THE EUROPEAN JOURNAL OF APPLIED ECONOMICS

EJAE 2026, 23(1): 146 - 170
ISSN 2406-2588
UDK: 37.015.31:336
658.14/.17
DOI: 10.5937/EJAE23-61816
Original paper/Originalni naučni rad

ROLES OF FINANCIAL LITERACY AND DIGITAL FINANCIAL LITERACY IN ENHANCING MSME FINANCIAL WELL-BEING

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Abstract:
This study examines the effects of financial literacy and digital financial literacy on the financial well-being of micro and small enterprise (MSE) owners. Primary data were collected through surveys administered to MSE owners in Bantul Regency, Special Region of Yogyakarta Province. This research generated a sample through various sampling selection techniques (cluster, purposive, and accidental sampling). A total of 168 respondents were used for data analysis employing Partial Least Squares-Structural Equation Modeling (PLS-SEM) with SmartPLS software. The findings reveal that financial knowledge affects financial behaviors and attitudes, while digital financial knowledge affects digital financial behaviors and digital financial attitudes, with digital financial attitudes further impacting digital financial behaviors. In addition, this study also documents that the financial behaviors, digital financial knowledge, and digital financial behavior dimensions affect financial well-being. Micro and small enterprises will arguably make sound judgments, manage financial matters more effectively, and develop sustainable businesses if they have a better understanding of financial management and digital technology.

Keywords:
financial literacy; digital financial literacy; financial well-being; micro and small enterprises; PLS-SEM.

JEL Classification:
G11, D12

INTRODUCTION

Digital technology has undergone remarkable development in Indonesia in recent years. This is evidenced by the increase in internet users and the proliferation of electronic commerce platforms in the country. A poll conducted by the Indonesian Internet Service Providers Association (APJII) indicated that, as of 2018, internet penetration in Indonesia was 64.8%. The percentage then increased to 73.7% in 2020, 77.01% in 2022, 78.19% in 2023, and ultimately 79.5% in 2024 (APJII, 2024).

Article info:
Received: September 30, 2025
Correction: January 05 2026
Accepted: March 30, 2026

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In a similar vein, the number of e-commerce businesses is projected to increase by 27.40 percent in 2023, rising from 2,995,986 in 2022 to 3,816,750 in 2023 (BPS, 2025). The rise in internet utilization and the proliferation of e-commerce businesses are favorable indicators for the Indonesian economy, as advancements in digital technology would enhance business efficiency, hence augmenting economic production. (Digital) technological advancements will arguably stimulate (Aleksandrova *et al.*, 2022; Farcau, 2024; Jia *et al.*, 2023). The development of digital technologies influence the financial sector development, as well (Sajić *et al.*, 2019).

Despite the rise in internet and e-commerce users, a 2023 survey revealed that merely 22.40% of firms participated in e-commerce. Correspondingly, cash on delivery (COD) was the predominant payment method, accounting for 75.19% of transactions. One reason businesses reported for not participating in online business activities was insufficient expertise (28.96%) (BPS, 2025). This condition indicates a lack of financial literacy (FL), particularly digital financial literacy (DFL), among the Indonesian population.

FL is determined as the capability to comprehend and implement financial constructs in making informed financial decisions, managing personal finances effectively, and proposing sound financial plans for future needs (Foster *et al.*, 2022). A national survey on FL and inclusion carried out by the Financial Services Authority (FSA or OJK) revealed that Indonesia's FL rate was only 49.68% in 2022. Inadequate FL adversely affects financial well-being (FWB). FWB is a condition when people possess control over their finances, can withstand financial shocks, and stay aligned with their financial objectives (Comerton-Forde *et al.*, 2020). Research conducted by the Management Institute of the Faculty of Economics and Business (FEB) at the University of Indonesia recorded the FWB index of the Indonesian population at 53.1% in 2023 (Rizaty, 2023). The relatively limited FWB index in Indonesia will undoubtedly affect the achievement of public welfare as the ultimate goal of development. Enhancing FL is a method to attain FWB.

Several prior studies have demonstrated that people with better FL, as indicated by three dimensions (financial knowledge, behaviors, and attitudes (FK, FB, and FA)), are more resilient to financial disturbances and exhibit better FWB (Castro-González & Fernández-López, 2020; Chan *et al.*, 2012; Philippas & Avdoulas, 2020; Rahman *et al.*, 2021; Tie & Nizam, 2015). Moreover, in the age of (digital) technological development, DFL profoundly influences the achievement of FWB. Greater DFL makes it possible for people to capitalize on the advancements in digital technology. Individuals with DFL can effectively employ digital tools to enhance their financial decision-making processes (Bushra & Mir, 2024). Choung *et al.* (2025) demonstrate that DFL is positively related to life satisfaction. More specifically, several studies document that DFK positively influences FL (Choi & Kim, 2023; Dzogbenuku *et al.*, 2022; Gong *et al.*, 2024; Jhonson *et al.*, 2023).

Prior research on the impacts of FL and DFL on FWB primarily focuses on individuals, with limited attention to micro and small enterprise owners. Accordingly, this study seeks to address this gap. MSMEs have demonstrated resilience during the COVID-19 pandemic and constitute the backbone of the Indonesian economy. According to data from the Indonesian Chamber of Commerce and Industry (Kadin, 2025), the MSME sector accounts for over 60% of GDP and employs about 97% of the workforce. In 2023, the five provinces in Indonesia with the highest number of MSMEs were East Java (977,471 MSMEs), Central Java (862,926 MSMEs), West Java (641,639 MSMEs), West Nusa Tenggara (149,962 MSMEs), and the Special Region of Yogyakarta (134,025 MSMEs) (BPS, 2024b). The Yogyakarta Province ranked seventh in the number of MSMEs. Conversely, this province ranked 10th out of 34 provinces in Indonesia in terms of the FL index. The FL rating of 55% is relatively larger than that of other provinces in Indonesia. As the level of knowledge is a critical factor in fostering MSME development

(Islam & Hossain, 2018), one can expect to become a catalyst for the advancement of the MSME sector and the improvement of MSME actors' welfare. Accordingly, this study seeks to identify the effects of FL and DFL dimensions on MSE owners in Bantul Regency, Special Region of Yogyakarta Province.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Behavioral Life Cycle Theory

Behavioral Life Cycle Theory explains how individuals manage their finances (saving and spending) throughout their life cycle (Yoon & Hanna, 2024). Individuals' financial decisions are affected by psychological and behavioral aspects, such as mental accounting, self-control, and framing of wealth. Mental accounting illustrates how individuals classify money separately based on sources and objectives. Furthermore, self-control represents individuals' ability to deliberately control their thoughts, emotions, and behavior to achieve long-term objectives, even in the presence of strong urges or temptations. It can also be characterized as individuals' capacity to withstand immediate consuming impulses and substitute them with saving or investing. Lastly, the framing of wealth pertains to the manner in which humans classify wealth according to temporal factors and accessibility (Tangney *et al*., 2004).

FWB

FWB has become a widely discussed topic in various economic discussion forums since the COVID-19 pandemic. The COVID-19 pandemic precipitated a global economic downturn, which in turn affected the cost of living. This experience has heightened awareness of the importance of protecting individuals from financial shocks. FWB refers to a person's assessment of their ability to achieve a desired standard of living and maintain financial autonomy in both the present and the future (Brüggen *et al.*, 2017). FWB is a condition in which individuals have control over their finances, are able to withstand financial adversity, and remain aligned with their financial goals. (Comerton-Forde *et al*., 2020). In other words, FWB refers to a person's overall happiness and satisfaction with their financial situation (Sinani, 2021). OECD (2023) defines FWB as comprising subjective and objective dimensions. The objective aspect is related to financial resilience, indicating the accessibility of financial resources to withstand adverse financial shocks. Meanwhile, the subjective dimension refers to a person's happiness with their financial circumstances and the stress they experience when confronted with financial difficulties. The FWB measures encompass subjective and objective dimensions. FWB is categorized as poor with a total point of 0-39, medium with a point of 40-69, and high with a point of 70-100 (CFPB, 2017).

FL is defined as knowledge (awareness), skills, and beliefs that affect attitudes (perspectives) and behaviors in improving the quality of financial choice-making and arrangement to achieve public FWB (OJK, 2023). In a similar vein, Lusardi and Mitchell (2014) define FL as awareness of financial management that is critical for achieving well-being. More specifically, Foster *et al.* (2022) define financial literacy (FL) as the ability to understand financial concepts, manage personal finances, make informed decisions, and implement effective financial arrangements for future financial needs.

Three components must be addressed when assessing FL (OECD, 2023). First, the FK dimension enables individuals to understand and manage their financial products, compare financial products and services, make informed financial decisions, and react appropriately to events that may affect their FWB. Second, the financial behavior (FB) dimension affects individuals' short-term and long-term

financial situations and well-being. Several behaviors, such as delaying bill payments, failure to plan future expenses, or uninformed selection of financial products, may negatively affect individuals' financial situations and well-being. Third, the financial attitudes (FA) dimension could affect individuals' FB and decision-making processes. Furthermore, the OECD (2023) classifies financial literacy levels, indicating that a score below 70 reflects a low level of financial literacy.

DFL

Technological development, especially digital financial technology, necessitates individuals to utilize technology for their own interests. Hence, individuals must possess sufficient knowledge of digital financial technology or DFL. DFL points to the public comprehension of operating financial transactions on digital platforms (Kim *et al*., 2025). DFL is an integral component of both digital competency and financial literacy, enabling individuals to effectively and responsibly use digital financial products and services to maintain and improve their financial well-being (Andreou & Anyfantaki, 2021). Like FL, digital financial literacy (DFL) is measured across three dimensions: awareness, behaviors, and attitudes. The awareness dimension of the DFL rate encompasses understanding of digital agreements and the utilization of individual data. The behavior dimension of DFL is measured by "smart" digital behaviors. Lastly, the attitudes dimension is measured with "smart" attitudes toward digital financial technology (OECD, 2023). Further, Imjai *et al.* (2025) suggest that DFL is an important competency for people to enhance their involvement in a technology-driven world.

The Effect of FK on FB and FA

FL is measured through three dimensions: knowledge, behaviors, and attitudes. FK points to a comprehension of financial principles, including their management, investments, and growth. Individuals with better FK are likely to exhibit more effective FB. Netemeyer *et al.* (2024) observed that individuals with economic education backgrounds exhibit better FK, which in turn leads to better FB (Grable & Rabbani, 2023; Lihan *et al.*, 2024). Furthermore, FK also affects FA. A financial understanding can significantly impact individuals' FA. Individuals with sufficient financial understanding will possess better FA. Based on these arguments, we propose the following hypotheses:

H1: FK positively influences FB

H2: FK positively affects FA

The Effect of FA on FB

FA are defined as the practice of financial principles to maintain values in making financial choices (Moko *et al*., 2022). FA refelect individuals' mindset, judgement, and assessment of their personal finances, which subsequently influence their financial behaviors (Coskun & Dalziel, 2020). Furthermore, financial behaviors (FB) refer to the actions or practices undertaken by individuals that impact their financial situation and overall financial well-being (OECD, 2023). More effective FA will motivate individuals to exhibit better FB (Hendri *et al*., 2022; Moko *et al*., 2022; Ratnawati *et al*., 2023). Those arguments lead to the following hypothesis:

H3: FA positively affect FB

The Effect of DFK on Digital Financial Behavior (DFB)

DFL is determined as a person's capacity to comprehend and employ digital financial services. DFL is measured across three components: DFK, DFB, and DFA (OECD, 2023). DFK refers to an individual's understanding of digital finances, while DFB encompasses individuals' digital financial technology-related actions, such as using online payments from online financial institutions. Individuals' understanding of digital financial technologies influences their behaviors and decision-making when using these technologies. The influence of digital financial knowledge (DFK) on DFB remains understudied. Nevertheless, several studies demonstrate that FK positively influences FB (Grable & Rabbani, 2023; Lihan *et al*., 2024; Netemeyer *et al*., 2024). Accordingly, we suggest the following hypothesis:

H4: DFK positively affects DFB.

The Effect of DFK on FA and Digital Financial Attitudes (DFA)

DFK represents an individual's comprehension and awareness of digital financial concepts. This knowledge shapes their digital financial behaviors and attitudes (Muat *et al*., 2024). DFK contributes to more effective financial attitudes, promoting better planning for investments and savings to meet future needs within the digital technology framework. These arguments lead to the following hypotheses:

H5: DFK positively influences FA

H6: DFK positively influences DFA

The Effect of DFA on FA

Individuals' in using digital financial technologies, such as safeguarding against associated risks, influence their attitudes toward financial programs. The influence of DFB on FA remains understudied. Nevertheless, Masitoh *et al*. (2024) reveal that FB affect individuals' FA, especially in investment choices. According to those arguments, we propose the following hypothesis:

H7: DFB positively affects FA

The Effect of DFA on DFB

Referring to the definition of FA as individuals' state of mind, opinions, and evaluation of their personal finances that are applied to their behaviors (Coskun & Dalziel, 2020), DFA can be defined as individuals' mindset, opinions, and evaluation of digital financial technology applied to their FB. Individuals' attitudes toward digital financial technologies shape their behavior in utilizing such tools. This issue remains understudied, although Moko *et al.* (2022), Ratnawati *et al.* (2023) and Hendri *et al.* (2022) demonstrate that effective FA motivates individuals to exhibit better FB. These arguments lead to the following hypothesis:

H8: DFA positively affect DFB

The Effects of FL (FK, FB, and FA) on FWB

FWB refers to a state in which individuals possess control over their finances, can effectively manage financial shocks, and remain aligned with their financial goals. (Comerton-Forde *et al*., 2020). FWB is not a spontaneous occurrence. It is founded on robust FK, prudent financial practices, and a sound approach to managing money. These three aspects constitute FL. Philippas and Avdoulas (2020) analyze Generation-Z students in Greece and found that those with higher financial literacy were better able to anticipate and respond to financial shocks. In a similar vein, Chan *et al*. (2012) document that students with better FK handle their finances more effectively and exhibit better FB, as indicated by lower debt levels and better FWB. FWB is affected not only by FK and activities but also by FA. An individual's attitude toward money influences their FB, which in turn affects their FWB. Individuals' attitudes toward money influences their actual FB (Castro-González & Fernández-López, 2020). Individuals with better FA could deal with financial shocks and manage financial stress more effectively (Rahman *et al*., 2021). In other words, better FA leads to better FWB. According to those arguments, we recommend these hypotheses:

H9: FK positively affects FWB.

H10: FB positively affect FWB.

H11: FA positively affect FWB.

The Effects of DFL (DFK, DFB, and DFA) on FWB

The advancement of digital technology, along with the development of digital financial tools, offers significant opportunities for economic agents to leverage these innovations to improve their financial well-being. To effectively leverage developments in digital financial technology, a robust DFL is essential. DFL involves an understanding of digital technology, actions associated with it, and attitudes toward it. Sufficient DFL enables consumers to circumvent the adverse effects of digital technological developments and effectively leverage these developments to increase their FWB (Choung *et al*., 2025). A comprehensive understanding of digital financial technology enables individuals to leverage these advancements for investments, savings, and digital payments, thus enhancing personal satisfaction and FWB (Choi & Kim, 2023; Dzogbenuku *et al*., 2022; Gong *et al*., 2024; Jhonson *et al*., 2023). The above discussions lead us to the following hypotheses:

H12: DFK affects FWB

H13: DFB affect FWB

H14: DFA affect FWB

RESEARCH METHODOLOGY

Data Type and Source

This study used primary data obtained through a survey conducted from early May to early June 2025. Data collection occurred in three phases. First, a pilot study was conducted on May 3, 2025, in Sewon District. Second, after refining the questionnaire, data were collected in Bantul District, Kasihan District, Jetis District, and Banguntapan District from May 23 to May 25, 2025. Third, we collected data in Imogiri District and Banguntapan District from May 30 until June 1, 2025. We collected data by visiting local markets, industrial centers, tourism areas, and local events.

Sample Size

Partial Least Squares-Structural Equation Modeling (PLS-SEM) was employed as the analytical method. Based on Hair *et al.* (2021, 2022), achieving a minimum path coefficient of 0.11–0.20 at a 5% significance level necessitates a minimum sample size of 155. The final survey included 168 MSE respondents, exceeding this requirement (see Table 2).

Sampling Technique

There are four sampling techniques used in this study. The initial method employed at the provincial level was cluster sampling, selecting samples from MSMEs in Bantul Regency, which possesses the highest concentration of MSMEs in Yogyakarta (see Table 1). This method can yield a representative sample of the population while simultaneously mitigating the constraints of available research funds.

Table 1. MSME Population, per Scale and Area in Yogyakarta Special Region, 2024

Business Scale	MSME	%	Area	MSME	%
Micro	**328,591**	**95**	**Bantul Regency**	**94,095**	**27**
Small	16,126	5	Sleman Regency	89,249	26
Medium	2,131	1	Gunungkidul Regency	58,915	17
			Yogyakarta City	42,368	12
			Kulon Progo Regency	38,276	11
			Non-DIY Resident, business location in DIY	23,945	7
	346,848	100	**Total**	346,868	100

Note: Percentage calculated from the process results.
Source: Bapperida DIY (2025)

Secondly, at the district level, judgmental or purposive sampling and cluster sampling procedures were employed, with samples drawn from micro-scale MSMEs, which represent the predominant category of MSMEs in DIY (see Table 1). The micro-scale reference is defined in accordance with the Law on MSMEs and BPS. Article 6 of Law No. 20 of 2008 about MSMEs stipulates that micro enterprises must meet the following criteria: (1) possessing assets (excluding land and buildings for company premises) not exceeding IDR 50 million, or (2) achieving a maximum revenue of IDR 300 million (Badan Pemeriksa Keuangan, 2008). According to the BPS criteria (2024a), micro industries are defined as those employing 1 to 4 individuals.

Table 2. Micro-Scale MSME Population and Sample, per District in Bantul Regency

District	Population		Sample	
	MSME	%	MSME	%
Banguntapan	7,536	9.5	37	22.0
Kasihan	6,927	8.7	30	17.9
Sewon	6,406	8.1	9	5.4
Bantul	5.632	7.1	43	25.6
Jetis	5,586	7.0	12	7.1
Imogiri	5,531	7.0	37	22.0
Total of six districts	37,618	47.4	168	100.0
11 other districts	41,695	52.6		
Total	79,313	100.0		

Note: MSMEs only refer to micro firms and do not include medium-sized firms or those that have not submitted the data in the Sidakui Bantul.
Source: Sidakui Bantul (2024)

Third, at the regency level, a cluster sampling method was employed, selecting samples from the six districts with the highest densities of micro-scale MSMEs (see Table 2). Fourth, due to the absence of a comprehensive list of MSMEs and their addresses, incidental sampling was utilized instead of random sampling.

Table 3. MSME Sample, per Business Type in Bantul, 2024

Business Type	Population		Sample	
	MSME	%	MSME	%
Non-Trade	15,734	41.0	86	51.2
Trade	22.607	59.0	82	48.8
Total	38,341	100.0	168	100.0

Note: (1) The non-trade business category within the population includes agriculture, culinary arts, fashion, education, automotive, crafts, and electronics. (2) The non-trade business category in the sample comprises micro-enterprises engaged in the production of food and beverages, non-food items, and services.
Source: Sidakui Bantul (2024)

We had a conversation with the respondent in Bantul Regency to obtain their informed consent. By describing the goals of this study, we were able to gain their approval. Additionally, we thoroughly explained the goals, procedures, and benefits of the research to each respondent. All respondents confirmed that they had read the background information and voluntarily agreed to participate, providing verbal informed consent.

RESEARCH MODEL

This study used the PLS-SEM analysis approach. Each indicator of FL, DFL, and FWB is scored on a scale from 0 to 100, yielding an average score within that range. A higher score (close to 100) indicates a high level of FL, DFL, and FWB among the respondents. Certain questions are designated as correct or incorrect. A correct answer is scored 100, and 0 otherwise. Several questions are also formulated using a Likert scale ranging from 1 to 5. The correct response is assigned a score of 100, whereas the incorrect response is assigned a score of 0. The answers between the correct and incorrect answers are scored 75, 50, and 25. We utilize Anshika *et al.* (2021), CDPB (2023), Chen and Volpe (1998), Dewi *et al.* (2020), Kartini and Mashudi (2022), Lyons and Kass-Hanna (2021), Melbourne Institute (2020), OECD (2023), Ouachani *et al.* (2021), and Sinani (2021) as references for the questionnaire items, incorporating some modifications.

Figures 1-4 illustrate the correlation patterns among the dimensions of FL, DFL, and FWB investigated in this study. This study employed the model depicted in the accompanying figures, following the conceptual framework presented.

$$FWB = \beta_{10} + \beta_{11} \cdot FK + \beta_{12} \cdot FB + \beta_{13} \cdot FA + \beta_{14} \cdot DFK + \beta_{15} \cdot DFB + \beta_{16} \cdot DFA + \varepsilon_1 \quad (1)$$

$$FB = \beta_{20} + \beta_{21} \cdot FK + \beta_{22} \cdot FA + \varepsilon_2 \quad (2)$$

$$FA = \beta_{30} + \beta_{31} \cdot FK + \beta_{31} \cdot DFK + \beta_{32} \cdot DFB + \varepsilon_3 \quad (3)$$

$$DFB = \beta_{40} + \beta_{41} \cdot DFK + \beta_{42} \cdot DFA + \varepsilon_4 \quad (4)$$

$$DFA = \beta_{50} + \beta_{51} \cdot DFK + \varepsilon_5 \quad (5)$$

Where: FWB = financial well-being, FK = financial knowledge, FB = financial behaviors, FA = financial attitudes, DFK = digital financial knowledge, DFB = digital financial behaviors, and DFA = digital financial attitudes, β_{i0} = the i_{th} model constant, β_{ij} = regression coefficients in the i_{th} equation for the j_{th} independent variables in the i_{th} model, and ε_i = the i_{th} error model.

PLS-SEM Phases

Before running the hypothesis test on the research model, several steps must be taken using the PLS-SEM method. By evaluating each indicator's relevance using its outer loading values, this study performed a convergent validity assessment (Hair *et al.*, 2019, 2021). An outside loading greater than 0.5 is considered sufficient to demonstrate convergent validity, according to Chin (1998). Indicators with outer loading values below 0.5 were removed from the measurement model, following the recommended threshold (Hair *et al.*, 2019, 2021). Discriminant validity was assessed in addition to convergent validity (Hair *et al.*, 2019, 2021). The Heterotrait–Monotrait Ratio (HTMT) criterion was used to evaluate the discriminant validity of the constructs (Hair *et al.*, 2019, 2021). Adequate discriminant validity is indicated by HTMT scores below 0.90 (or below 0.85). Additionally, multicollinearity was evaluated using the Variance Inflation Factor (VIF), with acceptable VIF values being below 5 (Hair *et al.*, 2021) or below 10 (Hair *et al.*, 2019).

Validity and Reliability Tests

It is important to carry out validity and reliability testing stages on the study indicators and variables. This study framework has seven main variables, with each indicator signifying a reflective measurement model (Hair *et al.*, 2022). Thus, changes in the latent variables will lead to changes in each indicator. Figure 1 illustrates the causal relationship between the research variables.

Figure 1. Research Framework with the PLS-SEM Diagram

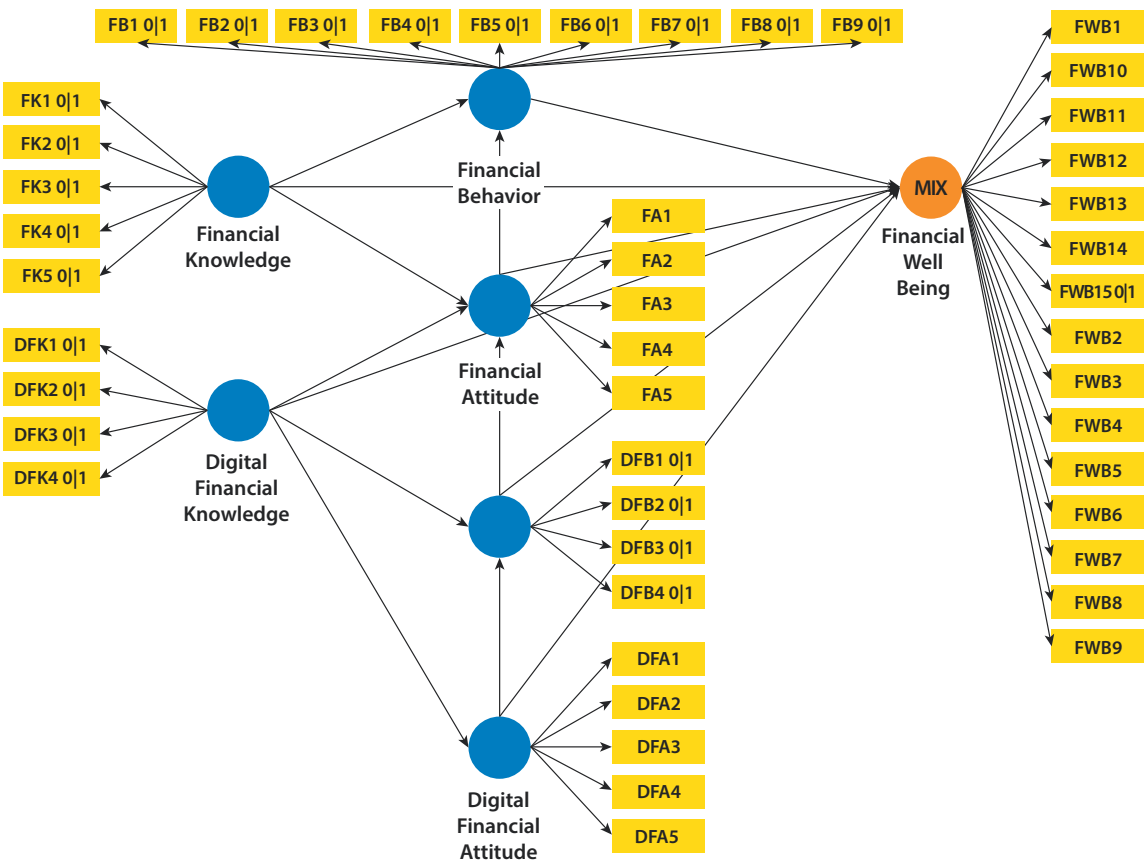
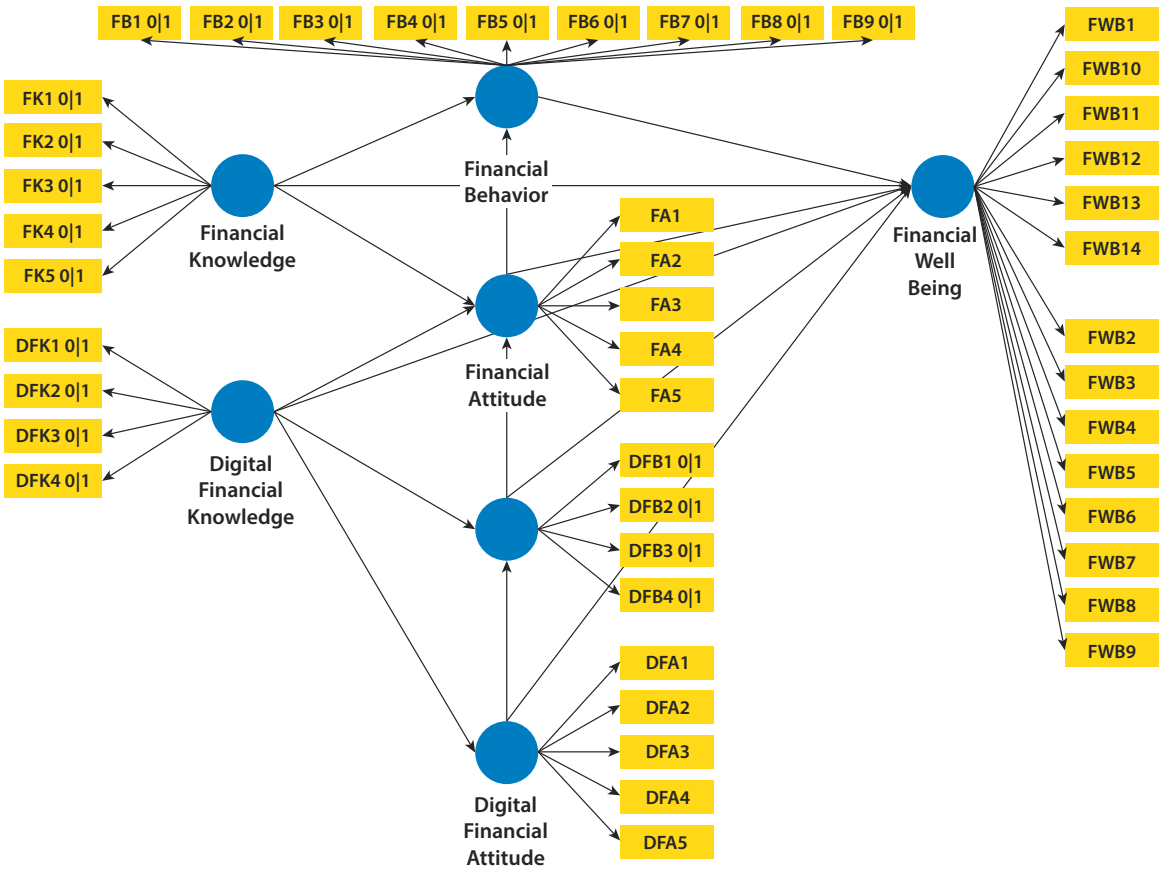


Figure 1 illustrates the measurement of FK using five indicators (FK1–FK5), DFK with four indicators (DFK1–DFK4), FB with nine indicators (FB1–FB9), FA with five indicators (FA1–FA5), DFB with four indicators (DFB1–DFB4), DFA with five indicators (DFA1–DFA5), and FWB with fifteen indicators (FWB1–FWB15).

Figure 1 illustrates the mix measurements attributable to the FWB15 indicator. The problem inhibited SmartPLS from processing the research data. The issue was resolved by excluding the FWB15 indicator from the dependent variable in the reflective measurement model.

Upon the removal of the FWB15 indicator from the model, Figure 2 was generated. Figure 2 illustrates the non-mixed data model used for assessing validity and reliability. Figure 2 was utilized to verify that the selected measurement scale corresponds with the theoretical construct, the data characteristics, and the analytical capabilities of the software.

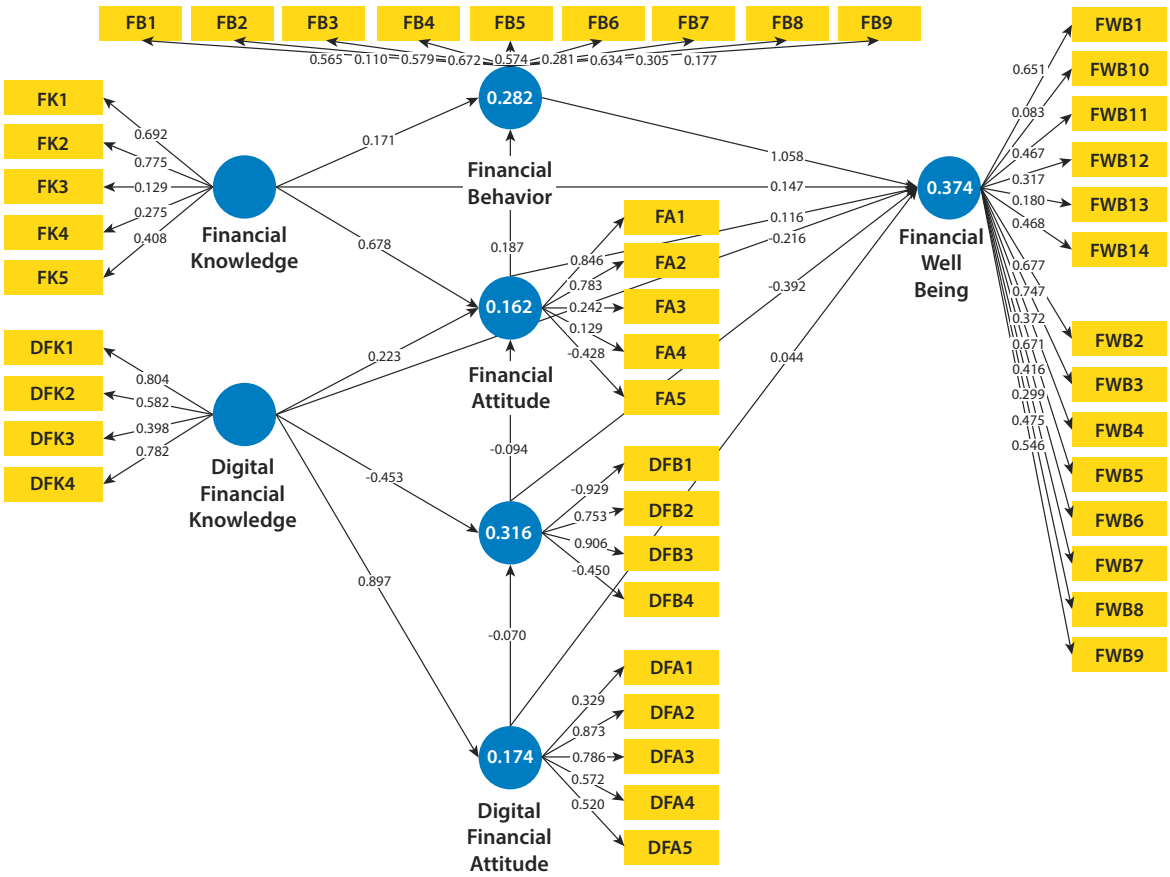
Figure 2. Non-Mixed Data Model



Convergent Validity Test

This research performed a convergent validity test, analyzing the relevance of each indicator in relation to its outer loadings (Hair *et al.*, 2019, 2021). Figure 3 illustrates the outcomes of the indicator validity tests utilizing outer loadings. According to Figure 3, the validity of indicators can be assessed through their respective outer loadings. Chin (1998) asserts that an outer loading value exceeding 0.5 is considered sufficient to meet convergent validity criteria. When a threshold value of <0.5 is applied (Hair *et al.*, 2019, 2021), outer loadings that fall below 0.5 are excluded from the model (Hair *et al.*, 2019). The indicators exhibiting outer loadings below 0.5 are DFA1, DFB4, DFK3; FA3, FA4, FA5; FB2, FB6, FB8, FB9; FK3, FK4, FK5; FWB4, FWB6, FWB7, FWB8, FWB10, FWB11, FWB12, FWB13, and FWB14.

Figure 3. Convergent Validity Test Diagram (Phase 1)



Upon removing these indicators from the model, this study generated a revised model, as illustrated in Figure 4. Figure 4 functioned as a benchmark for executing the convergent validity test in the subsequent phase. Despite the removal of multiple indicators from the PLS-SEM diagram, the model remained appropriate for assessing convergent validity. The investigation demonstrated that the remaining indicators in the model satisfied the criteria for convergent validity (outer loadings > 0.5). Validity measures, such as outer loadings, should be considered alongside theoretical justification and content validity. Instead of focusing on whether each indication satisfies a strict statistical threshold, measurement validity essentially reflects whether the set of indicators collectively captures the construct as it is theoretically stated. This viewpoint is consistent with more general measurement theory, which views construct validity as a synthesis of theoretical definition, content relevance, and empirical evidence rather than just a statistical feature (Repke *et al.*, 2024). When gathering extensive data, we have improved and validated the measurement tools in the current work. To ensure that the items are relevant, clear, and representative of the construct prior to official data collection, expert review is commonly recommended during instrument design. This process enhances both content validity and respondents' understanding of the questions.

Discriminant Validity Test

In addition to convergent validity, this study also tested discriminant validity (Hair *et al.*, 2019, 2021). The Heterotrait-Monotrait Ratio test (HTMT) (Hair *et al.*, 2019, 2021) evaluated discriminant validity among constructs in the study. An HTMT value below 0.9 (or <0.85) signifies sufficient discriminant validity. The outcomes of the discriminant validity assessment utilizing HTMT are presented in Table 4. According to Table 4, all correlation coefficients among the latent variables or constructs are below the threshold value (<0.9), signifying that the research model is satisfactory.

Figure 4. Convergent Validity Test Diagram (Phase 2)

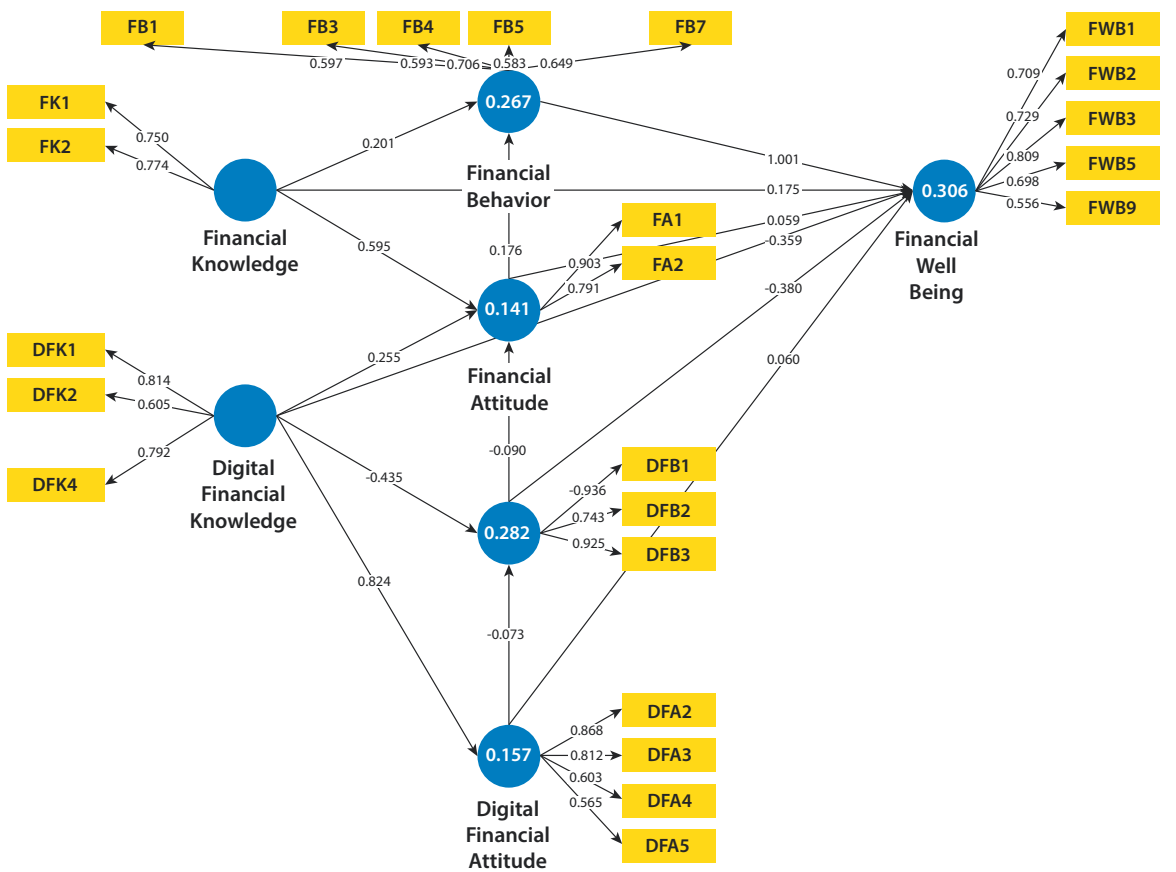


Table 4. Discriminant Validity Test using HTMT

Correlation	HTMT
DFB ↔ DFA	0.414
DFK ↔ DFA	0.607
DFK↔ DFB	0.667
FA ↔ DFA	0.248
FA ↔ DFB	0.247
FA ↔ DFK	0.375
FB ↔ DFA	0.258
FB ↔ DFB	0.336
FB ↔ DFK	0.462
FB ↔ FA	0.689
FK ↔ DFA	0.743
FK ↔ DFB	0.535
FK ↔ DFK	0.848
FK ↔ FA	0.831
FK ↔ FB	0.877
FWB ↔ DFA	0.226
FWB ↔ DFB	0.308
FWB ↔ DFK	0.217
FWB ↔ FA	0.420
FWB ↔ FB	0.696
FWB ↔ FK	0.587

Multicollinearity Test

Furthermore, the HTMT test outcomes were further corroborated by a multicollinearity test. Elevated multicollinearity can amplify standard errors and influence the interpretation of findings. Multicollinearity is determined by the Variance Inflation Factor (VIF) value. The optimal VIF value is below 5 (Hair *et al.*, 2021) or below 10 (Hair *et al*., 2019). The VIF values are presented in Table 5. Table 5 indicates the absence of multicollinearity among the indicators, as indicated by the VIF value, which is below 5.

Table 5. Multicollinearity Test

DFL Indicator	VIF	FL Indicator	VIF	FWB Indicator	VIF
DFA2	2.815	FA1	1.257	FWB1	1.899
DFA3	2.674	FA2	1.257	FWB2	1.915
DFA4	2.127	FB1	1.380	FWB3	1.629
DFA5	1.991	FB3	1.374	FWB5	1.451
DFB1	3.057	FB4	1.242	FWB9	1.181
DFB2	1.560	FB5	1.157		
DFB3	2.895	FB7	1.123		
DFK1	1.232	FK1	1.027		
DFK2	1.140	FK2	1.027		
DFK4	1.283				

Note: DFL = digital financial literacy, FL = financial literacy

Hypothesis Test

After confirming that the model met the criteria for both convergent and discriminant validity, the study proceeded to test the hypotheses presented in the following section.

RESULTS AND DISCUSSIONS

Results

Hypothesis testing is used in statistics to determine whether findings from a sample can be generalized to a larger population. The results of the hypothesis tests are presented in Table 6.

Table 6. Hypothesis Testing (Direct Effect)

Direct Effects	β	t-statistics	Prob.
FK → FA	0.595	3.509	0.000***
FK → FB	0.201	2.721	0.007***
FA → FB	0.176	4.524	0.000***
DFK → DFB	-0.435	6.013	0.000***
DFK → FA	0.255	1.443	0.149
DFK → DFA	0.824	6.531	0.000***
DFB → FA	-0.090	0.466	0.642
DFA → DFB	-0.073	2.060	0.039**
FK → FWB	0.175	1.101	0.271
FB → FWB	1.001	5.119	0.000***

Direct Effects	β	t-statistics	Prob.
FA → FWB	0.059	0.621	0.534
DFK → FWB	-0.359	2.259	0.024**
DFB → FWB	-0.380	2.408	0.016**
DFA → FWB	0.060	0.746	0.456

Note: ** and *** denote significance at error tolerance of 5% and 1%.

Table 6 illustrates that DFA have a significantly negative impact on DFB, which in turn negatively affect FWB. Furthermore, DFB affects DFA, DFB and FWB . FA positively affect FB, which subsequently have a positive effect on FWB. Finally, FK positively affects FA and FB.

DISCUSSIONS

The Effect of FK on FB and Financial Attitudes

The estimation results indicate that FK positively affects FB and FA. The findings are confirmed with Netemeyer *et al.* (2024), Lihan *et al.* (2024), and Lihan *et al.* (2024), who reveal that individuals with better FK will exhibit better FB. These findings also suggest that MSME owners with better FK, particularly in relation to inflation and investments, will appreciate the time value of money and exhibit more effective FB, as indicated by improved financial management. A type of financial management behavior involves future financial planning through the accumulation of savings.

Table 7. The Scores for FB Dimension Indicators

Indicator	Average Score
Preparing expenditure planning	47.024
Recording expenditure transactions	25.000
Allocating expenditure items	66.071
Owning savings	86.310
Setting saving targets	51.786

The savings ownership indicator score ranks highest within the FB dimension of MSMEs. This signifies that most MSMEs in Bantul possess savings. Moreover, a better financial understanding, especially concerning the time value of money, will enhance individuals' FA. MSMEs have a commendable FA' score of 65.476, influenced mainly by their perspective on utilizing surplus funds. The MSMEs' attitude indicator for allocating surplus capital toward long-term savings scored 76.94.

The Effect of FA on FB

FA positively affect FB. This finding is consistent with prior studies showing that stronger FA leads individuals to exhibit better FB (Hendri *et al.*, 2022; Moko *et al.*, 2022; Ratnawati *et al.*, 2023). The results indicate that individuals with more favorable FA exhibit more favorable FB. The application of financial principles, such as managing money shortages or surpluses, will impact FB. The mean score of the attitude indicator for MSMEs in Bantul Regency regarding the allocation of surplus cash for long-term savings is 76.935, surpassing the mean score for the utilization of surplus cash for non-cash assets, which stands at 54.018. This condition influences FB, with the savings ownership indication exhibiting the highest mean score within the FB dimension of MSMEs in Bantul Regency. Approximately 58.333% of MSMEs in Bantul save funds in commercial banks (see Table 8).

Table 8. Allocation of Assets of MSME Owners in Bantul Regency

Saving	Frequency
Saved in banks	84 (58.333%)
Hard cash at home	63 (43.448%)
Savings at Non-Formal Institutions	44 (30.345%)
Gold	33 (22.759%)
Others	20 (13.793%)
Pension Funds	5 (3.448%)
Bonds	1 (0.690%)
Stocks	1 (0.690%)

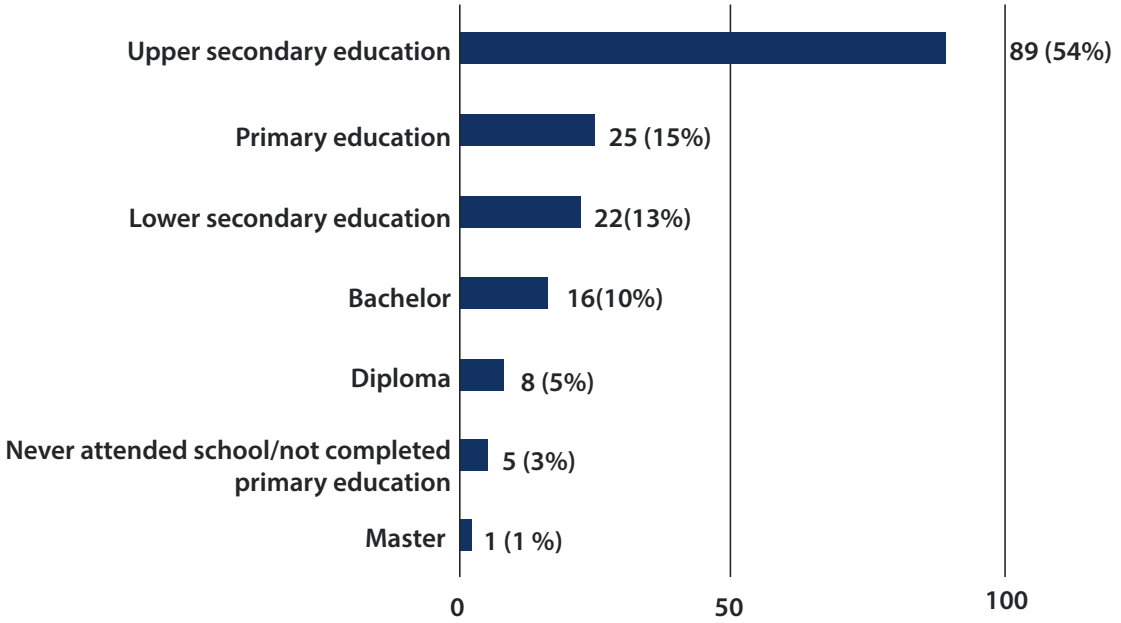
The Effect of DFK on DFB

Table 6 shows that DFK has a negative impact on DFB. The results differ from the hypothesis, which predicts that DFK has a positive effect on DFB. Our findings indicate that DFK negatively affects DFB, implying that individuals with better digital financial understanding exhibit poorer DFB. Thus, MSME owners in Bantul Regency tend to have lower DFK. The mean score for the DFK dimension among MSMEs in Bantul Regency is 47.024. With this limited understanding, individuals who possess greater knowledge of digital finances – including the associated benefits and risks – may be less motivated to adopt and use these technologies. The mean score for the inquiry "Do you utilize digital financial applications?" serves as a measure of the DFB dimension of MSMEs in Bantul Regency, with a value of 35.714. This signifies that a limited number of MSMEs utilize digital banking applications.

The Effect of DFK on FA and DFA

The estimation results presented in Table 6 indicate that DFK does not influence FA. This outcome contradicts our hypothesis, which predicts that DFK positively affects FA. The insignificant impact of DFK on FA indicates that a better understanding of digital financial technology, encompassing its usage, security features, and advantages, does not influence the FA of MSMEs throughout periods of financial excess or deficit. They continue to disregard the adoption of advancements in digital technology, likely because most MSME owners have limited educational qualifications, with most having only completed high school (see Figure 5).

Figure 5. Educational Levels of MSME Owners in Bantul Regency



Moreover, DFK does not affect DFA, perhaps because MSMEs tend to share transaction passwords/PINs with their spouses. Conversely, DFL positively affects DFA. These findings support the hypothesis that MSME owners with a stronger understanding of digital financial technology tend to be more cautious and prudent in its utilization. MSME owners with better DFK are more likely to verify websites before transactions, review terms and conditions before online purchases, avoid unsolicited promotional links, and resist online prize temptations presented via social media. The MSMEs in Bantul Regency exhibit a relatively high average score of 76.042 in the dimension of DFA.

The Effect of DFB on FA

DFB do not affect FA. The findings differ from prior studies that demonstrate that FB affect individuals' FA, especially in making investment decisions (Masitoh *et al.*, 2024). Hence, individuals' behaviors in utilizing digital financial technology, such as safeguarding against the risks associated with it, do not affect their attitudes in making financial planning.

The Effect of DFA on DFB

DFA negatively affect DFB. This finding rejects the hypothesis that DFA positively affect DFB. Hence, MSME owners with a more positive attitude toward the utilization of digital financial technology, as indicated by their awareness of associated risks, are less likely to adopt this technology.

The Effects of FL (FK, FB, and FA) on FWB

In the company of the three dimensions of FL—FK, FB, and FA—only FB has a significantly positive effect on FWB. The behavioral factor is the sole aspect of FL that encompasses behaviors or direct action. Proactive measures, which include financial planning, expenditure tracking, expense allocation when generating income, savings accumulation, and establishing savings objectives for future aspirations, will enhance individuals' resilience against financial adversities and elevate their financial satisfaction. Consequently, individuals exhibiting sound financial actions will experience enhanced FWB (Chan *et al.*, 2012).

Meanwhile, financial knowledge and attitudes do not significantly impact the FWB of MSME owners in Bantul Regency. The findings are attributed to the profound association between Javanese culture and gratitude. The average FWB score for MSMEs in Bantul Regency was very high at 77.555, with all MSMEs expressing satisfaction and no concerns regarding their financial conditions. Consequently, FWB was attained subjectively, irrespective of FL levels.

Table 9. FWB of MSME Owners

Aspect/Concept	Mean Score
Objective Aspect/Financial Resilience	73.065
Subjective Aspect/Satisfaction	100.000
FWB	77.555

Nevertheless, the objective (financial resilience) aspect is affected by MSME owners' FB. MSME owners' FB in managing their finances effectively enable them to survive amidst the COVID-19-driven economic downturns.

Table 10. FWB Indicators of MSME Owners

Indicator/Concept	Mean Score
Operating costs were always covered in the last 12 months.	83.036
Frequently capable of covering operational cost shortfalls	83.036
Savings can endure for more than one month even the business is not operating.	50.595
FWB	77.555

The Effects of DFL (DFK, DFB, and DFA) on FWB

The DFK and digital financial behaviors negatively affect the FWB of MSME owners in Bantul Regency. The findings do not support prior studies that report a positive relationship between DFL and FWB. A better understanding of digital financial technology enables individuals to utilize these innovations for investments, savings, and digital payments, thereby enhancing their financial satisfaction and overall well-being (Choi & Kim, 2023; Dzogbenuku *et al.*, 2022; Gong *et al.*, 2024; Jhonson *et al.*, 2023). Nevertheless, this study empirically documents different results, i.e., DFL (the DFK and DFB dimensions) negatively affects FWB. A likely explanation for these findings is that better DFL enables MSME owners to leverage their knowledge and capitalize on opportunities to utilize digital technology applications.

Digital technology applications serve not only business objectives but also lifestyle needs, such as online buying via the Shopee application and similar platforms. This hinders MSMEs from allocating funds for unexpected needs. Zhang and Fan (2024) demonstrate that excessive utilization of fintech products likely leads to irresponsible financial behavior, such as excessive spending and overreliance on expensive credits, ultimately jeopardizing financial well-being. Prabhakaran and Mynafathi, (2024) document that financial technology utilization negatively affects financial behavior. This adverse effect may arise from the rise of fintech users utilizing high-interest credit and buy-now-pay-later alternatives intended to promote consumptive spending. This access may encourage individuals, including the financially literate, to adopt spending patterns that undermine prudent financial behavior. These findings corroborate the behavioral life cycle theory, which posits that individual financial decisions regarding saving or consumption are influenced more by psychological and behavioral factors than by rational considerations. Under these conditions, enhancing DFL may lead to MSMEs lacking financial resilience. In other words, higher levels of DFL are associated with lower levels of FWB.

CONCLUSIONS

This study focuses on MSME owners in Bantul Regency by analyzing the effects of several variables on FWB, including FK, FB, FA, DFK, DFB, and DFA. The results demonstrate that financial knowledge affects FB and FA, while FA affect FB. Further, DFK affects DFB, DFK affects FK, and DFA and DFB affect FA. DFA affect DFB; FL (FK, FB, and FA) affects FWB. Lastly, DFL (DFK, DFB, and DFA) affects the FWB of MSME owners in Bantul Regency.

Better FL enables micro and small enterprise owners to make informed financial decisions, manage revenues and expenditures effectively, and prepare more effective financial plans, thus preventing firms from experiencing financial problems. FL also positively affects the business performance of micro and small enterprises, leading to improved FWB. DFL helps micro and small enterprises to select and utilize digital devices to support their business activities. The use of DFL-based fintech leads to more efficient and cost-saving transactions. Digital technology enables micro and small firms to expand their marketing and sales outreach. In the digital era, micro and small enterprises require digital literacy to adapt and sustain business performance, which affects their FWB.

From a policy standpoint, cooperation between local governments and financial authorities (Bank Indonesia, as the Central Bank of the Republic of Indonesia, and the Financial Services Authority and Banking Authority) is essential to enhance digital financial literacy among MSMEs through socialization and training initiatives. Moreover, the involvement of academicians in financial management training and mentorship for MSMEs is crucial. These activities seek to provide practical expertise in financial management, digital technology selection, and strategic corporate decision-making. Micro and small enterprises are encouraged to leverage financial technologies for improved operational efficiency and market expansion. Moreover, government support in terms of the availability of inclusive finance is absolutely necessary. Inclusive financial products and services encompass fintech breakthroughs, micro business loans, and payment solutions accessible to micro and small enterprises.

This study is limited to a narrow scope inside Bantul Regency, Yogyakarta Special Region. Our findings may not be generalized for other regions due to the arguably significant influence of culture on our results, which varies across different regions. Therefore, to expand the generalizability of the findings, future studies should focus on a broader scope (e.g., across districts, provinces, or nationally).

Due to the unavailability of the MSME list and their addresses, we used accidental sampling in the final phase of the sample technique. Consequently, future studies should utilize full probability sampling methods wherever feasible. Furthermore, the scope of this research is confined to a particular point in time. To assess the sustainability of FL, DFL, and genuine FWB, it is essential to evaluate the operational duration of micro and small enterprises. While PLS-SEM is suitable for exploratory modeling, future studies could benefit from longitudinal or panel data to better capture the dynamic relationships between literacy dimensions and financial well-being over time, particularly in the context of MSME sustainability and digital adoption.

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ULOGA FINANSIJSKE PISMENOSTI I DIGITALNE FINANSIJSKE PISMENOSTI U UNAPREĐENJU FINANSIJSKOG BLAGOSTANJA MALIH I SREDNJIH PREDUZEĆA

Rezime:

Ova studija ispituje efekte finansijske pismenosti i digitalne finansijske pismenosti na finansijsko blagostanje vlasnika mikro i malih preduzeća (MSP). Primarni podaci su prikupljeni putem anketa sprovedenih među vlasnicima MSP u regionu Bantul, specijalnom regionu provincije Jogjakarta. Ovo istraživanje je generisalo uzorak korišćenjem različitih tehnika uzorkovanja (klastersko, namerno i slučajno uzorkovanje). Ukupno 168 ispitanika je iskorišćeno za analizu podataka primenom modeliranja parcijalnih najmanjih kvadrata - strukturnih jednačina (PLS-SEM) sa softverom SmartPLS. Rezultati pokazuju da finansijsko znanje utiče na finansijsko ponašanje i stavove, dok digitalno finansijsko znanje utiče na digitalno finansijsko ponašanje i digitalne finansijske stavove, pri čemu digitalni finansijski stavovi dodatno utiču na digitalno finansijsko ponašanje. Pored toga, ova studija potvrđuje da finansijsko ponašanje, digitalno finansijsko znanje i dimenzije digitalnog finansijskog ponašanja utiču na finansijsko blagostanje. Mikro i mala preduzeća će verovatno donositi zdrave procene, efikasnije upravljati finansijskim pitanjima i razvijati održive poslove ako bolje razumeju finansijsko upravljanje i digitalnu tehnologiju.

Ključne reči:

finansijska pismenost;
digitalna finansijska pismenost;
finansijsko blagostanje;
mikro i mala preduzeća;
PLS-SEM.

JEL kasifikacija:
G11, D12