Journal of Social Research

P-ISSN: 2827-9832
E-ISSN: 2828-335x
Vol.5, No.5, April 2026
http://ijsr.internationaljournallabs.com/index.php/ijsr

Digital Financial Literacy and Digital Financial Inclusion Among Indonesian MSMEs: The Mediating Role of Financial Behavior and the Moderating Role of Education Level

Adesha Novrima*, Bagus Prasetyo, Syach Iskandar Muhammad, Christy Dwita Mariana

BINUS University, Indonesia

Email: adesha.novrima@binus.ac.id*, bagus.prasetyo@binus.ac.id, syach.muhammad@binus.ac.id, christy.dwita@binus.ac.id

Keywords:

Digital Financial Literacy; Digital Financial Inclusion; Financial Behavior; Education Level; MSMEs

ABSTRACT

The rapid expansion of digital financial services has reshaped financial access for micro, small, and medium enterprises (MSMEs) in Indonesia. Despite their substantial contribution to national economic growth, many MSME owners remain vulnerable to digital financial exclusion due to gaps in digital financial capabilities. This study examines the relationship between Digital Financial Literacy (DFL) and Digital Financial Inclusion (DFI) among Indonesian MSMEs, incorporating Financial Behavior (FB) as a mediating variable and Education Level (EL) as a moderating variable. Using a quantitative, cross-sectional survey design, data were collected from 121 MSME owners and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings indicate that digital financial literacy has a positive and significant direct effect on both financial behavior and digital financial inclusion. However, financial behavior does not significantly influence digital financial inclusion and does not mediate the relationship between digital financial literacy and digital financial inclusion. Furthermore, education level does not moderate the relationship between digital financial literacy and digital financial inclusion, suggesting that the impact of digital financial literacy is consistent across different educational backgrounds. These results highlight that digital financial literacy serves as the primary driver of digital financial inclusion among MSMEs in Indonesia, while behavioral transformation and formal education play a more limited role. The study underscores the importance of strengthening practical digital financial literacy initiatives as a direct strategy to enhance inclusive participation in the digital financial ecosystem.

INTRODUCTION

In Indonesia, the rapid growth of digital financial services has transformed how individuals and businesses interact with the economic system (Kumalasari & Pratama, 2025; Tayibnapis et al., 2018). Digital platforms such as mobile banking, e-wallets, QRIS, and peer-to-peer (P2P) lending have enabled more efficient and accessible financial transactions. Bank Indonesia (2024) reported that digital financial transactions grew by 16.15% in the first quarter of 2024, alongside an 8.12% increase in credit disbursements to the Micro, Small, and Medium Enterprises (MSMEs) segment. These parallel developments indicate that digitalization in the financial sector is increasingly intertwined with MSME growth, thereby strengthening MSMEs' role within the national digital economy.

According to a press release from the Coordinating Ministry for Economic Affairs of the Republic of Indonesia, MSMEs play a significant role in the national economy, contributing 61% of Indonesia's GDP and absorbing more than 95% of the total workforce (2022). Yet, despite their substantial contribution, MSMEs remain among the segments most vulnerable to digital financial exclusion. Many face persistent barriers, including low digital literacy, limited exposure to financial technologies, and insufficient risk-management knowledge (Alam et al., 2021). These challenges prevent MSME owners from fully benefiting from digital financial innovations that could improve business efficiency, enhance financial record-keeping, and expand market access. Accordingly, it is becoming increasingly urgent to understand the importance of digital financial inclusion for MSME owners.

Digital Financial Inclusion (DFI), as defined by the World Bank (2022), involves more than expanding access to digital financial services; it also requires active, secure, and sustained use of these services. Achieving this form of inclusion requires adequate Digital Financial Literacy (DFL), which includes knowledge of digital financial products, an understanding of associated risks, and competence in using digital financial tools (Alliance for Financial Inclusion, 2021). Although prior studies generally argue that DFL increases the likelihood of adopting digital financial services (Ardini et al., 2024; Kusumawardhani, 2023), empirical findings remain mixed. Several studies report positive associations, as noted above; however, others find that literacy alone does not guarantee adoption (Adamek & Solarz, 2023; Setiawan et al., 2023).

In this context, Financial Behavior (FB) has emerged as a potential explanatory variable. Behavioral practices—such as budgeting, tracking business expenses, and maintaining disciplined savings—shape how individuals translate knowledge into action (Xiao and Kumar, 2023). For MSME owners, whose financial decisions directly affect business continuity, positive financial behaviors may be critical for converting literacy into meaningful digital participation. Yet, despite its theoretical relevance, empirical evidence on FB as a mediator in the DFL–DFI relationship remains limited, especially among MSMEs in Indonesia. Education Level (EL) may further influence these relationships. Higher educational attainment can enhance an individual's capacity to understand, evaluate, and adopt financial technologies, potentially strengthening the effects of both literacy and behavior on digital financial inclusion (Wang et al., 2024). However, research on the moderating role of education level within the MSME context in Indonesia also remains sparse.

Based on this background, this study aims to examine the relationship between Digital Financial Literacy and Digital Financial Inclusion among Indonesian MSMEs, with Financial Behavior as a mediating variable and Education Level as a moderating variable. Specifically, this study seeks to analyze whether digital financial literacy directly influences digital financial inclusion, whether it affects financial behavior, whether financial behavior contributes to digital financial inclusion, whether financial behavior mediates the relationship between digital financial literacy and digital financial inclusion, and whether education level strengthens or weakens that relationship.

This study is expected to provide both theoretical and practical benefits. Theoretically, it contributes to the growing literature on digital finance by offering a more comprehensive explanation of the mechanisms linking digital financial literacy and digital financial inclusion, especially in the MSME context. It also enriches the discussion on the roles of behavioral and

demographic factors in digital financial adoption within developing economies. Practically, the findings are expected to inform policymakers, financial institutions, and MSME development stakeholders in designing more effective strategies to enhance digital financial inclusion. In particular, the study may serve as a basis for improving digital financial literacy programs that are more practical, targeted, and inclusive for MSME owners across different educational backgrounds. Ultimately, this research is expected to support the development of a more inclusive digital financial ecosystem that empowers Indonesian MSMEs and strengthens their contribution to sustainable economic growth.

METHOD

This study employed a quantitative approach using a survey method based on hypothesis testing through deductive reasoning. This approach was selected to enable statistical examination of the relationships among variables and to allow the findings to be generalized to a broader population (Creswell & Creswell, 2018). The level of intervention was categorized as minimal interference, as data were collected in natural settings without manipulation of any variables, ensuring that the findings reflected the respondents' actual behaviors (Sekaran & Bougie, 2020). The study was conducted in a non-contrived setting, specifically within the real-world environment of MSME actors who use digital financial services in Indonesia.

The unit of analysis was the individual, as all variables examined—digital financial literacy, financial behavior, digital financial inclusion, and demographic characteristics—were inherent to each respondent (Saunders et al., 2019). The research adopted a cross-sectional design, with data collected once within a period of approximately three weeks (Bhattacherjee, 2012; Setia, 2016).

The target population comprised MSME actors in Indonesia who were at least 18 years old, owned digital devices, and were familiar with or had used digital financial services such as mobile banking or e-wallets. This population included banked, unbanked, and underbanked groups. The main variables measured were Digital Financial Literacy (DFL), Financial Behavior (FB), Digital Financial Inclusion (DFI), and demographic factors such as age, education, and income.

Due to the absence of a formal sampling frame of MSMEs using digital services, the study employed a non-probability purposive sampling method to select respondents who met the study criteria. The sampling procedure involved distributing questionnaires through social media, digital MSME communities, and business associations. A total of 129 responses were collected; after data screening and validation, 121 responses were deemed valid and included in the analysis.

The sample size was determined based on the rule of thumb for Structural Equation Modeling (SEM), which recommends a minimum of ten respondents per indicator. With four variables, each measured by three indicators, the minimum required sample size was 120 respondents. The final sample size of 121 was considered sufficient for the analysis and aligned with common practices in business and social research (Setia, 2016).

Data were collected using a structured questionnaire developed based on established indicators for Digital Financial Literacy (DFL), Financial Behavior (FB), Digital Financial Inclusion (DFI), and demographic factors (Widyastuti et al., 2024). The instrument was adapted from prior studies that had demonstrated validity and reliability (Ergün, 2025;

Widyastuti et al., 2024). A six-point Likert scale, ranging from "strongly disagree" to "strongly agree," was used to measure respondents' perceptions (Ratnawati et al., 2022).

Table 1. Indicators for Each Latent Variable

Variable	Indicator	Scale
Digital Financial Literacy (Widyastuti et al., 2024)	I have a good understanding of digital payment products (such as e-Debit, e-Credit, e-Money, Mobile/Internet Banking, e-Wallet).	6 = Strongly Agree 5 = Agree 4 = Slightly Agree 3 = Slightly Disagree 2 = Disagree 1 = Strongly Disagree
	I have experience using fintech products and services for digital payments (such as OVO, Gopay, LinkAja).	
	I am aware of potential financial risks when using digital financial service providers or fintech, such as provider legality, interest rates, and transaction fees.	
Financial Behaviour (Ergün, 2025)	I have a clear and structured monthly budget plan.	6 = Strongly Agree 5 = Agree 4 = Slightly Agree 3 = Slightly Disagree 2 = Disagree 1 = Strongly Disagree
	I save for long-term needs (e.g., education, retirement, or future investments).	
	I maintain written records of my budget and expenses to review and evaluate my financial patterns.	
Digital Financial Inclusion (Widyastuti, U., et al., 2024)	I use a mobile phone or the internet to access my account.	6 = Strongly Agree 5 = Agree 4 = Slightly Agree 3 = Slightly Disagree 2 = Disagree 1 = Strongly Disagree
	I use e-debit, e-credit, mobile/internet banking, e-money, e-wallet, or the internet to pay bills or make payment	
	I use a mobile phone or the internet to transfer money.	

Source: Adapted from Widyastuti et al. (2024) and Ergün (2025)

The questionnaire was distributed online through Google Forms to respondents selected via purposive sampling. The distribution channels included social media platforms, digital MSMEs communities, and business associations to ensure the sample was relevant to the study criteria. The online survey method was considered effective because it could reach a large number of respondents at a low cost and in a short time, while also aligning with the characteristics of the target population, who are accustomed to using digital devices and technology-based financial services (Johri et al., 2024; Ratnawati et al., 2022).

The collected data were analyzed using Structural Equation Modeling (SEM) based on Partial Least Squares (PLS). Hypotheses H1 through H4, which involve the direct and mediating effects of Financial Behavior (FB), were tested using standard PLS-SEM with one-tailed significance tests, as the directions of the relationships were theoretically predicted (Zaimović et al., 2024; Sabri et al., 2022).

Hypothesis H5, which examines the moderating effect of respondents' educational level on the relationship between Digital Financial Literacy (DFL) and Digital Financial Inclusion (DFI), was tested separately using the PROCESS module in PLS-SEM 4 with a two-tailed significance test, since the direction of the moderating effect was not hypothesized in advance.

The analysis followed several stages. First, construct validity and reliability tests were conducted to ensure that the research instrument was suitable for use. Next, path analysis and hypothesis testing were performed. Bootstrapping techniques were applied to obtain robust t-statistics and p-values (Abdallah et al., 2024). Descriptive statistics were also calculated to

provide an overview of respondents' demographic profiles. The significance level for all tests was set at $\alpha = 0.05$.

This analytical approach provides a comprehensive empirical assessment of the relationships among DFL, FB, and DFI, emphasizing the mediating role of Financial Behavior and the moderating effect of respondents' educational level.

RESULTS AND DISCUSSION

Descriptive Analysis

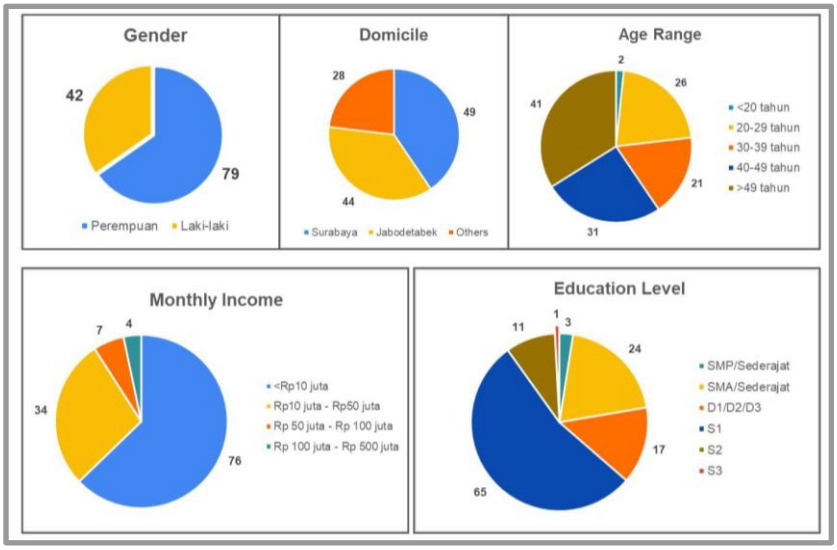

Figure 1. Respondents' Demographic Profile

Source: Processed from primary research data, 2026

A descriptive analysis was conducted to provide an overview of the respondents' demographic characteristics. The sample is dominated by male respondents, who make up 65.5% of the total, while females account for 34.5%. In terms of domicile, respondents are largely concentrated in Surabaya (40.5%) and the Greater Jakarta region (36.4%), with the remaining group (28 individuals) representing 23.1% from other areas. The age distribution shows that the largest segment is the 40–49 age group (34.0%), followed by those aged 20–29 and 30–39, indicating that the dataset is mainly composed of individuals in their productive adult years. Only 2 respondents fall into the above-49 category, highlighting the minimal representation of older adults.

Regarding monthly income, the majority of respondents earn less than IDR 10 million per month (63.3%), while around a third fall into the IDR 10–50 million range (28.3%). The higher-income groups (above IDR 50 million) are represented by only a small minority, totaling approximately 9% combined. The educational profile of the sample is relatively strong, with 54.2% holding a bachelor's degree, followed by high-school graduates and diploma holders. A smaller portion of respondents hold a master's degree (9.2%), while only isolated cases appear at the junior high school and doctoral levels. Overall, these demographic characteristics reflect a respondent pool dominated by well-educated, working-age individuals from major urban areas, which may shape the behavioral patterns examined in subsequent analytical sections.

Measurement Model

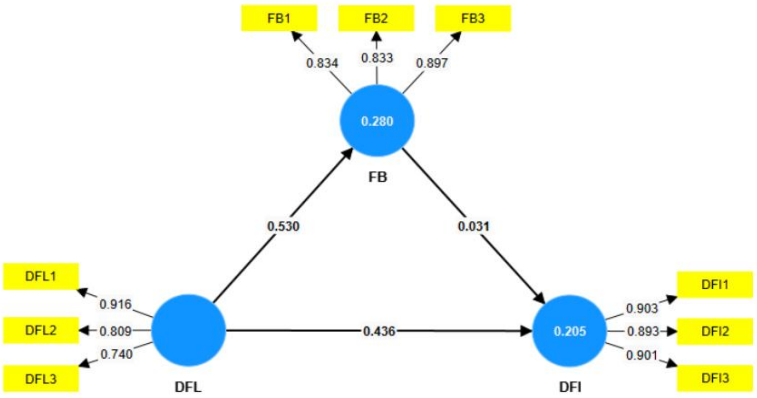

Figure 2. PLS-SEM output of the Measurement and Structural Model

Source: Processed from primary research data, 2026

Before examining the relationships between the constructs, this study first assessed the quality of the measurement model using the PLS-SEM approach. This step is essential because it evaluates whether the indicators used in the questionnaire represent the constructs of Digital Financial Literacy (DFL), Financial Behavior (FB), and Digital Financial Inclusion (DFI). The assessment was carried out through these criteria: indicator loadings, internal consistency, convergent validity, and discriminant validity.

Indicator Reliability (Loading Factors) & Convergent Validity

Indicator reliability assesses how well each item reflects the construct it is intended to measure. In practice, this means checking whether respondents answered consistently across items that belong to the same concept. In PLS-SEM, this is evaluated through loading factors, which indicate the strength of the relationship between an indicator and its latent variable. A commonly accepted benchmark is 0.708, which implies that the indicator shares at least half of its variance with the construct. Hair et al (2022) explain that an indicator loading of 0.708 is recommended because it means the construct explains at least 50% of the variance. In this study, the loading values for all indicators exceeded this threshold, showing that each item contributes meaningfully to the measurement of its respective construct. For Digital Financial Literacy (DFL), loadings ranged from 0.74 to 0.916, suggesting that respondents were able to clearly understand and differentiate the various dimensions of digital literacy, such as knowledge of digital platforms, confidence in using technology, and awareness of digital financial risks. The same goes for Financial Behavior (FB) showed strong loadings of 0.833 to 0.897, indicating that budgeting, saving, and other financial management practices were measured consistently among participants. Digital Financial Inclusion (DFI) shows the highest loadings overall, with values above 0.893, showing that elements such as ease of access, frequency of use, and comfort with digital financial services were captured reliably.

Table 2. Loading Factors

Indicator	DFI	DFL	FB	Marks
DFI1	0.903	-	-	Valid
DFI2	0.893	-	-	Valid
DFI3	0.901	-	-	Valid
DFL1	-	0.916	-	Valid

Indicator	DFI	DFL	FB	Marks
DFL2	-	0.809	-	Valid
DFL3	-	0.74	-	Valid
FB1	-	-	0.834	Valid
FB2	-	-	0.833	Valid
FB3	-	-	0.897	Valid

Source: Processed from primary research data, 2026

Table 3. Average Variance Extracted(AVE)

Construct	AVE	Marks
DFI	0.808	Valid
DFL	0.68	Valid
FB	0.731	Valid

Source: Processed from primary research data, 2026

The fact that no item fell below the recommended threshold suggests that the questionnaire items were well understood, clearly worded, and relevant to the respondents' experiences. This is particularly important in studies involving digital finance, where respondents may have varying familiarity with technological concepts. Strong loading values also indicate that the constructs are stable and are not being misrepresented by poorly performing items. Because all indicators met the criteria, the measurement model retained all original items without modification. This provides a solid foundation before moving on to analyze the relationships between constructs.

Convergent validity examines whether items that are intended to measure the same construct actually converge toward the same concept. In other words, it can test whether the indicators share enough common variance to justify being grouped together. The Average Variance Extracted (AVE) is used to assess this, with 0.50 being the minimum acceptable value. Fornell & Larcker (1981) introduced AVE and stated that AVE $\geq$ 0.50 indicates acceptable convergent validity, because it means the latent construct explains more than half of the variance of its indicators. An AVE above 0.50 means the construct explains more variance in its indicators than the unexplained measurement error. The results of this study show clear evidence of convergent validity. The AVE values were 0.68 for DFL, 0.731 for FB, and 0.808 for DFI. These values are all above the threshold, which indicates that the indicators within each construct share a strong conceptual foundation. The high AVE for DFI may reflect how consistently respondents interpreted questions about their use of digital financial systems. This may be a sign that digital financial services have become more familiar and widely used, making the concept easier for respondents to understand. For DFL, an AVE of 0.68 suggests that respondents could clearly identify their level of digital financial understanding, can be in terms of accessing information, evaluating digital platforms, or recognizing cybersecurity issues. Meanwhile, the AVE for FB (with result of 0.731) shows that behaviors such as saving regularly, budgeting, and making financial plans were interpreted similarly across respondents. The strong AVE results also suggest that the survey items were aligned with the context of the respondents.

1. Discriminant Validity

Table 4. Heterotrait-Monotrait (HTMT) Ratio

	DFI	DFL	FB	Marks
DFI	-	-	-	Valid
DFL	**0.507**	-	-	Valid
FB	**0.29**	**0.633**	-	Valid

Source: Processed from primary research data, 2026

Table 5. Fornell-Larcker Criterion

	DFI	DFL	FB	Marks
DFI	**0.899**	-	-	Valid
DFL	0.452	**0.825**	-	Valid
FB	0.262	0.53	**0.855**	Valid

Source: Processed from primary research data, 2026

Table 6. Cross-Loadings

Indicator	DFI	DFL	FB	Marks
DFI1	**0.903**	0.438	0.258	Valid
DFI2	**0.893**	0.437	0.265	Valid
DFI3	**0.901**	0.321	0.164	Valid
DFL1	0.526	**0.916**	0.52	Valid
DFL2	0.377	**0.809**	0.262	Valid
DFL3	0.149	**0.740**	0.494	Valid
FB1	0.173	0.393	**0.834**	Valid
FB2	0.206	0.388	**0.833**	Valid
FB3	0.275	0.547	**0.897**	Valid

Source: Processed from primary research data, 2026

The HTMT ratio (Heterotrait–Monotrait Ratio of Correlations) was assessed. A conservative threshold of 0.85 was used in this research. Henseler et al. (2015) recommended comparing the heterotrait-monotrait (HTMT) ratio of cor relations with a threshold value of 0.85 to examine discriminant validity in variance-based SEM (i.e., partial least squares). All HTMT values were below this threshold, providing additional reassurance that the constructs were perceived as distinct by respondents. This suggests that although DFL, FB, and DFI are conceptually connected, participants did not treat them as one similar concept.

The Fornell-Larcker criterion was also tested. This method compares the square root of each construct's AVE with the correlations it has with other constructs. The results showed the AVE square root values were consistently higher than the correlations with other variables. This pattern indicates that each construct has a strong internal structure and that respondents interpreted the items in a rational way.

Cross-loadings were also reviewed. This step involves checking whether each item loads highest on the construct it is intended to measure. The results showed that all indicators met this expectation. None of the items loaded more strongly on any other construct, which implies that respondents did not misinterpret the items or apply the same reasoning across different sections of the questionnaire. The clear separation in loadings reflects that each set of items was understood within its intended conceptual boundaries.

The study demonstrates strong discriminant validity across all constructs. This means that digital financial literacy, financial behavior, and digital financial inclusion each capture

different aspects of digital finance. DFL reflects an individual's understanding and ability to navigate digital financial tools; FB represents how individuals manage their finances; and DFI reflects actual access and usage of digital financial services. Although these variables interact within the same framework of digital finance, the statistical tests confirm that they are not redundant and do not 'blur' into one another. In practical terms, this strengthens the credibility of the structural model results.

Reliability

Reliability evaluates whether the items within a construct are working together in a coherent framework. In a way, it examines whether the indicators that make up a latent variable such as DFL, FB, or DFI are capturing the same underlying idea rather than measuring unrelated concepts. In PLS-SEM, this step is important because the method relies on the quality of indicators to produce a coherent structural relationship.

Table 7. Reliability Assessment (Cronbach's Alpha and Composite Reliability)

Construct	Cronbach's Alpha	Composite Reliability	Interpretation
DFI	0.882	0.927	**Reliable**
DFL	0.766	0.863	**Reliable**
FB	0.819	0.891	**Reliable**

Source: Processed from primary research data, 2026

Cronbach's Alpha is used to assess internal consistency, meanwhile Composite Reliability (CR) reflects the actual contribution of each indicator to the construct. In this study, the CR and Cronbach's Alpha values for all three constructs exceeded the commonly accepted threshold of 0.70, indicating strong internal consistency across the model. Cronbach's Alpha (1951) established alpha ≥ 0.70 as acceptable for internal consistency reliability. While Hair et al (2022) mentions that CR of ≥ 0.70 as acceptable. Digital Financial Literacy (DFL) achieved a CR of 0.863, showing that the various items capturing digital abilities, knowledge, and awareness are reinforcing each other. Financial Behavior (FB) recorded a CR of 0.891, suggesting that budgeting, saving, spending discipline, and other related practices form a pattern among respondents. Digital Financial Inclusion (DFI) showed the highest CR value at 0.927, which suggests that the items measuring access, usage, and confidence in digital financial services are highly consistent and represent a stable construct in the samples. Cronbach's Alpha values also supported these findings, ranging between approximately 0.766 and 0.882.

Overall, the internal consistency results show that respondents answered the items in a way that reflects clear and predictable patterns. Rather than scattered or inconsistent, the responses indicate that the constructs are well understood and that the measurement instruments align with how individuals actually experience digital literacy, financial behavior, and digital financial inclusion. This consistency provides a strong foundation for moving forward to the structural model, where the relationships between constructs will be examined.

Structural Model

Table 8. Coefficient of Determination (R Square and Adjusted R Square)

	R-Square	R-Square Adjusted	Marks
DFI	0.205	0.192	Weak

	R-Square	R-Square Adjusted	Marks
FB	0.28	0.274	Weak

Source: Processed from primary research data, 2026

The R-square value, or coefficient of determination, is one of the key measures used in evaluating the structural model within PLS-SEM. It indicates how much of the variation in the dependent variable can be explained by the independent variables included in the model. R-square values are generally interpreted using the classification proposed by Hair et al. (2022), where values around 0.75 are considered strong, around 0.50 are moderate, and around 0.25 are weak.

In this study, the R-square values obtained for the two dependent variables of Financial Behavior (FB) and Digital Financial Inclusion (DFI) fall into the "weak" category. Specifically, the R-square for DFI is 0.205, indicating that approximately 20.5% of the variation in digital financial inclusion can be explained by Digital Financial Literacy (DFL) and Financial Behavior (FB). Meanwhile, the R-square for FB is 0.28, meaning that around 28% of the variation in financial behavior is explained by DFL.

These numbers might seem low, but weak R-square values are not unusual in behavioral and social science studies (Hair et al, 2022). Human financial behavior and decisions related to digital financial services are influenced by numerous factors where it cannot be denied that many of which fall outside the scope of this model. For example, attitudes, cultural influences, digital trust, accessibility of technology, perceived risks, income stability, and personal preferences can all play substantial roles. Because this model focuses primarily on the role of digital financial literacy and does not incorporate a full range of behavioral, psychological, or environmental variables, a weak R-square value is reasonable.

The R-square of 0.28 for financial behavior suggests that digital financial literacy does show a meaningful but not dominant influence on how individuals manage their finances. In a way, this makes sense in real-world contexts: people's financial habits are shaped not only by what they know but also by their surroundings, personal discipline, financial goals, social norms, and household conditions. Having knowledge does not automatically translate into financial action, and this gap between literacy and behavior has been widely observed in previous studies. Similarly, the R-square of 0.205 for digital financial inclusion reflects the reality that digital adoption is shaped by many other considerations beyond literacy and behavior. Other factors such as internet access, smartphone availability, user-friendly platform design, institutional trust, and even promotional incentives from financial service providers contribute to individuals' willingness and ability to adopt digital financial tools.

A separate direct model of DFL to DFI shows that digital financial literacy explains 23.6% of the variance in digital financial inclusion (where $R^2 = 0.236$; adjusted $R^2 = 0.230$), which is also categorized as weak according to Hair et al. (2022). This indicates that even before introducing a mediator, the explanatory power of DFL on DFI is modest to begin with. So when Financial Behavior is included as a mediator, the R-square slightly decreases to 0.205 (adjusted $R^2 = 0.192$), suggesting that the addition of the mediator does not strengthen the model. This outcome however aligns with the non-significant effect of FB on DFI, demonstrating that FB does not contribute to improving the model.

While the R-square values in this model are categorized as weak, they still provide useful insights. They show that digital financial literacy does play a role in shaping financial behavior and digital financial inclusion, but it is not the sole driving factor. These results also highlight the complexity of financial decision-making in the digital era and point to the need for broader models that incorporate psychological, technological, and structural factors to fully explain variations in digital financial inclusion. The findings open opportunities for future research to explore additional variables that may enhance predictive accuracy and provide a more comprehensive understanding of what drives digital financial engagement in Indonesia.

Path Coefficient - Direct Effect

The path analysis reveals three main direct relationships with result as below:

Table 9. Bootstrapping Results of Direct Effects

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Vales	Marks
DFL → DFI	**0.436**	0.444	0.098	4.645	**0.000**	H1 accept
DFL → FB	**0.53**	0.537	0.066	8.045	**0.000**	H2 accept
FB → DFI	0.031	0.035	0.099	0.313	0.377	H3 reject

Source: Processed from primary research data, 2026

The first hypothesis, or H1, is Digital Financial Literacy (DFL) → Digital Financial Inclusion (DFI). The analysis shows that the coefficient for DFL to DFI is positive and significant ($\beta = 0.436$; $p < 0.001$), indicating that higher digital financial literacy enhances MSMEs owners' adoption and utilization of digital financial services. This finding aligns with Astuti et al. (2025), Kusumawardhani et al. (2023), and Tony & Desai (2020), who highlight that literacy improves technological confidence, reduces perceived risks, and increases willingness to adopt financial technology solutions. In practice, the ability to navigate digital platforms such as e-wallets, mobile banking, and QRIS payments serves as a knowledge-based readiness factor driving digital participation.

The second hypothesis, or H2, is Digital Financial Literacy (DFL) → Financial Behavior (FB). The analysis shows that DFL also demonstrates a positive and significant influence on FB ($\beta = 0.53$; $p < 0.001$). This aligns with the studies by Chhillar (2025) and Abdallah et al. (2024), who conceptualize literacy as a cognitive enabler that shapes more disciplined and structured financial actions. MSMEs owners with higher literacy are more likely to engage in financial behaviors such as budgeting, recording digital transactions, and routine saving through online platforms. This is also consistent with Perry & Morris (2005) and Bruggen et al. (2024), who view financial behavior as an interaction between financial knowledge and psychological confidence.

The third hypothesis, or H3, is Financial Behavior (FB) → Digital Financial Inclusion (DFI). Although DFL shows a positive and significant coefficient to DFL and FB, the relationship between FB and DFI is not significant ($\beta = 0.031$; $p < 0.377$). This suggests that improved financial behavior has not yet translated into greater digital financial inclusion among

MSMEs owners, even though it has been proven beneficial for business management. Instead, many still rely on manual or semi-digital financial routines, creating a behavioral gap between financial discipline and digital financial participation. This contrasts with Zaimovic et al. (2024) and Ratnawati et al. (2022), whose studies in household or corporate settings identified significant behavioral meditation. It highlights the lag in digital behavioral transformation within the MSMEs segment. Meanwhile, the indirect relationships are revealed as follows:

Path Coefficient - Indirect Effect

The path analysis reveals the mediation relationships with result as below:

Table 10. Bootstrapping Results of Indirect Effects (Mediation)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Vales	Marks
DFL → DFI	0.016	0.018	0.054	0.302	0.381	H4 reject

Source: Processed from primary research data, 2026

The fourth hypothesis, or H4, states the indirect relationship or pathway, which is Digital Financial Literacy (DFL) → Financial Behavior (FB) → Digital Financial Inclusion (DFI). The analysis shows that it is not significant ($\beta = 0.016$; $p < 0.377$), indicating that FB does not mediate the relationship. This finding is consistent with the above result for H3, where FB was also not found to be significant on DFI. According to a study by Lusardi & Mitchell (2014), this suggests that digital literacy is sufficiently strong to influence inclusion without necessitating direct behavioral transformation. This also confirms Bruggen et al. (2024)'s argument that behavioral mediation only emerges when behaviors are digital, which is not yet common among MSMEs owners in Indonesia, who rarely use digital bookkeeping, e-savings, or any other kind of digital investment tools.

As for the fifth hypothesis, or H5, the results are revealed as follows:

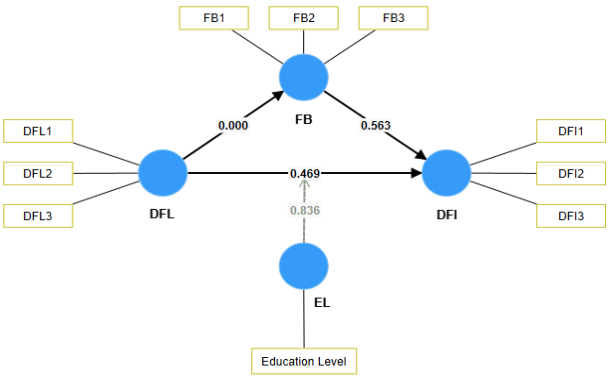

Figure 3. PLS-SEM Output After the Moderation Effect

Source: Processed from primary research data, 2026

Table 11. Bootstrapping Results of Indirect Effects (Moderation)

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Marks
EL → DFI	-0.102	-0.111	0.614	0.166	0.868	Reject

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Marks
EL x DFL → DFI	0.023	0.024	0.113	0.207	0.836	Reject

Source: Processed from primary research data, 2026

The fifth hypothesis, or H5, is the moderating effect. It shows that EL does not significantly moderate the DFL → DFI relationships ($p > 0.005$). This indicates that digital literacy consistently influences inclusion across educational levels. This finding aligns with Widyastuti et al. (2024), who observed diminishing demographic gaps in Indonesia. This may reflect the early formation of digital parity, as widespread smartphone use and mass-market adoption of financial technology have reduced demographic disparities within the MSMEs segment.

Overall, the empirical model confirms that digital financial literacy is the most critical determinant of digital financial inclusion among MSMEs owners. However, the findings also highlight a notable behavioral gap, which suggests that strong literacy does not necessarily translate into digital financial action. This indicates the need for interventions from external parties of the MSMEs, such as training in the usage of digital financial platforms, QRIS utilization, and e-invoice management. Strengthening these practical competencies may help bridge the gap and support greater inclusivity in digital financial participation across the MSMEs segment.

CONCLUSION

The findings of this study indicate that digital financial literacy (DFL) plays a significant role in influencing both financial behavior (FB) and digital financial inclusion (DFI), with higher literacy levels associated with better financial management and greater adoption of digital financial services. However, although DFL positively affects financial behavior, FB does not significantly predict DFI and does not mediate the relationship between DFL and DFI, suggesting that the impact of literacy on inclusion is primarily direct rather than behavioral. Furthermore, education level does not moderate this relationship, indicating that the effect of digital financial literacy on digital inclusion is relatively consistent across different educational backgrounds. The relatively low explanatory power of the model implies that other factors—such as digital trust, access to technology, platform usability, and perceived risk—may also play important roles in shaping digital financial inclusion. These findings underscore the importance of strengthening digital financial literacy initiatives as a direct pathway to enhancing inclusion, particularly by improving users' digital skills, evaluation capabilities, and cybersecurity awareness. For future research, it is recommended to incorporate additional psychological, technological, and environmental variables to develop a more comprehensive understanding of the drivers of digital financial adoption, especially in the evolving context of Indonesia's digital economy.

REFERENCES

Abdallah, W., Tfaily, F., & Harraf, A. (2024). The impact of digital financial literacy on financial behavior: Customers' perspective. Competitiveness Review, ahead-of-print. https://doi.org/10.1108/CR-11-2023-0297

Adamek, J., & Solarz, M. (2023). Adoption factors in digital lending services offered by FinTech lenders. Oeconomia Copernicana, 14(1), 169–212. https://doi.org/10.24136/oc.2023.005

Alam, K., Ali, M. A., Erdiaw-Kwasie, M. O., Murray, P. A., & Wiesner, R. (2022). Digital Transformation among SMEs: Does Gender Matter? Sustainability, 14(1), 535. https://doi.org/10.3390/su14010535

Alliance for Financial Inclusion (2021). Digital Financial Literacy, Guideline Note No. 45. Retrieved September 27, from https://www.afi-global.org/publication/digital-financial-literacy/

Ardini, L., Fahlevi, M., Dandi, M, Dahlan, O. P., & Dahlan, S. P. (2024). Digital Financial Literacy and Its Impact on Financial Skills and Financial Goals in Indonesia's Digital payment Ecosystem. Economic Studies Journal, 33(7), 181-200

Astuti, R. D., Purwiyanta, Ediningsih, S. I., & Tugiyo. (2025). How digital and financial literacy strengthens financial inclusion in Indonesia? SHS Web of Conferences, 212, Article 01007. https://doi.org/10.1051/shsconf/202521201007

Bank Indonesia. (2004). Laporan Kebijakan Moneter Triwulan I 2024. Retrieved September 27, 2025, from https://www.bi.go.id/id/publikasi/laporan/Pages/Laporan-Kebijakan-Moneter-Triwulan-I-2024.aspx

Bhattacherjee, A. (2012). Social science research: Principles, methods, and practices (2nd ed.). University of South Florida Scholar Commons. https://doi.org/10.5038/9780978718671

Chhillar, N. (2025). Exploring the role of digital financial literacy and personal financial management behavior: Evidence from the National Capital Territory (NCT) of India. [Nama Jurnal belum tampil dalam referensi]. https://doi.org/10.1016/j.whatever/S0001691825006213

Coordinating Ministry for Economic Affairs of the Republic of Indonesia. (2022). Coordinating Minister Airlangga: Government Continues to Encourage Strengthening Economic Foundations by Establishing Digital Transformation of MSMEs as One of the Priorities. Retrieved November 17, 2025, from https://ekon.go.id/publikasi/detail/4065/coordinating-minister-airlangga-government-continues-to-encourage-strengthening-economic-foundations-by-establishing-digital-transformation-of-msmes-as-one-of-the-priorities

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

Ergün, K. (2025). Responsible Financial Behavior: Similarities and Differences between Youth in Türkiye and Lithuania. Revista Romaneasca Pentru Educatie Multidimensionala, 17(3), 726–753. https://doi.org/10.18662/rrem/17.3/1041

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.1177/002224378101800104

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43, 115–135.

Johri, A., et al. (2024). Digital financial inclusion in micro enterprises: understanding the determinants and impact on ease of doing business from World Bank survey. Humanities & Social Sciences Communications, 11(1), 1-10. http://dx.doi.org/10.1057/s41599-024-02856-2

Kumalasari, E. N., & Pratama, P. A. (2025). Analysis of the Role of Increasing Financial Inclusion Through Digital Transformation on the Stability of the Financial System in Indonesia. *Journal of Accounting, Finance, and FinTech Advancements*, *1*(2), 55–69.

Kusumawardhani, R. , Ningrum, N. K., & Rinofah, R. (2023). Inveestigating Digital Financial Literacy and its Impact on SME's Performance: Evidence from Indonesia. International Journal of Professional Business Review, 8(12), e04097.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. Journal of Economic Literature, 52(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Perry, V. G., & Morris, M. D. (2005). Who is in control? The role of self-perception, knowledge, and income in explaining consumer financial behavior. Journal of Consumer Affairs, 39(2), 299–313. https://doi.org/10.1111/j.1745-6606.2005.00016.x

Ratnawati, R., Sudarmiatin, S., Soetjipto, B. E., & Restuningdiah, N. (2022). The role of financial behavior as a mediator of the influence of financial literacy and financial attitudes on MSMEs investment decisions in Indonesia. Journal of Social Economics Research, 9(4), 193–203. Retrieved from http://dx.doi.org/10.18488/35.v9i4.3231

Sabri, M. F., Shaari, N., & Jaafar, N. L. (2022). Mediating effect of financial behaviour on the relationship between perceived financial wellbeing and its factors among low-income young adults in Malaysia. Frontiers in Psychology, 13, 858630. https://doi.org/10.3389/fpsyg.2022.858630

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson Education Limited

Sekaran, U., & Bougie, R. (2020). Research methods for business: A skill-building approach (8th ed.). Wiley

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. Indian Journal of Dermatology, 61(3), 261–264. https://doi.org/10.4103/0019-5154.182410

Setiawan, B., Phan, T. D., Medina, J., Wieriks, M., Nathan, R. J. & Fekete-Farkas, M. (2023). Quest for financial inclusion via digital financial services (Fintech) during COVID-19 pandemic: case study of women in Indonesia. Journal of Financial Services Marketing, 29(2), 459-473. http://dx.doi.org/10.1057/s41264-023-00217-9

Tayibnapis, A. Z., Wuryaningsih, L. E., & Gora, R. (2018). The development of digital economy in Indonesia. *IJMBS International Journal of Management and Business Studies*, *8*(3), 14–18.

Tony, N., & Desai, K. (2020). Impact of Digital Financial Literacy on Digital Financial Inclusion. International Journal of Scientific & Technology Research, 9(1), 1911–1915. https://doi.org/10.55927/fjmr.v3i5.9213

Wang, G., Zhang, M., & He, B. (2024). Financial literacy and investment returns: The moderating effect of education level. Finance Research Letters, 67(A), 105781. https://doi.org/10.1016/j.frl.2024.105781

Widyastuti, U., et al. (2024). The nexus of digital financial inclusion, digital financial literacy and demographic factors: lesson from Indonesia. Cogent Business & Management, 11(1), 2322778. https://doi.org/10.1080/23311975.2024.2322778

World Bank. (n.d.). Digital Financial Inclusion. Retrieved August 20, 2025, from https://www.worldbank.org/en/topic/financialinclusion/publication/digital-financial-inclusion

Xiao, J. J. & Kumar, S. (2023). Introduction to A Research Agenda for Consumer Financial Behavior. In Edward Elgar Publishing eBooks (pp. 1-15). https://doi.org/10.4337/9781803922652

Zaimović, A., Nuhic Meskovic, M., Arnaut-Berilo, A., Dedovic, L., Zaimović, T., & Torlaković, A. (2024). The nexus between digital financial knowledge and financial inclusion: Digital financial attitudes and behaviour as mediators enhancing financial inclusion. International Journal of Bank Marketing, 43(2), 388–423. https://doi.org/10.1108/IJBM-01-2024-0053