	0.786	<0.001
	FL8	0.862	<0.001
Digital Literacy	DL1	0.929	<0.001
	DL2	0.931	<0.001
	DL3	0.899	<0.001
Human Capital	HC1	0.709	<0.001
	HC2	0.815	<0.001
	HC3	0.759	<0.001
	HC4	0.834	<0.001
	HC5	0.872	<0.001
Competitive Advantage	CA1	0.887	<0.001
	CA2	0.854	<0.001
	CA3	0.853	<0.001
	CA4	0.868	<0.001
	CA5	0.796	<0.001
	CA6	0.889	<0.001
	CA7	0.796	<0.001
	CA8	0.86	<0.001
	CA9	0.853	<0.001

Source: Processed data, 2026

Based on the results of the convergent validity testing, there is one indicator with a loading value below 0.7, namely the indicator of financial literacy (FL1), which is shown in bold in Table 1 above. This indicator must be excluded from further processing because it does not meet the established criteria.

The reliability test was measured using *cronbach's alpha* and *composite reliability*. According to Sholihin and Ratmono (2013), the *rule of thumb* for *composite reliability* and *cronbach's alpha* is greater than 0.70. Table 2 below presents the results of the reliability test calculation:

Table 2. Reliability Test Results

Variable	FL	DL	HC	CA
Composite reliability	0.945	0.943	0.898	0.96
Cronbach's alpha	0.931	0.909	0.858	0.952

Source: Processed data, 2026

The next stage is to evaluate this structural model using the coefficient of determination (R^2) and Q-Squared values. Table 3 below presents the results of the structural model testing in this study:

Table 3. Coefficient of Determination of Latent Variables

Variable	FL	DL	HC	CA
R^2			0.595	0.923
Q-Squared			0.597	0.924

Source: Processed data, 2026

The hypothesis testing in this study uses the structural model evaluation in SEM-PLS. The tests in this study can be observed based on the path coefficient values and the significance values (p-value). The path coefficient is used to determine the direction of the relationship in the research hypotheses. A positive path coefficient value indicates that the independent variable is positively related to the dependent variable, whereas a negative path coefficient value indicates that the independent variable is negatively related to the dependent variable. This study also tests the mediation hypotheses by following the mediation hypothesis testing procedure explained by Hair *et al.* (2017), which is grouped as follows:

a. *Complementary mediation,* if the direct relationship effect and the indirect relationship effect are both significant and have the same direction.
b. *Competitive mediation*, if the direct relationship effect and the indirect relationship effect are both significant and have opposite directions.
c. *Indirect-only (full mediation),* if the direct relationship effect is not significant and the indirect relationship effect is significant.

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The hypothesis testing results in this study are summarized in the two figures below; Figure 1 presents the results of the direct testing before the mediating variable was included, and Figure 2 presents the results of the testing after the mediating variable was included.

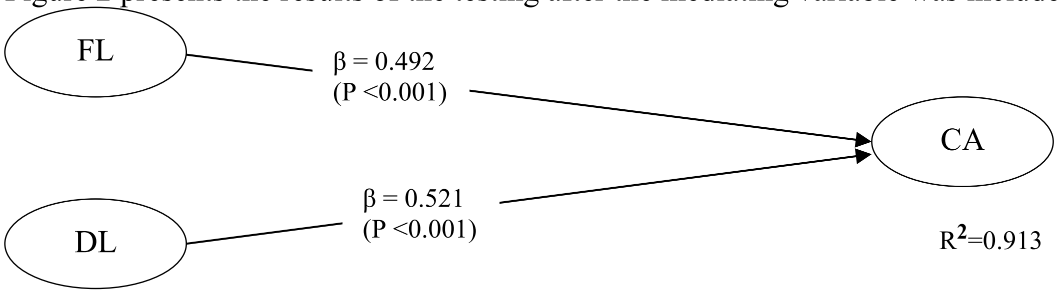

Figure 1. Estimation of Direct Relationships

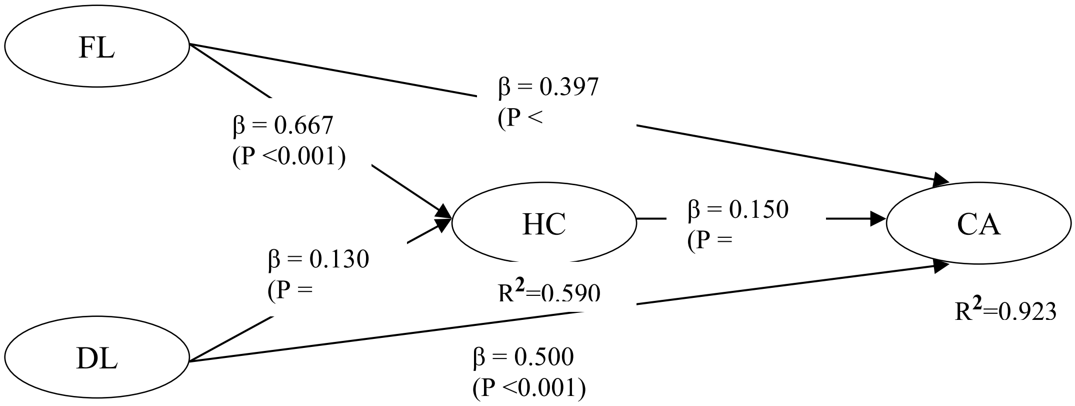

Figure 2. Estimation of Indirect Relationships

The results of testing hypothesis 1 in the study show that the beta coefficient value of financial literacy on competitive advantage is 0.397 with a P-value of < 0.001; financial literacy on human capital has a beta coefficient of 0.667 and a p-value of < 0.001; and human capital on competitive advantage has a beta coefficient of 0.150 and a p-value of < 0.026. These results indicate that financial literacy has a direct effect on competitive advantage; in addition, financial literacy also affects competitive advantage through human capital, so it can be concluded that the mediating effect of human capital on the effect of financial literacy on the competitive advantage of SMEs is a partial (complementary) mediation. This finding indicates that financial literacy is not only able to enhance competitive advantage directly, but also through the improvement of the quality of the human resources possessed by SME actors.

Empirically, these results show that SME actors with a good level of financial literacy tend to have a greater ability to understand cash flow management, financial planning, cost control, risk management, and investment decision-making. Such knowledge encourages business actors to improve their competence, skills, and managerial capacity, which ultimately strengthens human capital. Quality human capital then becomes an important asset in creating innovation, improving business efficiency, optimizing resource utilization, and responding to market changes more quickly. This condition ultimately enhances the ability of SMEs to build and maintain competitive advantage.

This finding can be explained through the Resource-Based View (RBV) proposed by Barney (1991) which states that a firm's competitive advantage originates from strategic assets that are valuable, rare, inimitable, and non-substitutable. In the context of this study, financial literacy is a source of knowledge that provides added value for SME actors, while human capital is a strategic asset that enables that knowledge to be converted into business capabilities. In other words, financial literacy provides the knowledge, while human capital acts as the mechanism that transforms that knowledge into business actions and strategies that generate competitive advantage.

In addition to RBV, the results of this study are also consistent with the Human Capital Theory introduced by Becker (1964), which explains that investment in knowledge, education, skills, and experience will increase individual productivity and generate greater economic benefits. Financial literacy can be viewed as a form of knowledge investment that enriches an individual's capacity to manage a business. When such knowledge improves the quality of human capital, SME actors become more capable of making strategic decisions, managing resources efficiently, and creating sustainable added value. Therefore, human capital becomes an important pathway that bridges the effect of financial literacy on competitive advantage.

The partial mediation found in this study indicates that human capital is not the only mechanism that explains the relationship between financial literacy and competitive advantage. Financial literacy still has a direct effect on competitive advantage, which means that good financial understanding can directly help SME actors improve the quality of business decisions, reduce business risks, and optimize the use of resources. Nevertheless, this effect becomes stronger when supported by a high quality of human capital. Thus, human capital functions as a reinforcing factor (complementary mechanism) in creating the competitive advantage of SMEs.

The results of this study are also supported by various previous studies. Research conducted by George et al. (2024) shows that financial literacy plays an important role in improving the quality of economic decision-making and business performance. Furthermore, research by Jin et al. (2010) found that human capital is a key component that drives the creation of competitive advantage and the improvement of organizational performance. These findings are reinforced by various SME studies showing that business actors with high levels of competence, skills, and knowledge tend to be more capable of utilizing financial information to create innovation and enhance business competitiveness.

This study also supports the view that improving financial literacy should not be focused solely on the transfer of financial knowledge, but must also be accompanied by the development of human resource capacity. Financial training programs combined with the improvement of managerial skills, analytical ability, and entrepreneurial competence will have a greater impact on the competitiveness of SMEs. Therefore, the government, SME support institutions, and educational institutions need to integrate financial literacy programs with human capital development so that the benefits obtained by SMEs can be more optimal and sustainable. It can be concluded from the results of this study that the higher the level of

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financial literacy possessed by SME actors, the better the quality of human capital that is formed, and the greater the ability of SMEs to create a competitive advantage. This finding reinforces the argument that the competitiveness of SMEs is determined not only by the possession of financial knowledge but also by the ability of human resources to manage and implement that knowledge into superior business capabilities.

The results of testing hypothesis 2 in the study show that the beta coefficient value of digital literacy on competitive advantage is 0.130 with a P-value of 0.046; furthermore, digital literacy on human capital has a beta coefficient of 0.500 and a p-value of < 0.001; and human capital on competitive advantage has a beta coefficient of 0.150 and a p-value of < 0.026. Based on the hypothesis testing results, it is shown that human capital is able to partially mediate the effect of digital literacy on the competitive advantage of SMEs in Java. The partial mediation is indicated by the significance of the direct effect of digital literacy on competitive advantage as well as the significance of the indirect effect of digital literacy on competitive advantage through human capital. This finding indicates that digital literacy plays an important role in enhancing the competitiveness of SMEs, both directly and through the improvement of the quality of the human resources possessed by business actors.

Empirically, the research results show that SME actors with a high level of digital literacy tend to be more capable of utilizing digital technology to support their business activities, such as digital marketing, customer relationship management, the use of marketplaces, the use of digital payment systems, and the more effective processing of business information. Such capabilities not only improve the operational efficiency of the business, but also encourage the development of the competence, skills, creativity, and adaptive capability of business actors in facing changes in the business environment. In other words, digital literacy contributes to improving the quality of human capital, which ultimately strengthens the competitive advantage of SMEs.

The results of this study are consistent with the RBV theory developed by Barney (1991), which explains that an organization's competitive advantage originates from strategic resources that are valuable, rare, difficult to imitate, and not easily substitutable. In the context of SMEs, digital literacy is a knowledge-based resource that enables business actors to obtain access to broader information, technology, and market opportunities. However, such resources can only provide maximum benefits when supported by human capital capable of managing, developing, and implementing digital knowledge in business activities. Therefore, human capital acts as the mechanism that transforms digital capability into strategic capabilities that generate competitive advantage.

The results of this study are also consistent with the Human Capital Theory introduced by Becker (1964), which emphasizes that the knowledge, skills, experience, and abilities of individuals constitute a form of capital that can increase the productivity and performance of an organization. Digital literacy can be viewed as a knowledge investment that enriches an individual's ability to understand and utilize technology. When digital literacy improves the quality of human capital, SME actors become more innovative, more responsive to market changes, and more capable of developing technology-based business strategies. This condition ultimately creates sustainable competitive advantage.

The results of this study can also be explained through the perspective of the Knowledge-Based View (KBV) developed by Grant (2015), which states that knowledge is the primary resource in creating value and competitive advantage for an organization. Digital literacy provides access to broader knowledge and information, but the value of such knowledge depends greatly on the ability of individuals to process and implement it. In this regard, human capital becomes the medium that enables digital knowledge to be translated into innovation, improved service quality, business process efficiency, and the development of products that align with market needs.

The partial mediation found indicates that digital literacy still has a direct effect on the competitive advantage of SMEs. This means that the use of digital technology can directly improve market access, expand customer networks, increase the effectiveness of promotion, and accelerate the business transaction process. Nevertheless, this effect will become stronger when business actors possess quality human capital. In other words, the digital capability possessed by SMEs will yield more optimal results when supported by adequate skills, creativity, experience, and adaptive capability.

The findings of this study are supported by various previous studies showing that digital literacy plays an important role in enhancing the competitiveness and performance of SMEs. Research conducted by Fitriana et al., (2019); Faizal et al. (2023) found that digital literacy has a positive effect on competitive advantage; these results also explain that digital literacy is not only related to the ability to use technology, but also to the ability to understand, evaluate, and utilize information effectively. Meanwhile, Choo & Bontis (2002) asserts that human capital is a primary factor that determines the ability of an organization to create value and maintain competitive advantage. Various SME studies in developing countries also show that the adoption of digital technology, supported by good human resource quality, is able to enhance innovation, productivity, and business competitiveness. Other research examining the digital transformation of SMEs found that the success of digitalization is determined not only by the availability of technology, but also by the readiness of human resources to utilize that technology productively (Fadillah et al., 2021). SMEs whose workforce and business owners possess high digital competence tend to be more successful in developing new business models, expanding markets, and improving the quality of service to customers. These findings reinforce the argument that human capital is a key factor that bridges the relationship between digital literacy and competitive advantage. The implications of the results of this study indicate that efforts to enhance the competitiveness of SMEs are not sufficient through the provision of technology and digital training alone. SME development programs need to be directed toward improving the quality of human capital through digital skills training, the development of managerial ability, the enhancement of innovation capacity, and the strengthening of adaptive capability in the face of technological change. In this way, the benefits of digital literacy can be translated more effectively into sustainable competitive advantage.

CONCLUSION

Based on the research results, it can be concluded that human capital is proven to partially mediate the effect of financial literacy and digital literacy on the competitive advantage of SMEs in Java. This finding shows that improving financial literacy and digital literacy not only has a direct effect on the ability of SMEs to create competitive advantage, but is also able to improve the quality of the human capital possessed by business actors. Through the improvement of knowledge, skills, experience, creativity, and adaptive capability, SME actors can optimize the use of financial information and digital technology to enhance the effectiveness of business management, innovation, and responsiveness to market changes.

In addition, the research results affirm that human capital is a strategic asset that plays an important role in transforming financial literacy and digital literacy into a source of sustainable competitive advantage. Although financial literacy and digital literacy have a direct effect on competitive advantage, the presence of quality human capital is able to strengthen that effect, thereby producing higher competitiveness. Therefore, efforts to enhance the competitiveness of SMEs in Java need to be carried out through an integrated approach, namely by strengthening financial literacy, improving digital literacy, and developing the quality of human resources so that SMEs are able to adapt, innovate, and compete sustainably in an increasingly dynamic and digital business environment

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AUTHORSHIP CONTRIBUTION STATEMENT

Hidayatul Khusnah: Conceptualization, research design, methodology development, questionnaire development, data collection coordination, project administration, supervision, investigation, data validation, interpretation of findings, manuscript review, and overall management of the research project.

Muhammad Arsalan Khan: critical review of the manuscript, interpretation of results, manuscript, editing, and proofreading.

Siti Salwani Abdullah: Theoretical development, validation of research framework, methodological consultation, manuscript review, and final approval of the manuscript.

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