

Research Article

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Digital Financial Literacy and Financial Well-Being Among MSMEs: A Multi-Group Analysis and Implications for Higher Education Finance

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Abstract

Background/purpose. The digital transformation of the financial system has reshaped not only the practices of Micro, Small, and Medium Enterprises (MSMEs) but also the educational needs of students preparing for future entrepreneurship. This study aims to analyze the differences in the influence of key factors, Digital Financial Literacy, Entrepreneurial Orientation, and Managerial Attributes, on the Financial Well-Being of MSMEs based on business scale (micro, small, and medium enterprises). The study also considers Perceived Regulatory Support as a moderating variable and Fintech Proficiency as a mediating variable.

Materials/methods. This study employs a quantitative approach involving 295 respondents selected from 1,129 MSMEs fostered by Bank Indonesia across 33 provinces. Data analysis was conducted using the Multi-Group Analysis (MGA) approach to explore structural differences among business scale groups.

Results. The results of the Multi-Group Analysis (MGA) indicate structural differences among MSME groups. In the micro-enterprise group, Digital Financial Literacy emerged as the primary factor directly influencing financial well-being. In the small-enterprise group, Managerial Attributes and Fintech Proficiency were identified as the dominant factors. Meanwhile, in the medium-enterprise group, Financial Well-Being was more strongly influenced by Fintech Proficiency and Entrepreneurial Orientation.

Conclusion. The findings emphasize the importance of designing tiered and contextual empowerment strategies for MSMEs, focusing on literacy, managerial capacity, and technology adoption. Importantly, the results also offer pedagogical implications: strengthening students' digital financial literacy, managerial skills, and entrepreneurial orientation in higher education can equip them to thrive in an increasingly digital financial ecosystem.

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a vital role in Indonesia's economy. Despite their large numbers and significant contributions, MSMEs in Indonesia continue to face various challenges related to financial well-being. Many MSME actors have not yet achieved stable financial well-being, as indicated by the high dependence on financing through online loans or fintech lending. According to data from the Financial Services Authority (OJK), MSME financing through fintech peer-to-peer (P2P) lending in 2022 accounted for approximately 32.97% of total fintech lending in Indonesia.

The financial well-being of MSME actors encompasses their ability to meet both short-term and long-term financial needs, as well as maintain reserves to face emergency conditions. Financial well-being has long been an area of interest for economists, researchers, educators, financial advisors, and planners (García-Mata & Zerón-Félix, 2022). One of the factors influencing MSME financial well-being is the low level of digital financial literacy.

Digital financial literacy plays a key role in enhancing the ability of MSME actors to manage finances, particularly in an increasingly digital business environment. Previous studies, such as that conducted by Kumar et al. (2023), show a positive correlation between digital financial literacy and the financial well-being of business actors, where a good understanding of digital financial products enables MSMEs to access more effective financing and manage financial risks more wisely. Several earlier studies have examined the relationship between digital financial literacy and financial well-being. Choung et al. (2023) found a positive influence, while Zhang & Fan (2024) and Bhat et al. (2025) reported a negative influence. Digital financial literacy not only impacts MSME actors' ability to manage finances more prudently, but also plays an important role in enhancing entrepreneurial orientation.

Entrepreneurial orientation refers to the processes, practices, and decision-making activities that lead to entrepreneurial behavior within an organization or individual. According to Miller (1983), entrepreneurial orientation includes innovative, proactive, and risk-taking behaviors. Previous research has frequently demonstrated a positive influence of entrepreneurial orientation on the financial well-being of MSME actors. For example, a study by Wilson & Perepelkin (2022) found that innovation and risk-taking, two key dimensions of entrepreneurial orientation, significantly contribute to improved financial performance, ultimately enhancing financial well-being. Entrepreneurial orientation is closely related to managerial attributes, which play a crucial role in supporting effective and sustainable MSME management.

Managerial attributes refer to the qualities or managerial skills that influence a leader's effectiveness in performing managerial roles. A study by Salehi et al. (2022) found that firms with strong managerial skills tend to achieve better business sustainability, which in turn improves their financial well-being. Other studies have also highlighted the impact of managerial attributes on MSME financial well-being. Roffia et al. (2022) discussed how board attributes affect financial performance, which is indirectly related to financial well-being. Eide & Madsen (2021) examined how managerial growth aspirations influence organizational outcomes, including employee welfare as an indicator of SME financial well-being. However, some studies, such as those by Park & Byun (2022) and Arianpoor & Yazandpanah (2023), show that not all managerial attributes significantly enhance financial performance.

Given the mixed findings on the relationship between digital financial literacy, entrepreneurial orientation, and managerial attributes with financial well-being, this study proposes Fintech Proficiency as a mediating variable. Fintech proficiency is defined as the level of competence users possess in utilizing, managing, and optimizing digital financial technologies to enhance financial performance, effectiveness, and efficiency. This study not only focuses on the mediating role of

fintech proficiency but also explores how perceived regulatory support may strengthen the influence of digital financial literacy on fintech proficiency. Several prior studies have highlighted the role of perceived regulatory support as a moderator in the impact of digital financial literacy. Amnas et al. (2024) emphasized the importance of digital financial literacy in improving MSMEs' access to and use of fintech. Abdulkareem & Oladimeji (2024) discussed the critical role of regulatory support in enhancing the adoption of digital financial technology.

Beyond the business context, this issue carries profound educational relevance. Universities are tasked with preparing students not only to be job-seekers but also future entrepreneurs. Yet, curricula in many higher education institutions still lack an integrated approach to financial education that bridges digital literacy, managerial skills, and entrepreneurial orientation. Consequently, the lessons drawn from MSME practices can serve as valuable inputs for developing higher education programs. By translating MSME experiences into academic insights, universities can strengthen students' readiness for the financial challenges of the digital era.

Despite the growing body of research, several gaps remain. First, studies rarely differentiate the influence of these determinants across business scales, leaving unanswered whether micro, small, and medium enterprises experience unique pathways to financial well-being. Second, there is limited exploration of how these findings can inform educational practices, particularly the design of financial and entrepreneurial education in higher education institutions. This study addresses both gaps by investigating the structural differences among MSMEs while explicitly discussing the implications for student learning.

2. Literature Review and Hypothesis Development

2.1. Digital Financial Literacy and Fintech Proficiency

Digital Financial Literacy denotes an individual's capacity to comprehend and proficiently utilise digital financial technologies. Alkhwalidi's study (2024) revealed that digital financial literacy significantly influences the adoption of financial technology among small and medium enterprises in Malaysia. Affandi (2024) underscored the need of digital transformation for MSMEs to attain growth and competitiveness in the global marketplace. Consequently, robust backing from policymakers is essential to promote digital adoption within the MSME sector. In light of these ideas, the initial hypothesis of this investigation is articulated as follows:

H1: Digital Financial Literacy has a positive and significant effect on Fintech Proficiency.

2.2. Entrepreneurial Orientation and Fintech Proficiency

Entrepreneurial orientation denotes the capacity or inclination of individuals or organisations to demonstrate entrepreneurial behaviours, including creativity, risk-taking, and proactivity. Business actors with a pronounced entrepreneurial orientation are more inclined to proactively utilise digital financial technologies to enhance their operational effectiveness. Research conducted by Shah and Ahmad (2019) and Asad (2023) indicates that entrepreneurial mindset improves firm owners' capacity to embrace financial technologies. In their 2021 study, Khattak and Shah investigated the influence of entrepreneurial orientation on the efficiency of small and medium companies, emphasising the moderating effect of government financial incentives. Consequently, the second hypothesis of this study is articulated as follows:

H2: Entrepreneurial Orientation has a positive and significant effect on Fintech Proficiency.

2.3. Managerial Attributes and Fintech Proficiency

Managerial attributes refer to the characteristics and managerial competencies, such as experience, knowledge, leadership skills, and decision-making abilities, possessed by business

managers or owners. Wang et al. (2023) found that strong managerial skills, such as decision-making ability and technological understanding, positively contribute to fintech proficiency. Coles and Li (2020) revealed that management attributes significantly impact corporate policies and performance, which might indirectly affect the adoption and deployment of financial technology in a corporation. In light of these observations, the third hypothesis of this study is articulated as follows:

H3: Managerial Attributes have a positive and significant effect on Fintech Proficiency

2.4. Digital Financial Literacy and Financial Well-Being

Digital Financial Literacy denotes the capacity of individuals or business entities to comprehend and utilise digital financial information and technology-driven financial services. Enhanced digital financial literacy is anticipated to improve the financial well-being of MSME participants, evidenced by increased financial stability, a heightened sense of financial security, and superior financial management. Kamble et al. (2024) and Rai et al. (2025) investigated the correlation between digital financial literacy and financial well-being among MSME participants. Their findings indicate that MSMEs with robust digital financial literacy are more likely to achieve enhanced financial security. In light of these observations, the fourth hypothesis of this study is articulated as follows:

H4: Digital Financial Literacy has a positive and significant effect on Financial Well-Being

2.5. Entrepreneurial Orientation and Financial Well-Being

Entrepreneurial orientation significantly contributes to the financial well-being of MSMEs. The research conducted by Desai et al. (2024) investigated the influence of entrepreneurial orientation on the financial well-being of women-led MSMEs in India. The findings indicated that MSME proprietors exhibiting a heightened entrepreneurial orientation demonstrated superior risk management and adaptability to fluctuating market conditions, hence enhancing their financial prosperity. Bernoster et al. (2020) discovered that elevated entrepreneurial orientation, especially regarding proactiveness and creativity, correlates positively with financial stability and entrepreneurial resilience. The findings indicate that a robust entrepreneurial attitude might augment the financial performance of MSMEs and promote their financial well-being. In light of these observations, the fifth hypothesis of this study is articulated as follows:

H5: Entrepreneurial Orientation has a positive and significant effect on Financial Well-Being.

2.6. Managerial Attributes and Financial Well-Being

Owners of MSMEs possessing robust managerial qualities are generally more adept at managing risks, manoeuvring through volatile business landscapes, and capitalising on chances to improve their financial stability and welfare. Rahman et al. (2020) investigated the influence of financial literacy and managerial characteristics on the financial well-being of MSME proprietors in Bangladesh. Research indicates that managerial qualities significantly enhance financial well-being, particularly through increased financial management efficiency and superior business decision-making. Hansen et al. (2021) discovered in their study in Myanmar that managerial qualities, including experience and access to formal financing, enhance the financial stability of firms. In light of these findings, the sixth hypothesis of this study is articulated as follows:

H6: Managerial Attributes have a positive and significant effect on Financial Well-Being

2.7. Fintech Proficiency and Financial Well-Being

In the realm of MSMEs, fintech competency denotes the capability to utilise digital financial services and apps, including digital payments, app-based financial management, and access to online credit and investment platforms. The research conducted by Dzogbenuku et al. (2023) underscores the significance of financial literacy, fintech adoption, and access to funding in enhancing the

performance and sustainability of small and medium companies (SMEs). The amalgamation of these three aspects not only fosters corporate efficiency and competitiveness but also substantially enhances the financial well-being of SME stakeholders. Gafoor & Amilan (2024) discovered that MSMEs possessing greater fintech expertise demonstrate superior financial risk management. In light of these observations, the seventh hypothesis of this study is articulated as follows:

H7: Fintech Proficiency has a positive and significant effect on Financial Well-Being

2.8. Perceived Regulatory Support moderates the relationship between Digital Financial Literacy and Fintech Proficiency

The perceived regulatory support among MSME stakeholders pertains to their views on the regulations, policies, and assistance offered by the government or pertinent authorities to promote the utilisation of digital financial technology. Amnas et al. (2024) investigated the moderating effect of perceived regulatory support on the link between digital financial literacy and fintech competency among MSMEs in India. Lontchi et al. (2023) similarly discovered that governmental regulatory support can amplify the influence of digital financial technology on the fintech capabilities of MSMEs in Cameroon. The results demonstrate that favourable regulatory backing enhances the impact of digital financial literacy on fintech competence. Consequently, the eighth hypothesis of this study is articulated as follows:

Hypothesis 8: Perceived Regulatory Support serves as a moderator in the relationship between Digital Financial Literacy and Fintech Proficiency

2.9. Mediating Role of Fintech Proficiency

Alkhawaldeh et al. (2023) discovered that digital financial literacy is essential for augmenting fintech competency, hence boosting the financial well-being of MSMEs in Jordan. The study conducted by Hidayat-ur-Rehman (2024) investigated the correlation between digital financial literacy and financial well-being, with fintech proficiency serving as a mediating variable among MSMEs. The findings indicated that MSMEs with elevated digital literacy are capable of improving their fintech competencies, hence reinforcing their financial health.

Kraus et al. (2023) discovered that entrepreneurial approach favourably affects the effective implementation of digital technology, which subsequently enhances financial performance and overall firm health. Yadav et al. (2024) indicated that elevated entrepreneurial orientation enhances the digital financial competencies of MSME proprietors, hence augmenting their financial well-being. Their findings suggest that an entrepreneurial attitude promotes the use of fintech, resulting in beneficial impacts on financial well-being. Xia et al. (2024) also determined that entrepreneurial orientation enhances financial well-being through proficiency in digital technologies within the MSME sector.

Zhu and Huang (2023) discovered that robust management qualities, including adaptability and creativity, positively influence fintech proficiency. This results in improved financial management and ultimately augments financial well-being. Zhang et al. (2024) established that managerial characteristics, especially decision-making abilities, enhance the utilisation of financial technology. This study corroborates the idea that robust fintech skills enhance the financial well-being of MSME participants. In light of these findings, the ninth, tenth, and eleventh hypotheses of this study are articulated as follows:

H9: Digital Financial Literacy has a positive and significant effect on Financial Well-Being through Fintech Proficiency.

H10: Entrepreneurial Orientation has a positive and significant effect on Financial Well-Being through Fintech Proficiency.

H11: Managerial Attributes have a positive and significant effect on Financial Well-Being through Fintech Proficiency.”

Based on the literature review, the conceptual framework of this study is constructed. The overall conceptual framework can be seen in Figure 1:

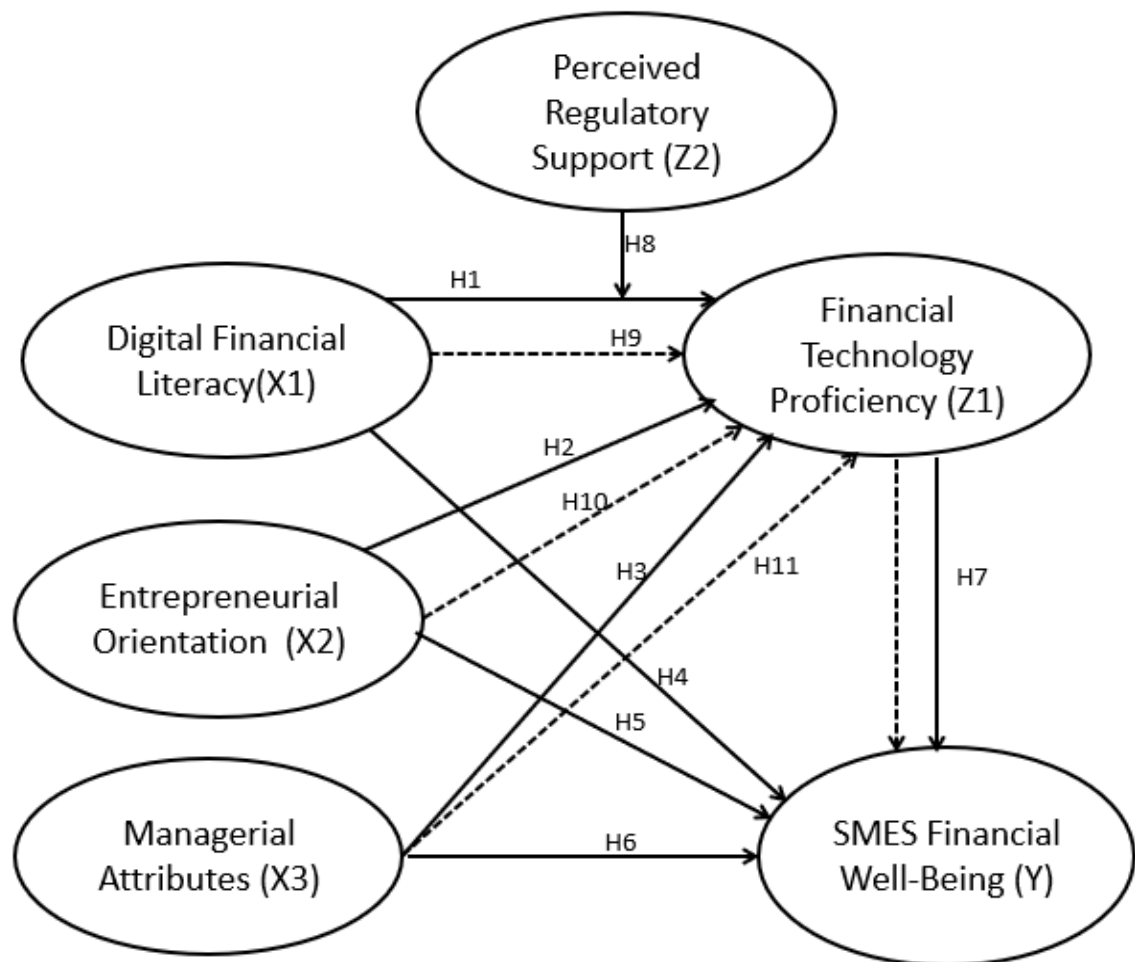


Figure 1. Proposed Research Model

Figure 1 illustrates the conceptual framework of this study. The model proposes that Digital Financial Literacy, Entrepreneurial Orientation, and Managerial Attributes directly influence Financial Well-Being while also exerting indirect effects through Fintech Proficiency. In addition, Perceived Regulatory Support is hypothesized to moderate the relationship between digital financial literacy and fintech proficiency. This framework acknowledges that the pathways to financial well-being may differ according to enterprise size, reflecting the distinct resources, capabilities, and challenges faced by micro, small, and medium enterprises

3. Methodology

3.1. Research Design

This study employed a quantitative, explanatory research design using a cross-sectional survey. The explanatory design was chosen because the purpose of this study is to test and compare the influence of several independent variables on the financial well-being of MSMEs while also examining mediating and moderating effects. The quantitative approach provides statistical rigor and allows for replicability across different enterprise groups.

3.2. Population and Sample

The population of this study comprised 1,129 MSMEs fostered by Bank Indonesia across 33 provinces in Indonesia. These enterprises represent diverse business scales (micro, small, and medium) and were considered a suitable population because they are actively involved in digital financial ecosystems. A total of 295 respondents were selected as the sample. The sampling technique combined purposive sampling (to ensure participants were MSMEs actively engaged in digital financial practices) with proportioned cluster random sampling (to ensure representativeness across provinces and business scales). The minimum sample size was determined using Krejcie and Morgan's (1970) formula, which recommended at least 285 respondents for a population of over 1,000. Thus, the final sample of 295 respondents was considered adequate and representative. The distribution of the sample was as follows: 134 micro-enterprises (45.43%), 104 small enterprises (35.25%), and 57 medium enterprises (19.32%).

3.3. Data Collection

Data were collected through an online questionnaire distributed to micro, small, and medium enterprises (MSMEs) fostered by Bank Indonesia. The sampling frame was drawn from Bank Indonesia's official MSME database, which ensured the representativeness of the study. Respondents were contacted through official channels, and their participation was entirely voluntary. Ethical approval was obtained from the Universitas Sumatera Utara Ethics Committee, and strict measures were taken to protect confidentiality and anonymity.

3.4. Research Instruments

For the purposes of this study, a structured questionnaire was designed, consisting of six main scales and a demographic section. The scales measured Digital Financial Literacy (DFL), Entrepreneurial Orientation (EO), Managerial Attributes (MA), Fintech Proficiency (FP), Perceived Regulatory Support (PRS), and Financial Well-Being (FWB). All items were rated on a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

The Digital Financial Literacy (DFL) scale, adapted from Kumar et al. (2023), Choung et al. (2023), and Kamble et al. (2024), consisted of four items. These items assessed the ability of respondents to conduct transactions on digital platforms, their knowledge of online financial services, awareness of risks such as fraud, and their budgeting and saving skills using digital tools. The Entrepreneurial Orientation (EO) scale was based on the classic framework introduced by Miller (1983) and further refined by Shah and Ahmad (2019) and Kraus et al. (2023). This three-item scale captured the extent of innovativeness, proactiveness, and willingness to take risks among MSME owners and managers.

The Managerial Attributes (MA) scale included four items that evaluated leadership and decision-making, access to resources, strategic capability, and integrity in managerial practices. These items were drawn from prior research on managerial competencies (Coles & Li, 2020; Hansen et al., 2021; Salehi et al., 2022). The Fintech Proficiency (FP) scale was newly developed for this study. Its conceptualization drew upon the Dreyfus Model of Skill Acquisition (Dreyfus & Dreyfus, 1980) and the Diffusion of Innovation Theory (Rogers, 1962). Four items were developed to represent the progressive stages of fintech use: awareness, adoption, proficiency, and optimization. This scale reflects the authors' effort to introduce a context-specific construct that captures MSMEs' ability to effectively utilize fintech.

The Perceived Regulatory Support (PRS) scale, adapted from Amnas et al. (2024) and Khattak and Shah (2021), comprised four items. It measured the extent to which respondents perceived government policies, financial incentives, and infrastructure support as enabling factors for fintech adoption and MSME growth. The Financial Well-Being (FWB) scale was measured with four items, based on García-Mata and Zerón-Félix (2022), Bhat et al. (2025), and Rai et al. (2025). It assessed

MSMEs' ability to meet financial obligations, confidence in long-term financial stability, reduction of financial stress, and capacity to sustain business growth while supporting personal and family well-being.

In total, the instrument included 23 items across the six constructs. Prior to full distribution, the questionnaire was reviewed by three academic experts specializing in finance, entrepreneurship, and management to establish content validity. Their feedback led to minor revisions in wording and contextual adjustments to ensure clarity and cultural appropriateness. These procedures enhanced the robustness of the instrument, which was subsequently subjected to statistical testing for construct validity and reliability.

3.5. Validity and Reliability

Prior to the main survey, a pilot test was conducted with 30 MSME respondents. The instrument demonstrated content validity through expert review and construct validity using Confirmatory Factor Analysis (CFA). The results indicated satisfactory factor loadings (>0.60). Reliability was assessed through Cronbach's Alpha and Composite Reliability (CR), with all constructs exceeding the threshold of 0.70. Average Variance Extracted (AVE) values were above 0.50, indicating good convergent validity. Discriminant validity was confirmed using the Fornell-Larcker criterion.

3.6. Data Analysis

The data were examined through a Multi-Group Analysis (MGA) method to investigate variations in the effects of research variables according to the magnitude of MSME businesses (micro, small, and medium enterprises). This method was selected to attain a more profound comprehension of the dynamics of financial well-being in relation to various business group features. The investigation utilised SmartPLS version 4, facilitating concurrent path estimation and group comparison. Testing was conducted utilising Henseler's MGA and parametric analyses to verify the dependability of the outcomes. The analysis of data took into account the social context and diversity of MSMEs sponsored by Bank Indonesia, ensuring that the results are both scientifically pertinent and practically usable for empowerment initiatives.

3.7. Measurement

All variables were assessed via a 5-point Likert scale grounded in indicators validated by prior research. The test encompasses five primary constructs: Digital Financial Literacy, Entrepreneurial Orientation, Managerial Attributes, Fintech Proficiency, and Financial Well-Being, in addition to one moderating variable, Perceived Regulatory Support. The metrics were tailored to the context of MSMEs funded by Bank Indonesia. The instruments' validity and reliability were assessed before the primary analysis. This methodology guarantees measurement uniformity among the groups (micro, small, and medium firms) in the multi-group analysis (MGA).

4. Results

4.1. Structural Model Assessment

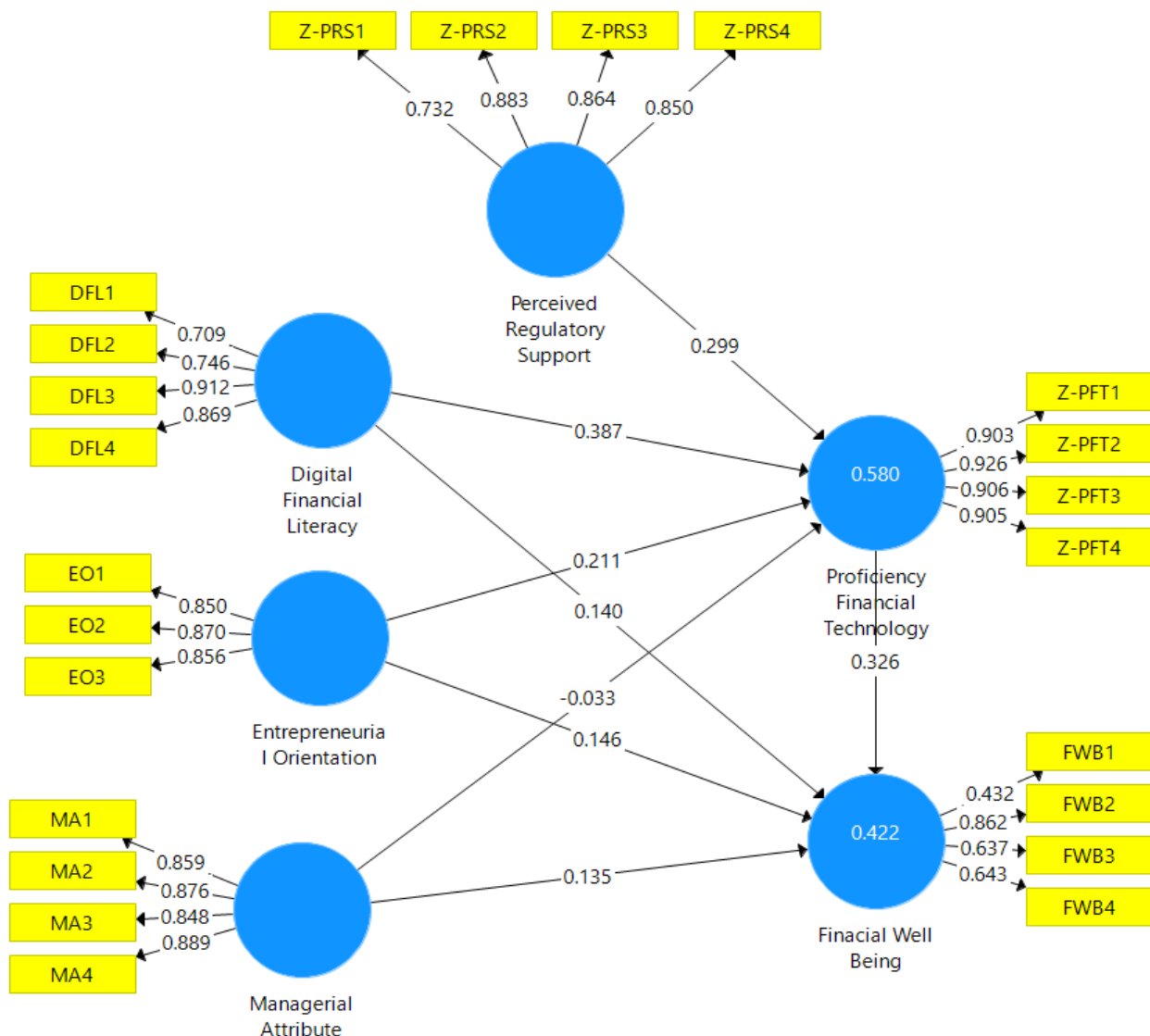


Figure 2. Structural Model Assessment

Figure 2 illustrates the structural model estimated in this study, including the standardized path coefficients, factor loadings, and the explained variance (R^2) for the endogenous constructs. The results show that the model accounts for a substantial proportion of variance in the outcome variables. Specifically, Fintech Proficiency (FP) achieved an R^2 value of 0.580, while Financial Well-Being (FWB) attained an R^2 value of 0.422. Following the guidelines of Hair et al. (2019), these values can be considered moderate to substantial, indicating that the independent variables explain a meaningful portion of variance in the dependent constructs.

The figure also highlights the magnitude and direction of relationships among constructs. Digital Financial Literacy (DFL) demonstrates strong positive effects on both FP ($\beta = 0.387$) and FWB ($\beta = 0.146$), underscoring the critical role of digital financial capabilities in both enhancing fintech proficiency and directly improving MSMEs' financial well-being. Entrepreneurial Orientation (EO), meanwhile, shows positive but relatively weaker paths toward FP ($\beta = 0.211$) and FWB ($\beta = 0.140$). This finding suggests that while an entrepreneurial mindset contributes to financial outcomes, its influence may be mediated or complemented by other capabilities.

In contrast, Managerial Attributes (MA) exhibit a more limited direct impact, with modest effects on FP ($\beta = 0.135$) and a non-significant path toward FWB ($\beta = -0.033$). This result implies that managerial skills, while important, may not directly translate into financial well-being unless coupled with fintech engagement or regulatory support.

The role of Perceived Regulatory Support (PRS) is also notable. PRS positively influences FP ($\beta = 0.299$), highlighting the importance of a supportive policy and regulatory environment in fostering the adoption and effective use of fintech among MSMEs. This aligns with prior studies emphasizing the enabling role of institutional support in technology adoption.

Overall, the structural model provides a coherent picture of how digital financial literacy, entrepreneurial orientation, and managerial attributes, together with regulatory conditions, shape fintech proficiency, which in turn exerts a significant positive effect on financial well-being. The results suggest that FP acts as a key mediator, bridging core competencies with financial outcomes, while PRS enhances the effectiveness of this mediation by creating a conducive external environment.

4.2. Multi-Group Analysis (MGA) Results

This study evaluates the effects among variables based on specific sample subset characteristics, namely micro, small, and medium enterprises. Out of a total of 295 research samples, the distribution consists of 134 micro enterprises (45.43%), 104 small enterprises (35.25%), and 57 medium enterprises (19.32%). The multi-group analysis in this study is based on the final model with moderation effects. Since the study aims to compare three data subsets, the multi-group comparison (MGA) is divided into three sub-sections of analysis. The results of the multi-group evaluation are summarized in Table 1.

Table 1. Multi-Group Analysis of the Study

<i>Direct Effect</i>	Micro		Small		Medium	
	Path	p-Value	Path	p-Value	Path	p-Value
Digital Financial Literacy -> Financial Well Being	0,404	0,000	-0,007	0,481	-0,179	0,144
Digital Financial Literacy -> Financial Technology Proficiency	0,425	0,000	0,324	0,001	0,229	0,040
Entrepreneurial Orientation -> Financial Well Being	0,084	0,243	0,007	0,480	0,272	0,115
Entrepreneurial Orientation -> Financial Technology Proficiency	0,148	0,067	0,184	0,097	0,384	0,016
Managerial Attribute -> Financial Well Being	0,022	0,410	0,348	0,004	0,269	0,070
Managerial Attribute -> Financial Technology Proficiency	0,012	0,452	0,103	0,166	-0,213	0,100
Moderating Effect 1 -> Financial Technology Proficiency	-0,073	0,257	-0,132	0,224	0,134	0,160

Perceived Regulatory Support - > Financial Technology Proficiency	0,218	0,031	0,227	0,007	0,481	0,016
Financial Technology Proficiency -> Financial Well Being	0,286	0,008	0,374	0,002	0,390	0,023
<i>Indirect Effect</i>	Micro		Small		Medium	
	Path	p- Value	Path	p- Value	Path	p- Value
Digital Financial Literacy -> Financial Technology Proficiency -> Financial Well Being	0,122	0,015	0,121	0,024	0,089	0,085
Entrepreneurial Orientation -> Financial Technology Proficiency -> Financial Well Being	0,043	0,117	0,069	0,102	0,150	0,050
Managerial Attribute -> Financial Technology Proficiency -> Financial Well Being	0,003	0,453	0,039	0,176	-0,083	0,146

Table 1 illustrates a comparative analysis of the effects among variables in the final study model according to each company grouping. The table demonstrates that in micro companies, digital financial literacy is crucial for developing fintech expertise and improving the financial well-being of micro-entrepreneurs. Perceived regulatory assistance demonstrates a good and significant impact on enhancing fintech proficiency among micro-entrepreneurs. This competence, consequently, is essential for enhancing their financial welfare. In micro companies, digital financial literacy is the sole variable that has a substantial indirect impact on financial well-being via fintech proficiency.

In the small enterprise group, the variables that significantly contribute to improving financial well-being are managerial attributes and fintech proficiency. Digital financial literacy does not directly enhance financial well-being in small enterprises, but rather exerts its influence indirectly through fintech proficiency. Although not statistically significant, the influence of perceived regulatory support tends to have a weakening effect on fintech learning in small enterprises.

A different pattern is observed in the medium enterprise group. Two factors are particularly noteworthy in promoting financial well-being in this segment: fintech proficiency and the indirect influence of entrepreneurial orientation through fintech proficiency. Fintech proficiency emerges as the dominant factor in medium enterprises. Other variables contribute indirectly by enhancing fintech skills among entrepreneurs. Digital financial literacy is also relevant in fostering fintech proficiency. Additionally, perceived regulatory support provides a reinforcing effect on fintech learning in medium enterprises, although its statistical significance remains limited.

4.3. A Comparative Analysis of Micro and Small Enterprises

This section presents a comparative comparison between micro and small firms. This study utilises a parametric test based on the assumption of equal variances among groups, in addition to the Welch-Satterthwaite test, which operates under the assumption of unequal variances among groups. The outcomes of this assessment are encapsulated in the subsequent table.

Table 2. Model Comparison between Micro and Small Enterprises

Welch-Satterthwait Test			
Direct Effect	diff (Micro - Small)	t-Value	p-Value
Digital Financial Literacy -> Financial Well Being	0,411	2,206	0,015
Digital Financial Literacy -> Financial Technology Proficiency	0,100	0,623	0,267
Entrepreneurial Orientation -> Financial Well Being	0,077	0,437	0,332
Entrepreneurial Orientation -> Financial Technology Proficiency	-0,036	0,207	0,418
Managerial Attribute -> Financial Well Being	-0,326	2,032	0,022
Managerial Attribute -> Financial Technology Proficiency	-0,092	0,645	0,260
Moderating Effect 1 -> Financial Technology Proficiency	0,058	0,282	0,389
Perceived Regulatory Support -> Financial Technology Proficiency	-0,009	0,063	0,475
Financial Technology Proficiency -> Financial Well Being	-0,088	0,503	0,308
Indirect Effect	diff (Micro - Small)	t-Value	p-Value
Digital Financial Literacy -> Financial Technology Proficiency -> Financial Well Being	0,000	0,005	0,498
Entrepreneurial Orientation -> Financial Technology Proficiency -> Financial Well Being	-0,026	0,407	0,342
Managerial Attribute -> Financial Technology Proficiency -> Financial Well Being	-0,035	0,708	0,240

Table 2 indicates that the most significant disparities in variable influence arise between the micro and small firm categories. Statistically, two effects exhibit differences that have a significance level of $p < 0.05$. The primary distinction pertains to the impact of digital financial literacy on attaining financial well-being among business stakeholders. Digital financial literacy exerts a markedly greater influence on micro firms than on small enterprises (diff = 0.411). Another significant difference is found in managerial attributes, which play a crucial role in small enterprises but not in micro enterprises. The difference between the two is recorded at diff = -0.326, indicating that the influence of managerial attributes is considerably stronger in small enterprises than in micro ones. These results

provide a clearer foundation for formulating more tailored policy recommendations for each business group. Managerial capabilities primarily drive financial well-being in small enterprises, whereas for micro enterprises, the key lies in enhancing digital financial literacy.

4.4. Comparative Analysis of Micro and Medium Enterprises

This study also evaluates the significance of the differences between micro and medium-sized enterprises. The results of this evaluation are summarized in Table 3.

Table 3. Model Comparison between Micro and Medium Enterprises

Welch-Satterthwait Test			
Direct Effect	diff (Micro - Medium)	t-Value	p-Value
Digital Financial Literacy -> Financial Well Being	0,583	2,821	0,003
Digital Financial Literacy -> Financial Technology Proficiency	0,196	1,099	0,138
Entrepreneurial Orientation -> Financial Well Being	-0,188	0,739	0,231
Entrepreneurial Orientation -> Financial Technology Proficiency	-0,236	1,154	0,126
Managerial Attribute -> Financial Well Being	-0,248	1,214	0,115
Managerial Attribute -> Financial Technology Proficiency	0,224	1,181	0,121
Moderating Effect 1 -> Financial Technology Proficiency	-0,208	1,188	0,119
Perceived Regulatory Support -> Financial Technology Proficiency	-0,263	1,051	0,149
Financial Technology Proficiency -> Financial Well Being	-0,104	0,455	0,325
Indirect Effect	diff (Micro - Medium)	t-Value	p-Value
Digital Financial Literacy -> Financial Technology Proficiency -> Financial Well Being	0,032	0,376	0,354
Entrepreneurial Orientation -> Financial Technology Proficiency -> Financial Well Being	-0,107	1,106	0,137

Managerial Attribute -> Financial	0,086	1,039	0,152
Technology Proficiency -> Financial			
Well Being			

Table 3 demonstrates that the principal distinction in influence between the micro and medium enterprise categories is attributed to digital financial literacy. This further substantiates the idea that the influence of digital financial literacy on enhancing the financial well-being of business entities is more pronounced among micro-enterprises. The disparity between the two is 0.583, underscoring the significant impact of digital financial literacy within the micro-enterprise category.”

5. Discussion

This study provides three main insights. First, in micro-enterprises, Digital Financial Literacy emerges as the most critical factor. This suggests that basic knowledge and confidence in using digital financial tools can significantly enhance financial well-being for small-scale entrepreneurs. This finding is consistent with Kumar et al. (2023) and Kurniasari et al. (2025), who argue that micro-entrepreneurs often rely on simple, practical digital solutions to sustain financial stability. The educational implication is that higher education should integrate applied digital financial literacy training into curricula, preparing students to operate effectively in grassroots entrepreneurship contexts.

Second, in small enterprises, Managerial Attributes play a decisive role. Small business owners must go beyond basic literacy and demonstrate strong managerial decision-making to leverage fintech effectively. This aligns with Coles & Li (2020) and Rahman et al. (2020), who highlight the importance of leadership capacity for financial resilience. For higher education, this underscores the need to embed managerial skills training, such as financial planning, risk analysis, and digital leadership, into entrepreneurial education.

Third, in medium enterprises, Fintech Proficiency and Entrepreneurial Orientation are the dominant drivers of financial well-being. At this scale, businesses are more capable of adopting and optimizing fintech systems, and entrepreneurial orientation amplifies these capabilities. This supports Miller’s (1983) classic model of entrepreneurial behavior as well as more recent findings (Schenkel et al., 2025). For higher education, the implication is clear: curricula should go beyond literacy and management to cultivate innovation, proactivity, and risk-taking among students.

Finally, across all groups, Perceived Regulatory Support influenced Fintech Proficiency, reflecting the importance of policy clarity and institutional trust. This mirrors Amnas et al. (2024), who argue that regulatory frameworks are critical for fostering digital adoption. Universities can use this insight to encourage students to critically evaluate the role of policy in shaping entrepreneurial ecosystems.

6. Conclusion

This study demonstrates that the determinants of financial well-being among MSME actors are not uniform, but are instead influenced by the level of readiness and business capacity within each segment. In micro enterprises, digital financial literacy plays the most prominent role, both directly and through the mediation of fintech proficiency, indicating the importance of practical and educational approaches in improving financial well-being. Perceived regulatory support also contributes positively to fintech proficiency; however, its effectiveness remains highly dependent on the continuity and clarity of its implementation. In small enterprises, managerial attributes and fintech proficiency emerge as significant factors. Digital financial literacy does not have a direct effect but operates through the mediation pathway of fintech proficiency, aligning with the innovation diffusion framework. Regulatory support tends to be ineffective and may even hinder progress due to policy ambiguities that have not been fully communicated to this segment. On the other hand, in

medium enterprises, fintech proficiency becomes the dominant variable in promoting financial well-being, reinforced by entrepreneurial orientation, which functions indirectly. At this level, business actors are in a more mature phase of technological adoption and integration, making literacy alone insufficient without execution capabilities. Perceived regulatory support begins to show a positive effect, reflecting growing trust in policy, although it has yet to reach statistical significance. Overall, these findings underscore the importance of a tiered and contextual approach in designing MSME empowerment strategies toward technology-based financial well-being. Digital education, managerial capacity strengthening, and inclusive regulations must be tailored to the characteristics of each business segment to ensure that interventions have a tangible and sustainable impact.

The findings provide valuable lessons for higher education. Universities should integrate digital financial literacy, managerial skills, and entrepreneurial orientation into their curricula to prepare students for real-world challenges in a digital financial ecosystem. Such educational reforms not only benefit students but also bridge academia with practical business realities, ensuring that graduates are equipped to contribute meaningfully to entrepreneurial ecosystems.

7. Suggestion

7.1. Practical Implications

This study offers several practical implications that extend beyond the MSME context to the field of education and curriculum development. First, in the micro-enterprise segment, interventions should focus on enhancing applicable digital financial literacy through community-based training, interactive modules, and simple yet relevant mentoring tailored to the needs of business actors. Given the high sensitivity to ease of access and practical technology, educational approaches should be participatory rather than top-down.

Second, for small enterprises, programs aimed at strengthening managerial capacity are key—particularly in financial planning, risk mitigation, and data-driven decision-making. In this context, integrating fintech proficiency into business management training is essential. Moreover, communication and dissemination of regulations need to be improved to prevent resistance or confusion that could hinder technology adoption.

Third, in medium-sized enterprises, policies that are facilitative and promote innovation-based digital transformation need to be expanded. Support for entrepreneurial characteristics such as risk-taking and innovation orientation can reinforce the role of fintech in improving financial well-being. Here, the role of regulators should extend beyond policy-making to becoming strategic partners within the MSME digital ecosystem.

Overall, MSME empowerment strategies must be designed in a tiered and contextual manner, aligning approaches with the level of technological readiness, managerial capacity, and regulatory perception of each business segment. In doing so, efforts to enhance financial well-being can move beyond policy discourse and be realized through tangible, inclusive, and long-term impact.

The findings also carry important educational implications. Universities and higher education institutions can translate the lessons from MSMEs into curriculum reforms by:

- Embedding digital financial literacy into business and management courses, ensuring that students can confidently navigate digital platforms.
- Incorporating managerial skill development, such as leadership, decision-making, and financial planning, into entrepreneurship programs.
- Encouraging entrepreneurial orientation through experiential learning, simulations, and start-up incubators that promote innovation, proactivity, and risk-taking.

By aligning MSME insights with pedagogy, higher education can better prepare students not only to be job-seekers but also to become resilient entrepreneurs and informed financial decision-makers in the digital economy.

7.2. Limitations and Future Research Suggestions

While this study makes several contributions, it is not without limitations. These limitations offer opportunities for future research:

1. Cross-sectional design: The use of a one-time survey limits the ability to capture long-term dynamics of financial well-being. Future studies should adopt longitudinal designs to examine how digital literacy, managerial attributes, and entrepreneurial orientation evolve over time.
2. Sectoral diversity: The present study focused on MSMEs in general without distinguishing between sectors (e.g., manufacturing, services, agriculture). Future research could conduct sector-specific analyses to uncover contextual differences in how digital financial literacy and fintech adoption impact well-being.
3. Behavioral and psychosocial factors: Variables such as trust in digital systems, self-efficacy, and entrepreneurial resilience were not included in the model. These could be integrated in future studies to provide a more holistic understanding of financial behavior.
4. Comparative educational focus: While this study highlighted implications for higher education, future research could conduct comparative studies between MSME actors and university students to identify similarities and gaps in digital financial literacy and entrepreneurial orientation. Such comparisons would help bridge the gap between theory, practice, and pedagogy.
5. Geographical generalizability: The study was limited to MSMEs supported by Bank Indonesia, which may not fully represent informal or unfostered enterprises. Broader sampling across regions and contexts could improve external validity.

By addressing these limitations, future research can build on this study to design more adaptive, inclusive, and evidence-based strategies for both MSME development and financial education in higher education.

Declarations

Author Contributions. The authors have contributed equally to this paper. Andriansyah: Corresponding author, responsible for conceptualization, supervision, revising the original draft, and developing the research instrument. Isfenti Sadalia: Contributed to conceptualization, formal analysis, investigation, methodology, visualization, drafting the initial manuscript, as well as reviewing and editing. Khaira Amalia Fachrudin: Assisted in preparing the research instrument and data curation. Syahyunan: Involved in revising the original draft, reviewing, and editing. All authors have read and approved the final published version of the article.

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Data Availability Statement. All data generated and analyzed during this study are included in this published article

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