Financial Literacy and Technological Innovation: Women's Micro-Businesses Adaptation in the Digital Ecosystem

Martino Wibowo[1],Saif Ur Rahman[2], Tias Andarini Indarwati[3], Hesti Umiyati[4]

[1] Universitas Terbuka, Indonesia
[2] Siam University, Thailand
[3]Universitas Negeri Surabaya, Indonesia
[4] Utpadaka Swastika University, Indonesia

[1]*tino@ecampus.ut.ac.id*

ABSTRACT

Economic development endeavors to enhance societal welfare. The micro-business sector is a fundamental pillar of the Indonesian economy, necessitating the government's prioritization in its developmental initiatives. Our findings show that factors such as adaptive learning, digital financial innovation, and financial literacy play pivotal roles in micro-business growth. It is essential to recognize and integrate adaptive learning, digital financial innovation, and financial literacy within the realm of micro-businesses. Financial Technology, often termed 'FinTech,' amalgamates financial services and information technology domains. Using the Structural Equation Model-Partial Least Square, this study surveyed 98 women-owned micro-enterprises that yield revenue by adopting technology-driven financial services. The financial sector in Indonesia has undergone a transformative phase due to swift technological advancements and growth. Such a paradigmatic shift presents consumers with the dual challenge of adapting to technological evolution and juxtaposing the potential advantages of these innovations against their inherent risks. As technological innovation gallops forward, society experiences varied rates of technology adoption. To facilitate this, this paper aims to study a form of literacy that capacitates individuals with adequate knowledge and offers straightforward assistance without imposing undue complexities, especially concerning the growth of women-owned micro-businesses when adopting new digital technology. This research focuses on integrating financial technology innovations within conventional and Islamic banking financial products. This study endeavors to ascertain the influence of financial inclusion and literacy on the micro-enterprises of Islamic bank clientele in Riau, East Java, and Jabodetabek, Indonesia.

Keywords: Financial Literacy, Digital Adaptive Learning, Women Micro-Business, Company Performance

INTRODUCTION

National economic development represents a concerted effort to achieve economic growth, aiming to enhance community income. Development is also interpreted as an initiative to bolster the capacities of the community for prospects, with the ultimate objective of attaining

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a superior standard of living (Sarfiah et al., 2019). Economic development remains a focal point of the government in realizing societal prosperity.

The acceleration of economic growth, pivotal for economic development, is significantly influenced by the financial sector's role (Adriani & Wiksuana, 2018). Movements in the financial sector closely intertwine with its financial systems and their inherent functions. The financial system is a principal aspect of economic movement, encompassing key stakeholders, mechanisms, products, and regulations pertinent to the system's operation. The economic system also offers flexibility for community members to engage in economic activities.

Accelerating economic growth in Indonesia requires reinforcement through optimizing micro-enterprises. Support in the form of facilitated access to capital, streamlined licensing, and other incentives can stimulate micro-enterprises productivity. A dearth of investment and an insufficient human resource pool emerge as predominant challenges confronting enhancing micro-enterprise productivity.

The volatile overall economic conditions and the escalating prevalence of micro-enterprises have unearthed research gaps in this study. This research is also designed to discern the impact of adaptive learning in digital financial innovations and financial literacy among Islamic Bank customers in Riau, East Java, and greater Jakarta.

Micro, Small, and Medium Enterprises (MSMEs), especially the micro-sector, commonly face challenges accessing financing or other financial facilities due to consumers' limited understanding of financial products. According to surveys, women-owned MSMEs confront disproportionate barriers, exacerbating challenges in securing loans. WMSMEs tend to be smaller and less formalized. Those originating from underserved groups typically possess diminished asset levels, and when property assets are involved, they often aren't registered under their names. Banks generally perceive WMSMEs as higher risk and may overlook deserving women-owned businesses. SOFIA (2017) identified a higher propensity for Indonesian women to borrow from external financial system sources. Specifically, the study found women more likely to seek informal lending routes (12%) than men (9%). This is evidenced by Indonesia's scarcity of bank financing products that accommodate women's specific needs and challenges. Micro, Small, and Medium Enterprises (MSMEs) are pivotal to the national economy (Sarfiah et al., 2019). The definition of micro-enterprises varies across different literature sources. One such source, Law No. 20 of 2008, classifies micro-enterprises based on wealth and business criteria as those having gross income below 50 million per year and net assets below 300 million per year. The World Bank defines micro-enterprises as businesses operated with a workforce of less than 30 people, with annual revenue and assets each typically less than US$3 million.

Digitization, defined as harnessing digital technology and data to transform business models, is pivotal for MSMEs to access contemporary financing. AFPI underscores that fintech lending leverages MSME digital technology and data pathways to mitigate loan risks for underserved MSMEs. Data and technology can recalibrate consumers previously deemed high-risk into creditworthy entities. However, many micro and small entrepreneurs in Indonesia, including target regions, have yet to embrace digital technology for business. Adaptive learning in digital financial innovation is an initiative undertaken to eliminate various barriers to utilizing financial services for the wider community (Yanti, 2019). This effort aims to alleviate poverty by fostering economic growth through easy economic transaction access.

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The limited financial access prevalent among numerous MSMEs also correlates with a deficit in financial literacy. Additionally, the adaptability factor towards digital innovations further contributes to a diminished understanding of financial product utilization. According to economic census data, fewer than 5% of micro and small businesses in some provinces maintain financial records. A lack of informed financial decision-making further exposes MSMEs to unscrupulous lenders.

While digital infrastructure remains a paramount challenge in specific regions, MSMEs in Indonesia necessitate enhanced access to digital and financial literacy resources to effectively participate in the digital economy. This encompasses foundational accounting and management knowledge, emphasizing financial risk management, enabling them to cultivate essential business management skills and heighten awareness of diverse financial schemes and options. A gender-responsive approach is essential to galvanize MSMEs to leverage these resources.

Meanwhile, financial literacy represents a process aimed at enhancing people's knowledge, skills, and trust in finance, hopefully improving their welfare through competent financial management (Septiani & Wuryani, 2020). Effective financial management requires a foundational understanding of financial concepts, enabling individuals to optimize their financial affairs. This knowledge includes discerning the real value versus the compound value of money, understanding compound interest concepts, recognizing and grasping the diversification of risks in financial activities, and various abilities to comprehend the time value of money and so forth.

In a Nicolini (2019) study, out of over 100 statistical analyses, financial literacy failed to significantly explain financial behavior only 17 times. This result underscores the relationship between financial literacy and people's financial behavior. Six of these 17 instances involved financial literacy measures based on correct answers to the "big 5" questions posed by Lusardi (2014). These findings support the hypothesis that sometimes the limited number of items and the broad content area examined by the Lusardi-Mitchell questions might miss capturing the existing relationship between financial literacy and financial behavior detected by alternative measures. Rather than critiquing the well-adopted measures, this outcome suggests a need, in some cases, to not constrain the importance of financial literacy in explaining one or more financial behaviors to the "big 5", especially when the measure finds no connections.

Another interesting result was a comparison between financial literacy measures on a zero to five scale, indicating that the "unbiased" financial literacy index—calculating the number of correct answers to questions analyzing topics unrelated to financial products and services ever used/owned by respondents and standardizing values on a zero to five scale—outperformed both the Lusardi-Mitchell index and the 5-specific index 14 times out of 30. In the remaining 16 cases, the 5-specific index showed the highest coefficient values 10 times, and only in 6 out of 30 cases did the Lusardi-Mitchell index best illustrate the relationship between financial literacy and financial behavior. From these results, the hypothesis arises that the Lusardi-Mitchell questions—because they're based on knowledge of basic financial principles (e.g., compound interest, inflation, etc.) and limited in terms of item number—might not perfectly function in assessing the role of financial literacy in explaining financial behavior when that behavior pertains to specific content areas (e.g., savings, retirement planning, credit card usage, etc.).

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Furthermore, research by Grohmann (2018) suggests that countries where most of the population follows Islam might have different financial literacy levels. This is particularly relevant for questions about interest and compound interest due to the prohibition of interest in Islamic law. Such questions may be less targeted in majority-Muslim nations, yet respondents might still have sound financial literacy regarding other financial topics.

Adopting a slightly different approach, Ejdys (2018) confirmed through structural equation modeling that the most influential factor shaping human attitudes is the perceived social impact received from usage. The study also affirmed that men are more positive toward technology than women. This aligns with Yoshino (2017)'s discovery that the primary determinants of financial literacy are education level, income, age, and employment status, and both financial literacy and general education level correlate positively and significantly with savings behavior and financial inclusion.

Financial literacy provides financial knowledge and skills, which can aid consumers in making financial decisions. A certain level of financial literacy is essential to employ digital financial products and manage risks properly. In connection with this, policymakers, managers, and practitioners must recognize the significance of financial literacy. They need to devise policies promoting financial literacy. There's a need to enhance citizens' financial literacy as part of the existing educational system to cultivate their financial awareness. Financial literacy programs should be accessible to every individual at various life stages. Even though there's an insignificant relationship between internet usage and financial inclusion, internet use, merging with digital financial products, plays a dual mediating role between financial literacy and adaptive learning in digital financial innovation. For the most part, internet usage can indirectly promote adaptive learning in digital financial innovation by acting based on the use of digital financial products. Indeed, access barriers might need to be addressed first before financial literacy and digital financial products can be effective. The internet is the optimal solution to address access issues. Lowering costs is crucial for enhancing access. Policymakers can implement policies ranging from low to zero cost in rural areas to encourage residents to utilize the internet (Shen et al., 2018).

Dalberg (2020) noted that while financial and digital initiatives are executed in Indonesia, the curricular scope is specific. The digital literacy program spearheaded by the Ministry of Communication and Informatics aims to educate the public about online fraud cases, cyberbullying, etc., and best practices for online safety. However, it does not encompass digital financial service (DFS) utilization scenarios. The SCORE program, orchestrated by ILO, SECO, and NORAD, aspires to amplify the productivity and capacity of SMEs through managerial and employee business training. There remains potential to launch programs amalgamating digital literacy with financial literacy to foster DFS adoption, particularly among micro and small entrepreneurs.

Hence, it is imperative to identify and evaluate the effectiveness of financial literacy and comprehend consumer adaptation to burgeoning digital financial products, especially concerning Shariah financial products. This study aims to serve as a tool for identification relating to the necessity of adaptive learning in digital financial innovation in policies and regulations applicable to micro-businesses of Islamic Bank customers in Riau, East Java, and greater Jakarta, Indonesia. Furthermore, it seeks to understand the role of financial literacy for these micro-businesses. The research outcomes can also serve as insightful information for stakeholders concerning policy rejuvenation for micro-businesses in relevant regions.

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Financial inclusion and financial literacy are two intertwined and inseparable concepts. Both financial inclusion and financial literacy have been shown to have a positive impact on micro-enterprises. With financial inclusion, the performance and growth of micro-enterprises improve (Sanistasya et al., 2019). This has a beneficial effect on economic growth, as micro-enterprises are a cornerstone of the Indonesian economy. Financial inclusion and literacy have been posited to enhance capital, increasing employment and sales in micro-enterprises (Ratnawati, 2020). Micro-enterprises can drive economic growth as they specialize products based on the diversity and uniqueness of a region, making them distinctive and different from one place to another (Shofawati, 2019). Programs focused on financial inclusion and literacy are carried out under the supervision and guidance of the Indonesian government, aiming to support equitable economic growth (Riwayati et al., 2020).

The research could contribute to a deeper understanding of the financial literacy levels among women entrepreneurs, particularly those operating micro-businesses. This could provide insights into where women may need more support or education to effectively manage their finances in a digital business environment. In addition, by examining how technological innovations affect women-led micro-businesses, the research may shed light on whether these innovations lead to increased business growth, efficiency, or market access. This could provide valuable information for policymakers and business support organizations looking to promote women's economic empowerment. The study might explore how gender disparities in accessing and using digital technologies impact women's micro-businesses. Such research can highlight the digital divide and provide recommendations on bridging it, ensuring women have equal opportunities to benefit from technological advancements. Findings from the research could have policy implications. For example, if the study identifies specific barriers hindering women's adaptation to the digital ecosystem, it could inform policy recommendations to remove these obstacles and create a more inclusive environment for female entrepreneurs. Apart from that, the research could offer practical insights and recommendations for women running micro-businesses on improving their financial literacy and effectively leveraging technological innovations to enhance their businesses. This guidance could be in workshops, training materials, or online resources. The study may contribute to the broader field of gender studies by examining how gender dynamics intersect with financial literacy and technology in the context of entrepreneurship. It could help advance our understanding of women entrepreneurs' unique challenges and opportunities. The research also could raise awareness about the importance of supporting women in micro-businesses and advocating for policies and programs promoting financial literacy and technology access for this demographic.

RESEARCH METHODOLOGY

This study pertains to a comprehensive survey conducted amongst 98 micro-business owners who are patrons of Sharia Banks located in Riau, East Java, and Greater Jakarta. The survey's primary focus encompasses the income levels, business growth, and knowledge of these micro-business operators regarding adaptive learning in digital financial innovations and financial literacy.

We employed the Random Partial Least Square (PLS) methodology in our analysis. The least square method is a statistical technique designed to discern multiple response and explanatory variables concurrently. This method is particularly apt for conducting multiple regression analyses and addresses issues of multicollinearity in the variables considered. Furthermore, this

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method does not predicate its analyses on assumptions or conditions, rendering it a more accessible technique. The PLS can elucidate the interrelations between variables and can be harnessed to confirm existing theories. Employing the random PLS further eliminates the heteroskedasticity problem within the data set. The random PLS model can be articulated as follows:

$$Yit = a + ai + \delta t + X'it\beta + \varepsilon it$$

Where,
Y = Dependent Variable
X = Independent Variable
a = intercept
β = Regression Coefficient
it = Time Period

This study uses the PLS approach with consideration because bound variables are used more than one and analyzed directly using reflective indicators. PLS also does not require a large number of samples so that the samples in this study are still eligible for testing. In addition, PLS does not require research data to be normally distributed multivariately, nor is the model required to meet the goodness of fit.

Table 1 Cross Loading Test

Measurement Criteria	Information
R-Square (R^2)	Results R^2 0.67, 0.33, and 0.19 indicates that the model is robust, moderate and weak
F-Square atau Effect Size	The value of F indicates degree of influence Predictors of latent variables which is 0.02, (weak), 0.15 (medium), 0.35 (large).
Q-Square Predictive Relevance	Q^2 value of > 0 indicates that the model has predictive relevance, while Q^2 < 0 indicates that the model lacks predictive relevance
Average Variance Extracted (AVE)	A P Value of ≤ 0.05 indicates the model is acceptable and valid

It is discernible from the specified testing criteria that if the T-Statistic exceeds the T-table value,

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it can be concluded that there is a significant influence between the exogenous variable and the endogenous variable for each hypothesis employed in this research. Based on the classification of the path coefficients presented in the aforementioned table, the magnitude and significance level of the paths forming this research's hypotheses are evident. The population and sample of this research consist of female Sharia Bank Customer located in Greater Jakarta, Riau dan East Java, with the population (N) of 98 women-owned enterprises. The criteria of Micro enterprises are established for more than one year. That includes in the micro business category owned by women entrepreneurs. Micro enterprises are still actively carrying out business activities. It has a number of employees from 1 to 99 people based on criteria that have been set for micro-enterprises. The design of the research includes product knowledge in financing and related digital business applications, financial literacy, digital transaction experience, technology Adaptation, skill needed in operating digital finance apps and the importance of digital finance. The respondents constitute 91% of business actors are women aged 30-50 years 9% of business actors are women under 30 years old. The composition of Micro Enterprises is:

Table 2 The Respondents Data

Business Type	**Respondent**	**Percentage**
Street Vendors Food and Drink	58	81.0%
Service Business	10	3.6%
Retail Store	30	15.4%
Total	98	100%

For this research, an online questionnaire was disseminated, accumulating 98 responses. Subsequent analysis and data processing were executed on this collected data. It is discernible that 91% of business operators are females. The age bracket for most micro, small, and medium enterprise (MSME) operators falls between 30 and 50 years, with the predominant educational background being equivalent to high school.

The research delineates the characteristics of MSMEs across various categories. Data recapitulation reveals that a substantial majority, 59% of the small-business owners, primarily engage in the food and beverage sector; 10% belongs to the service industry and 31% the retail-business owners. On average, these businesses employ between 1 to 4 individuals and have been operational for a duration ranging between one to ten years.

RESULTS AND DISCUSSION

Table 3 Construct Validity and Reliability

	Cronbach's Alpha	**rho_A**	**Composite Reliability**	**Average Variance Extracted(AVE)**	**Note**

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X1	0.897	0.898	0.921	0.660	**VALID**
X2	0.922	0.922	0.935	0.616	**VALID**
Y	**0.955**	**0.956**	**0.960**	**0.614**	**VALID**

Source: Author Estimation Using SMART PLS

Testing of the First Hypothesis (H1)

The first hypothesis posits that Adaptive Learning in Digital Innovation (X1) has a positive and significant impact on MSME Performance (Y). The results indicate that the variable of adaptive learning in digital financial innovation (X1) yielded a T-statistic value of 3.168 (β=0.397) with a p-value of 0.001. Comparing this with the known T-table value of 1.985 and considering that the p-value is less than 0.05. It is proved that the adaptive learning variable in digital financial innovation (X1) has a direct and significant and has a positive influence on MSME Performance (Y). Therefore, the first hypothesis is accepted.

Testing of the Second Hypothesis (H2)

The second hypothesis states that Financial Literacy (X2) has a positive and significant effect on the Performance of MSMEs (Y). The results show that the Financial Literacy variable (X2) has a T-statistic value of 3.433 (β=0.287) with a p-value of 0.020. This demonstrates that the Financial Literacy variable (X2) has a positive and significant impact on MSME Performance (Y). Based on these findings, it can be concluded that the second hypothesis is accepted.

Testing of the Second Hypothesis (H3)

The third hypothesis states that Adaptive Learning to Digital Innovation (X1) has a positive and significant effect on the Financial Literacy (X2). The results show that the Financial Literacy variable (X2) has a T-statistic value of 15.016 (β=0.740) with a p-value of 0.000. This demonstrates that the Financial Literacy variable (X2) has a positive and significant impact on SME Performance (Y). Based on these findings, it can be concluded that the second hypothesis is accepted

Testing of the Second Hypothesis (4)

The fourth hypothesis states that Adaptive Learning to Digital Innovation (X1) has a positive and significant effect on the Performance of MSMEs (Y) mediated by the Financial Literacy (X2). The results show that the Financial Literacy variable (X2) has a T-statistic value of 2.399 (β=0.212) with a p-value of 0.000. This demonstrates that the Financial Literacy variable (X2) has a positive and significant impact on SME Performance (Y). Based on these findings, it can be concluded that the second hypothesis is accepted

The variable of Adaptive Learning in Digital Financial Innovation has a Positive and Significant Impact on SME Performance. Based on the results of the tests conducted using Smart-PLS software, it is evident that the first hypothesis (H1), which suggests that Adaptive Learning in Digital Financial Innovation (X1) has a positive and significant impact on SME Performance (Y), is accepted. The research findings indicate that the variable of Adaptive Learning in Digital Financial Innovation (X1), represented by two dimensions: access to questions and well-being, has a positive and significant influence on SME Performance among female micro-entrepreneurs in Jabodetabek, East Java, and Riau. Higher financial literacy promotes better SME performance.

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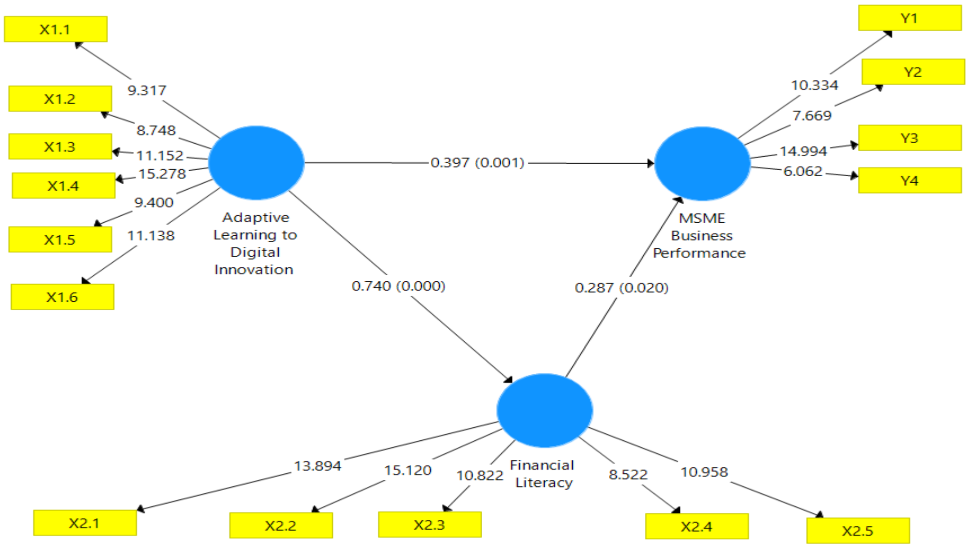

Figure 1 Structural Equation Model Diagram

Figure 1 shows that the adaptive learning variable of digital financial innovation (X1) significantly and positively influences Micro Business Performance (Y), so the first hypothesis is accepted.

This shows that the variable Financial Literacy (X2) positively and significantly affects Micro Business Performance (Y). Based on this, it can be concluded that the second hypothesis is accepted. Moreover, Intervening variables in the form of Financial Literacy also affect and strengthen adaptive learning variables of digital financial innovation.

Table 4 Relationship Between Variables

Effects Relationship	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Adaptive Learning to Digital Innovation -> Financial Literacy	0.740	0.748	0.049	15.016	0.000
Adaptive Learning to Digital Innovation -> MSME Business Performance	0.397	0.401	0.116	3.433	0.001
Financial Literacy -> MSME Business Performance	0.287	0.281	0.116	2.473	0.020
Adaptive Learning to Digital Innovation -> Financial Literacy -> MSME Business Performance	0.212	0.21	0.088	2.399	0.017

Source: Author Estimation Using SMART PLS

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Moreover, from the model of fit, it shows that the model is quite robust with $R^2>0.70$ and NFI>0.90.

Table 5 Model of Fit

	Saturated Model	Estimated Model
SRMR	0.09	0.09
d_ULS	0.966	0.966
d_G	0.392	0.392
Chi-Square	151.705	151.705
NFI	0.991	0.991

	R Square	R Square Adjusted
Financial Literacy	0.747	0.742
MSME Business Performance	0.708	0.795

Source: Author Estimation Using SMART PLS

In Presidential Regulation of the Republic of Indonesia Number 82 of 2016, which outlines the National Strategy for Financial Inclusion, adaptive learning in digital financial innovation is one of the conditions where every member of society has access to various high-quality, smooth, secure, and timely formal financial services at affordable costs, tailored to their needs and capabilities.

As Anwar Prabu Mangkuenegara (2000:67) states, performance is the result of both the quality and quantity of work achieved by an employee who has fulfilled their responsibilities. Performance represents the outcome and function of individual or group tasks and activities within an organization, influenced by various factors, to achieve common objectives within a defined time period. The purpose of work itself is the execution of tasks and responsibilities assigned individually or collectively, contributing to shared responsibility within a group (Tika, 2012:21).

Previous research stated that adaptive learning in digital financial innovation can have a positive and significant impact on SME performance. This suggests that SME performance can be significantly improved when SME entrepreneurs enhance their financial inclusion. These findings align with the results obtained by researchers, indicating that adaptive learning in digital financial innovation has a positive and significant influence on SME performance.

Financial literacy has a positive impact on financial performance. Based on the results of testing using Smart-PLS software, it can be confirmed that the first hypothesis (H2), which posits that Financial Literacy (X2) has a positive and significant effect on SME performance (Y), is accepted. Research findings show that the Financial Literacy variable (X2), represented by three indicators: knowledge, behavior, and attitude dimensions, has a positive and significant influence on SME performance among female micro-entrepreneurs in Jabodetabek, East Java, and Riau. A higher and better understanding of financial literacy promotes improved SME performance.

According to Hudson and Bush (Widiyati, 2017), financial literacy is the ability to comprehend financial conditions, financial concepts, and to transform knowledge into good behavior. Financial literacy can be defined as financial knowledge used by individuals to make decisions

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that can enhance economic well-being.

As Mangkunegara (2000:67) reiterates, performance is the result of both the quality and quantity of work achieved by an employee who fulfills their responsibilities. Performance represents the outcome and function of individual or group tasks and activities within an organization, influenced by various factors, with the aim of achieving common objectives within a defined time period. The purpose of work itself is the execution of tasks and responsibilities assigned individually or collectively, contributing to shared responsibility within a group (Tika, 2012:21).

There is a need for a strategic approach to improving performance, and one such approach involves having financial literacy, belief, and skills that can influence behavior and attitudes in enhancing decision-making and financial management to achieve well-being, as stated by (Ariwibawa, 2016). Research findings presented by Prakoso (2020) state that financial literacy significantly influences SME performance. These research results support the findings of researchers who state that financial literacy has a positive and significant impact on SME performance.

CONCLUSION

Adaptive learning of digital financial innovation has a positive and significant influence on the performance of MSMEs in micro enterprises in Jabodetabek, East Java and Riau. This means that the better adaptive learning of digital financial innovation carried out by micro entrepreneurs in Jabodetabek, East Java and Riau, for example by providing innovation in the use of MSME financial products and services, it will improve the good image of the MSME performance. A part from that, financial literacy has a positive and significant influence on the performance of MSMEs in women-owned micro-enterprises in Jabodetabek, East Java and Riau. This means that the better the understanding related to financial literacy, the better the image of the performance of a micro business. The next researcher is expected to develop a research model on MSME development through business sustainability and business performance improvement and use other variables that affect the development of MSMEs to explain other factors that can also affect MSME performance. Testing in the broader area needs to be carried out to determine the condition of MSMEs, considering that Indonesia is divided into several regions, so it is possible to find different variables that affect the sustainability conditions and performance of MSMEs. Expanding research on the effect of financial literacy on MSME performance through adaptive learning of digital financial innovation as a mediating variable with research samples not only in women-owned micro-enterprises in Jabodetabek, East Java, and Riau but also to cities or wider regions and not limited to women-owned micro-enterprises. In addition, research should be carried out with more respondents with varied characteristics to increase generalization and diversity in research results.

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