

DIGITAL TRANSFORMATION AND SUSTAINABILITY: IS PEER-TO-PEER LENDING A SOLUTION?

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ABSTRACT

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In emerging economies, understanding the interplay between digital transformation, peer-to-peer lending (P2P), and financial capability in shaping the sustainability of micro and small enterprises (MSEs) remains limited. This study examines how digital transformation influences business sustainability through a moderated-mediation model, with P2P lending as the mediator and financial literacy as the moderator. Drawing on the Resource-Based View (RBV) and the knowledge-based view, digital transformation is seen as a strategic intangible capability that enables firms to adapt and innovate. Using a quantitative approach, data were collected from 385 MSE owners in the greater Bandung area and analyzed with Partial Least Squares Structural Equation Modeling (PLS-SEM). Results show that digital transformation significantly enhances both P2P lending adoption and business sustainability. However, P2P lending, both directly and indirectly, does not contribute to sustainability unless supported by high financial literacy. In addition, financial literacy strengthens the indirect effect of digital transformation through P2P lending. Theoretically, this study integrates RBV and fintech perspectives within a moderated mediation framework. In practice, it highlights the need for MSEs to align digital adoption with financial capability development to ensure that fintech lending effectively contributes to long-term sustainability.

Keywords: Digital Transformation, Peer-to-Peer Lending, Financial Literacy, Business Sustainability, Micro and Small Businesses.

INTRODUCTION

Micro, small, and medium enterprises (MSMEs) have received significant attention from policymakers and researchers due to their role in driving economic growth and creating jobs. According to the press release by the Coordinating Ministry for Economic Affairs of The Republic of Indonesia (2025), there are 64 million MSMEs in Indonesia, equivalent to one business for every five residents. In practice, MSMEs face various challenges and obstacles that threaten their sustainability, including limited resources, access to financing, and the ability to adapt to changing business environments

(Ogundana et al., 2021; Tambunan, 2021). These challenges have become increasingly complex amid rapid technological and informational developments that have altered the economic activity paradigm in all sectors. Therefore, a crucial question arises: why do some MSMEs thrive and grow while others remain stagnant or even fail?

Currently, business sustainability has emerged as a strategic priority for companies across various industries. It is driven by intense market competition, changing consumer preferences, regulatory pressures, and a growing sense of social and environmental responsibility. Therefore, business sustainability is not only viewed from an economic perspective, but also to ensure operational resilience, adaptive capacity, and long-term value creation (Sheehy & Farneti, 2021). However, maintaining business performance in an uncertain, complex, and ambiguous environment remains a significant challenge, especially for micro, small, and medium enterprises (MSMEs) that often operate with limited resources. This situation highlights the need to identify key drivers that can strengthen business sustainability in the digital era. One key driver for sustainable business development is digital transformation (George & Schillebeeckx, 2022). Digital transformation enables companies to redesign business processes, diversify business models, and achieve operational efficiency (Siswanti et al., 2024). The concept of digital transformation adopted in this study does not refer to a single, unified process but rather to the integration of digitization and digitalization. Digitization involves the technical process of converting analog or physical information into digital form, while digitalization refers to the strategic and organizational application of digital technologies (Gradillas & Thomas, 2023). In the context of MSMEs, digital transformation consists of two interrelated components: digitization, such as digital records, inventory systems, and e-catalogs, is needed as a technical foundation. In contrast, digitalization is implemented into business strategies such as e-commerce, digital payment, or fintech platforms. Both processes are crucial to innovation and competitiveness (Li et al., 2023).

This study draws on the Resource-Based View theory (RBV) and its extension, the Knowledge-Based View (KBV), to conceptualize digital transformation as an intangible capability. These concepts state that competitive advantage and sustainability system from an organization's ability to manage unique resources (valuable, rare, inimitable, and nonsubstitutable). In this study, we position digital capabilities in (digitization and digitalization) as critical intangible assets that meet these criteria. For MSMEs, digitalization enables process efficiency, market expansion, innovation in service delivery, and data-driven decision-making. These outcomes not only enhance adaptability and responsiveness but also generate long-term competitive advantage (Kahveci, 2025).

Furthermore, the COVID-19 pandemic has further accelerated digitalization, making digital transformation not merely an option but a necessity for innovation, growth, and sustainability across all sectors (Musuluri, 2025). Numerous studies show that digital transformation impacts organizational performance, innovation capabilities, and competitive advantage (Kargas et al., 2024). However, the extent to which digital transformation directly drives business sustainability remains mixed in the literature. Previous findings suggest that the impact of digital transformation on sustainability is often indirect and dependent on mediating mechanisms and moderating conditions (Siswanti et al., 2024). It suggests that the relationship is more complex than a simple linear effect, creating a significant research gap.

In this context, peer-to-peer (P2P) lending is gaining increasing attention as a transformative financial innovation capable of bridging the financing gap experienced by small businesses (Naysary & Daud, 2021). Digital platforms offering P2P lending expand access to capital, reduce information asymmetry, and facilitate rapid loan disbursement

(Coakley & Huang, 2023). For many MSMEs undergoing digital transformation, access to flexible funding is a critical mechanism for investing in technology adoption, digital capabilities, and business expansion (Nurdana & Suryawati, 2021; M. R. Rita et al., 2021). Thus, P2P lending can serve as a mediating mechanism through which digital transformation improves business sustainability. Despite its relevance, empirical research integrating digital transformation, P2P lending, and business sustainability within a single framework remains limited, particularly in emerging markets where digital financial services are rapidly expanding.

Furthermore, the effectiveness of digital transformation and P2P lending in improving business sustainability is significantly influenced by financial literacy (Zada & Erokhin, 2024). People with better financial literacy skills are better at managing their finances in an orderly and sustainable manner (Hanna et al., 2022). For some MSMEs, online loans help business growth (Nurdana & Suryawati, 2021), while for others, they cause business failure (He & Li, 2020). Therefore, we not only explore the influence of digital transformation on business sustainability mediated by peer-to-peer lending, but also include financial literacy as a moderator between peer-to-peer lending and business sustainability. In addition, we test the moderated mediation effect, in which the interaction between digital transformation and peer-to-peer lending on business sustainability is moderated by financial literacy.

Overall, these issues highlight a significant gap in the literature: the absence of an integrated model that examines how digital transformation drives business sustainability through digital financial intermediation mechanisms such as P2P lending, and how this relationship is conditioned by a company's level of financial literacy. Addressing this gap is crucial for deepening our understanding of economic dynamics and for developing policies and managerial strategies that support sustainable business development in the digital era. Through the development of an integrated theoretical framework, this study seeks to enrich the discourse on how digital adoption, when aligned with financial capability, can enhance the effectiveness of fintech-based financing in supporting the long-term resilience and sustainability of micro and small enterprises.

Digital Transformation, Peer-to-Peer Lending, and Business Sustainability

Digital transformation (DT) refers to organizational activities that integrate digital technologies and business processes in a digital economy (Warner & Wäger, 2019). It has emerged as a key strategic driver for improving business sustainability. Several studies have shown that digital transformation positively affects business sustainability (Guandalini, 2022; Zhai et al., 2022). In line with RBV theory, digital transformation in organizations is considered a strategic resource asset; thus, the relationship between the two variables is theoretically supported. Furthermore, studies (Nurain et al., 2024; Wolf et al., 2018) found that the impact of digital transformation on sustainability increases when supported by active digital transformation management and strategic digitalization planning capabilities. This study aims to broadly replicate the positive findings of digital transformation on business sustainability, particularly in small businesses. Therefore, we propose the first hypothesis:

H₁: Digital Transformation Has A Positive and Significant Effect on Business Sustainability

Digital transformation (DT) in the context of MSMEs not only improves operational efficiency but also expands access to alternative financing, particularly peer-to-peer (P2P) lending, a fast, flexible mechanism that is independent of conventional financial institutions. Ease of access, trust in digital services, and speed of response have

led to increased intention to use P2P lending (Kusumawati et al., 2024). MSMEs that have undergone digital transformation generally have basic digital infrastructure, such as internet access and smartphones, allowing them to more easily access and utilize P2P lending platforms (Lam et al., 2025). Furthermore, the effects of digitalization also lead to information overload and a limited attention span, which can encourage individuals or businesses to make quick decisions, thereby overlooking important information. From the lenders' perspective, digitalization creates a digital footprint that can be used to assess creditworthiness quickly and in a data-driven manner (Zhen & Zhou, 2025). While DT theoretically facilitates access to P2P lending, its adoption rate has not necessarily kept pace due to increasing literacy and the abundance of similar alternatives, such as invoice financing and buy now, pay later. Therefore, this relationship needs to be tested empirically, so we propose a second hypothesis:

H₂: Digital Transformation Has A Positive and Significant Effect on Peer-to-Peer Lending

Peer-to-Peer Lending and Business Sustainability

Peer-to-peer lending refers to digital financial interactions that connect lenders and borrowers without the involvement of conventional financial intermediaries (Klein et al., 2023). These platforms enable individuals or small businesses to obtain direct, fast, and flexible financing through digital technology (Tay et al., 2022). When linked to social exchange theory, the relationship between lenders and borrowers in the P2P lending system is built on trust, reciprocity, and social norms, in which trust serves as a moral asset that enables the sustainable exchange of financial resources. Specifically, by participating in the digital financing ecosystem, business actors can access more flexible and efficient sources of capital than traditional financial institutions, thereby increasing business adaptability and innovation (Magableh et al., 2025). Empirically, several studies have shown that participation in digital financing ecosystems such as P2P lending can enhance business sustainability (Naysary & Daud, 2021). However, Lenz (2016) cautions that overreliance on unsecured digital credit without proper financial planning can lead to default risks and unsustainable debt burdens. These mixed findings highlight that while P2P lending can be a catalyst for growth and innovation, its actual contribution to sustainability depends on how effectively MSMEs manage the capital obtained and integrate it into their strategic operations. Thus, in line with the theoretical and empirical rationale, we propose the following hypothesis:

H₃: Peer-to-Peer Lending Has A Positive and Significant Effect on Business Sustainability

The Mediation Role of Peer-to-Peer Lending

Digital transformation (DT) has become a strategic driver for MSMEs to improve operational efficiency, market access, and overall business sustainability (Zhai et al., 2022). However, the path from digital transformation to sustainability is not always straightforward, especially when MSMEs face financial constraints. One important intermediary in this process is peer-to-peer (P2P) lending. For MSMEs undergoing digital transformation, improved connectivity, digital infrastructure, and access to online platforms increase the likelihood of engaging with P2P lending systems (Lam et al., 2025). Digital transformation also generates financial data that simplifies credit evaluation, enabling MSMEs to access financing faster and more flexibly (Coakley & Huang, 2023). Thus, DT can indirectly improve business sustainability by enabling better access to capital through P2P platforms. Liao et al. (2017) warn that overreliance on unsecured digital credit without proper financial planning can lead to default and a

persistent debt burden. These impacts can be detrimental to business performance and long-term sustainability, especially among less financially literate or impulsive borrowers. These cautionary findings underscore that while P2P lending offers access and speed, it is not without potential negative consequences. Given this duality, P2P lending as both an enabler and a potential risk, its role as a mediator between digital transformation and business sustainability merits empirical investigation. This study addresses this gap by proposing the following hypothesis:

H4: Peer-to-peer Lending Mediates The Relationship Between Digital Transformation and Business Sustainability

The Moderating Role of Financial Literacy

Access to alternative financing, particularly through P2P lending, has been recognized as a potential catalyst for the growth and sustainability of micro, small, and medium enterprises. These platforms offer fast, flexible, and often collateral-free loans to MSMEs, typically underserved by conventional banks (Tay et al., 2022). By minimizing financing barriers, P2P lending has become a crucial driver of innovation, adaptability, and operational sustainability, particularly during periods of liquidity constraints (Liu et al., 2023). However, the benefits of P2P lending are not felt equally by all MSMEs. A growing body of research indicates that the effectiveness of digital financing instruments depends on business owners' financial decision-making skills, a dimension encompassed by the concept of financial literacy. In the context of P2P lending, financially literate business owners tend to evaluate loan terms effectively, align loan capital with business goals, and manage repayments responsibly. As a result, they are better positioned to translate digital credit into sustainable business outcomes (Zada & Erokhin, 2024). Conversely, MSMEs with low financial literacy may misuse or overuse P2P lending, underestimate the repayment burden, or inappropriately allocate funds to unproductive activities. These patterns can lead to debt accumulation and default risk, ultimately jeopardizing business continuity (Käfer, 2016). Therefore, financial literacy is hypothesized to moderate the effect of P2P lending on business sustainability, strengthening the positive effect for those with high financial capability while weakening or negating it for those with limited financial literacy. Therefore, we propose a fifth hypothesis:

H5: Financial Literacy Moderates The Relationship Between Peer-to-Peer Lending and Business Sustainability, such that The Relationship is Stronger for Msmes with Higher Financial Literacy

Furthermore, the direct relationship between financial literacy and business sustainability has been examined from various perspectives in previous studies. However, financial literacy as a moderator of the indirect pathway from digital commerce to sustainability via P2P lending has not been examined. In other words, the mediating effect of P2P lending depends on the level of financial literacy. Therefore, our final hypothesis is:

H6: Financial Literacy Moderates The Mediated Relationship Between Digital Transformation and Business Sustainability through Peer-To-Peer Lending, so that The Mediated Relationship is Stronger at High Literacy Than at Low Financial Literacy

RESEARCH METHODS

This study employed a quantitative approach using statistical analysis to examine the impact of digital transformation on MSME business sustainability through peer-to-peer (P2P) lending, moderated by financial literacy. Hypotheses were tested using PLS-SEM to assess and confirm both direct and indirect relationships among variables. PLS-SEM was chosen because it is suitable for testing complex moderated mediation models regardless of data normality, for exploring relationships between variables, and for predictive analysis not available with other approaches. The research was conducted from May to October 2025 on micro and small business owners in the food and beverage, retail, and service sectors within the greater Bandung area (Bandung City, Cimahi City, and West Bandung Regency). These sectors were selected for their direct interaction with end consumers and high digitalization potential. Greater Bandung was chosen due to its largest MSME population in West Java, totaling 44,474 units, according to the BPS West Java Province (2022). Respondents were purposively selected MSMEs operating for at least 3 years, employing up to 19 permanent staff, and earning a maximum monthly turnover of IDR 50 million. They were also to have utilized digital tools (e.g., e-payments, social media) and engaged in online lending for at least two years. The sample size for the questionnaire, determined using Cochran's formula, is 385 respondents. All of the scales used in this study are unidimensional, and the statements were measured using a five-point Likert scale with a range of answers from 1, "strongly disagree," to 5, "strongly agree."

Digital transformation (DT) is an exogenous variable, measured with a ten-item scale developed by Bonnet & Westerman (2021). It consists of two dimensions, namely digital intensity and transformation management intensity. This scale measures the level of technical readiness and implementation of digital technology in business processes. An example of a question item is: 'Our business actively sells products through digital platforms'.

Peer-to-Peer lending (P2P) is a mediator variable, with a 10-item scale developed by Kumra et al. (2021), to measure P2P lending. It consists of three dimensions, namely: attitude towards behavior, subjective norm, and perceived behavioral control. This scale measures the factors that influence MSE entrepreneurs' use of online loans. An example of a question item is: 'I feel that the loan application process in P2P lending is easy to do'.

Financial literacy (FL) is a moderating variable, measured using a nine-item scale developed by Koskelainen et al. (2023). It consists of three dimensions, namely financial knowledge, financial behavior, and financial attitude. This scale measures MSME entrepreneurs' financial literacy in managing their business finances. An example of a question item is: 'I make a monthly budget for my business'.

Business sustainability (BS) is an endogenous variable, measured using a ten-item scale developed by Galankashi & Rafiei (2022). This scale measures how MSEs perceive their financial performance after digital transformation and using peer-to-peer lending. Business sustainability is often conceptualized as a multidimensional construct encompassing financial, social, and environmental outcomes. In the context of Indonesian SMEs, financial performance remains the most important indicator of sustainability. Furthermore, we use financial performance as a proxy, given that one of the biggest obstacles for Indonesian SMEs is a lack of capital. Therefore, this study operationalizes sustainability using financial metrics, such as profitability, return on investment, and growth. An example of a question item is: 'Promotion through social media helps increase our business sales'.

RESULTS AND DISCUSSION

The measurement instruments were tested for validity and reliability using the PLS-SEM approach with a reflective (outer) measurement model. Digital transformation (10 indicators) showed outer loadings of 0.704-0.816; peer-to-peer lending (10 indicators), 0.746-0.834; financial literacy (9 indicators), 0.818-0.865; and business sustainability (10 indicators), 0.728-0.810. All loadings exceeded 0.70, confirming indicator validity (Hair Jr. et al., 2019). Reliability was assessed using Cronbach's Alpha and Composite Reliability, both of which exceeded 0.70, indicating strong internal consistency (Sarstedt et al., 2017). Average Variance Extracted (AVE) values exceeded 0.500 for all constructs, confirming convergent validity (Henseler et al., 2016). Variance Inflation Factor (VIF) values ranged from 1.727 to 4.828, below the threshold of 5, demonstrating no multicollinearity and confirming overall construct validity and reliability. The detailed test results are presented in Table 1.

Table 1. Construct Validity and Reliability Analysis Results

	Number of indicators	Outer loading	α	CR	AVE	VIF
Digital Transformation	DT1-DT10	0.704 - 0.816	0.917	0.918	0.579	1.727 – 4.828
Peer-to-Peer Lending	PL1-PL10	0.746 – 0.834	0.919	0.919	0.637	2.142 – 2.777
Financial Literacy	FL1-FL9	0.818 – 0.865	0.949	0.951	0.711	2.502 – 2.915
Business Sustainability	BS1-BS10	0.728 – 0.810	0.937	0.938	0.574	2.179 – 3.540

Source: Data Processed, 2025

The Fornell-Larcker test was used to assess discriminant validity, in which the square root of each latent variable's AVE must be greater than the correlations among the latent variables. Table 2 shows that AVE root values are 0.798, 0.761, 0.758, and 0.757. The AVE root values are greater than the correlations between them: 0.652, 0.647, 0.586. According to these values, analysis meets the requirements of discriminant validity.

Table 2. Discriminant Validity Results

	BS	DT	PL	FL
Business Sustainability (BS)	0.798			
Digital Transformation (DT)	0.652	0.761		
Peer-to-Peer Lending (PL)	0.647	0.586	0.758	
Financial Literacy (FL)	0.585	0.520	0.623	0.757

Source: Data Processed, 2025

Descriptive statistics provide a general overview of respondents' demographic characteristics, including gender, age, education, and business length. Of the 385 respondents, 227 (59%) were male and 158 (41%) female entrepreneurs, reflecting men's dominant role as household heads and greater sectoral mobility. Most respondents were aged 18-30 years (155; 40.3%), followed by 41-50 years (113; 29.4%), indicating that younger entrepreneurs adapt more easily to digital tools, while older entrepreneurs possess more substantial managerial experience. In terms of education, the largest groups were high school (137; 35.6%) and bachelor's degree holders (94; 24.4%), followed by diploma (74; 19.2%), master's/doctoral (64; 16.6%), and junior high school graduates (16; 4.2%). The prevalence of secondary and undergraduate education highlights the potential to enhance digital and financial literacy for improved competitiveness. Based on business experience, 157 respondents (40.8%) had been in business for 3-5 years, while 80 (20.8%) had been in business for over 12 years.

The findings of direct effect, mediation, and moderation analysis were used to test H₁-H₅ presented in table 3. The results of the structural model testing show that TD has a positive and significant effect on BS ($\beta = 0.425, p < 0.010$), thus supporting H₁. In addition, DT has a positive and significant impact on PL ($\beta = 0.420, p < 0.010$), supporting H₂. Only the effect of PL on BS is positive but not significant ($\beta = 0.046, ns$), so H₃ is not supported. Furthermore, the results of testing the indirect effect of PL as a mediating variable in the relationship between TD and BS are also not supported ($\beta = 0.019, ns$), thus rejecting H₄. However, the results of the indirect effect test of FL as a moderator variable of the relationship between PL and BS showed a positive and significant effect ($\beta = 0.074, p < 0.010$), thus supporting H₅. While the value constructs of business sustainability ($R^2 = 0.574$ and $Q^2 = 0.374$) are above 0.350. The peer-to-peer lending prediction value (R^2) of 0.176 and the Q^2 of 0.027 are classified as low because the Q-square value is above 0.010 (Hair et al., 2019).

Table 3. Path Coefficients and Results for Hypothesis Testing

Description Path	Path Coeff.	P value	95% confidence interval		f-square	Hypothesis
			Lower	Upper		
Direct Effect						
DT -> BS	0.425	0.000	0.364	0.488	0.315	H ₁ is accepted
DT -> PL	0.420	0.000	0.354	0.491	0.214	H ₂ is accepted
PL -> BS	0.046	0.171	-0.039	0.125	0.003	H ₃ is rejected
Indirect effect (mediation and moderation)						
DT -> PL -> BS	0.019	0.174	-0.012	0.050		H ₄ is rejected
FL x PL -> BS	0.074	0.024	0.011	0.134		H ₅ is accepted
	R²	Q²				Predictive
Business Sustainability	0.574	0.374				Medium
Peer-to-peer Lending	0.176	0.0274				Low

Source: Data Processed, 2025

Based on the SRMR calculation results, the Saturated model = 0.056, indicating a good model because it is still below 0.080 (Hair et al., 2022). The results of the CVPAT-PLS-SEM indicator average and linear model prediction benchmark calculations also show that the IA results are significantly smaller than the LM (IA overall = 0.591 < LM overall = 0.831), indicating that the research model has good predictive power and validating that the measurement and structural models are consistent with the observed data patterns. Furthermore, Figure 1 shows the complete research model.

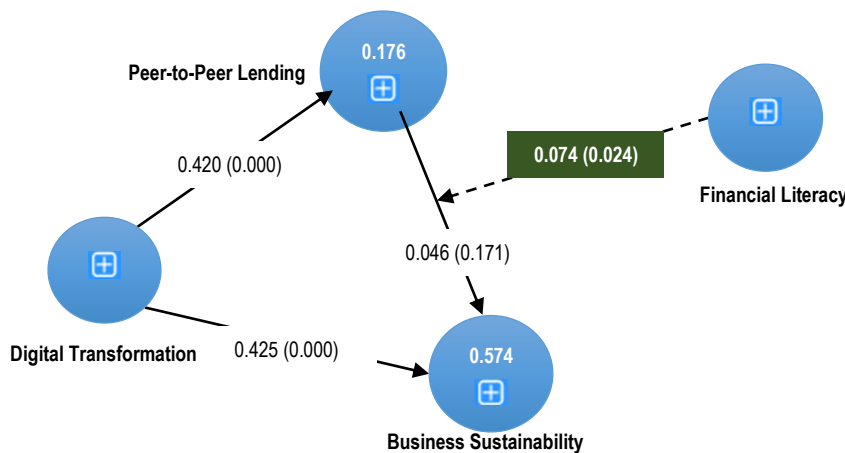


Figure 1. Overall Model Fit Test

Source: Data Processed, 2025

In the moderated mediation variable hypothesis test, we used the bootstrap method of Jollineau & Bowen (2023), increasing the sample size to 1000 to calculate bias-corrected confidence intervals. The indirect effect was statistically significant at the 95% confidence interval. Table 4 shows that PL is positively related to BS when financial literacy is high ($r = 0.194, p < 0.010$) than when financial literacy is low ($r = -0.062, ns; \Delta r = 0.256, p > 0.010$). Therefore, the results are consistent with hypothesis 5. The results also show that the indirect relationship between DT and BS is more significant when financial literacy is high ($r = 0.050, p < 0.010$) than when it is low ($r = -0.012, ns; \Delta r = 0.062, p > 0.010$). Thus, we confirm that the relationship between DT and BS, mediated by PL, is moderated by financial literacy, thereby accepting hypothesis H₆. The results of the direct and indirect effect tests 3 can be seen in table 4.

Table 4. Results of Moderated Mediation Analysis

	Digital Transformation (X) → P2P Lending (M)		Business Sustainability (Y)		
	1	2	Direct	Indirect	Total Effects
Moderator	P_{MX}	P_{YM}	P_{YX}	$P_{YM} \times P_{MX}$	$P_{YX} + P_{YM} \times P_{MX}$
Low Financial Literacy	0.351*	-0.062	-0.027	-0.012	-0.039
High Financial Literacy	0.214**	0.194**	0.120**	0.050**	0.170**
Differences	-0.137	0.256	0.147	0.062	0.209

Notes: $n = 385, P_{MX}$, path from digital transformation to P2P Lending; P_{YM} , path from P2P Lending to business sustainability; P_{YX} , path from digital transformation to business sustainability. Low financial literacy is 1 SD below the average; high financial literacy is 1 SD above the average. The difference test for indirect and total effects is based on bias-corrected bootstrap intervals. * $p < 0.050$; ** $p < 0.010$.

Source: Data Processed, 2025

Furthermore, we map the interaction effect using a procedure Becker et al. (2023) that estimates the slope at one standard deviation above and below the moderator variable's mean. Figure 2 shows the interaction pattern. Consistent with H₅, PL has a more substantial positive influence on BS when FL is high. It is shown in figure 2.

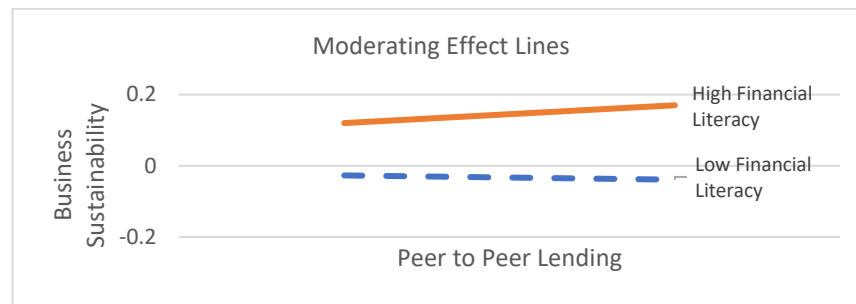


Figure 2. Moderating Effect of Financial Literacy

Source: Data processed, 2025

In the current era of dynamic market environments and technological acceleration, organizations' survival increasingly depends on their ability to integrate digital transformation (DT) and financial literacy as a core strategic capability (Fu & Ramayah, 2025; Weritz et al., 2024). The empirical findings of this study provide robust evidence that digital transformation significantly influences both business sustainability (BS) and peer-to-peer lending (PL) adoption. Conversely, peer-to-peer lending itself does not exert a significant direct effect on business sustainability, but it shows a moderated relationship when financial literacy is taken into account. The results of hypothesis testing and subsequent analysis offer several theoretical and managerial insights, which are discussed below.

H₁ proposed that digital transformation has a positive and significant impact on business sustainability. The total effect size ($\beta = 0.425$, $p < 0.010$; table 3) indicates that H₁ is accepted. This finding confirms that digital transformation (DT) significantly improves business sustainability in MSMEs. It aligns with Kahveci (2025), who found that the interconnected nature of digital awareness, digital strategies, digital adoption, and digital transformation can strengthen SMEs' competitive advantage. Similarly, a study by Mick et al. (2024) shows that firms with higher digital maturity can optimize operational processes, enhance resource allocation, and improve decision-making accuracy, thereby achieving sustainable profit margins. Guandalini (2022) also emphasized how strategic digitalization drives long-term value creation in small firms. In the context of Indonesian MSMEs, Saiful et al. (2025) observed that digital transformation enhances resilience and sustainability. Similarly, Zhai et al. (2022) found that digital transformation for sustainability involves not only adopting new technologies but also adapting organizational structures and innovation strategies within their businesses. Based on the Resource-Based View, Li et al. (2023) conceptualized digital capabilities as valuable and rare intangible assets that enhance a firm's adaptability and innovation.

Furthermore, Imran et al. (2025) reported that digital leadership and transformation intensity mediate sustainable competitiveness in Malaysian SMEs. Vrontis et al. (2022) also demonstrated that adopting digital technologies has a significant impact on the creation of economic sustainability and social value for SMEs in India. These findings confirm that digital transformation is more than just technical enhancements; it is a strategic imperative that enables dynamic capabilities and innovation pathways. However, sustainability outcomes depend on how well digital transformation is integrated into operational, financial, and strategic processes. Therefore, digital transformation should be viewed as an integrated capability involving digital infrastructure, talent, and a digital mindset.

H₂ suggests that digital transformation has a positive and significant effect on peer-to-peer lending. The total effect size ($\beta = 0.420$, $p < 0.010$; table 3) indicates that H₂ is accepted. Digital transformation in the context of MSMEs not only improves operational efficiency but also expands access to alternative financing such as peer-to-peer (P2P) lending. The results of this study indicate that DT significantly influences MSMEs' intention and ability to access P2P lending, in line with previous findings (Kusumawati et al., 2024; Lam et al., 2025). Digital infrastructure, such as the internet, smart devices, and digital record-keeping systems, creates a digital footprint that enables P2P platforms to assess creditworthiness (Tao et al., 2017; Zhen & Zhou, 2025).

Furthermore, perceived efficiency and trust in digital services strengthen the intention to use P2P lending (Tang et al., 2020; Velić et al., 2021). The shift from conventional to digitalization has led to a flood of incoming information, including digital financing from fintech. These findings confirm that digital transformation (DT) is a crucial catalyst for fintech adoption, including peer-to-peer lending. Therefore, digitalized MSMEs have a greater opportunity to utilize P2P financing efficiently, quickly, and inclusively.

H₃. The results of the study indicate that although peer-to-peer (P2P) lending is theoretically believed to improve business sustainability, in the context of this study, its effect on business sustainability was proven to be insignificant ($\beta = 0.046$, $p > 0.010$; table 3), thus rejecting hypothesis H₃. This finding indicates that access to digital financing does not automatically drive long-term profitability, growth, or resilience for MSMEs. Several contextual factors may explain this result. First, many MSMEs in developing countries use P2P lending primarily for short-term working capital rather than

as a long-term strategic investment, thereby limiting its contribution to sustainability (Anderloni et al., 2024; He & Li, 2020). Second, challenges such as information asymmetry, weak credit scores, and low financial management capacity also hinder the optimal utilization of funds obtained (Wang & Li, 2023). A study by Khan et al. (2021) also found that low financial literacy and weak financial planning are associated with a high risk of default and unproductive use of funds. Furthermore, the moral hazard factor in P2P lending arises when borrowers are reluctant to repay and lack responsibility towards the platform, leading to debt accumulation and disrupting company performance (Alsabah & Alibrahim, 2025). Even if they have no intention of repaying, their data is recorded, known as a personal credit risk or BI check in Indonesia, preventing them from applying for low-cost loans (Wen et al., 2022). In addition, unclear regulations and a lack of technical training also hinder business sustainability. As noted by P. Rita et al. (2019), adopting digital financing can increase a business's adaptive and innovative capacity. However, its impact depends heavily on the company's internal ability to manage these funds strategically and productively. In fact, overreliance on digital credit without careful consideration can actually increase debt burdens and reduce business sustainability in the medium term.

H₄ proposed hypothesis stated that peer-to-peer lending mediates the relationship between digital transformation and business sustainability. However, the statistical results revealed that this mediation effect was not significant ($\beta = 0.019$, $p > 0.010$; table 3), leading to the rejection of H₄. This finding contradicts earlier studies, such as Ogujiuba et al. (2023), which emphasized that financial support and digital financing accelerate innovation and performance through digital transformation. The non-significant result indicates that although digital transformation strengthens digital intensity and transformation management, the benefits do not necessarily pass through P2P lending mechanisms. One plausible explanation is that most MSEs use P2P lending for short-term liquidity rather than strategic business expansion, limiting its role in promoting sustainability (Miahendita, 2020). Moreover, low digital financial literacy and the immature fintech ecosystem may hinder the effectiveness of P2P lending as an intermediary (Garg & Singh, 2018). Therefore, digital transformation appears to directly influence business sustainability through internal operational improvements rather than indirectly via P2P lending. This result supports Tambunan's (2021) view that poorly managed finances and inadequate knowledge can undermine all plans, including threatening business sustainability.

H₅ indicates that financial literacy moderates the relationship between peer-to-peer lending and business sustainability, and this relationship is stronger in MSMEs with higher financial literacy. The total effect size ($\beta = 0.074$, $p < 0.010$; table 3) indicates that H₅ is accepted. The results indicate that financial literacy moderates the relationship between P2P lending usage and business sustainability intentions. This moderation is reinforcing: the higher MSMEs' financial literacy, the greater the benefits of P2P financing for business sustainability intentions. This finding is consistent with previous research emphasizing that financial literacy is not only knowledge but also practical skills in managing debt, analyzing costs and benefits, and planning long-term investments (Liu et al., 2023). In the context of MSMEs, financial literacy helps business actors understand the risks and benefits of digital financing such as P2P lending, including hidden fees, compound interest schemes, and the consequences of default. Studies by Zada & Erokhin (2024) and Khan et al. (2021) found that MSMEs with high financial literacy can allocate loans strategically, using funds for productive expansion, rather than simply covering short-term cash needs. Conversely, low financial literacy tends to encourage consumptive

financing behavior, increasing the risk of default and reducing the potential for sustainable growth (Hasan et al., 2024; Lusardi & Mitchell, 2023). Studies by Hanna et al. (2022) also show that financial literacy acts as a buffer against the risk of asymmetric information in the digital financial system. In the P2P ecosystem, this literacy enables business actors to read contracts, understand credit scoring, and compare various financing alternatives. Therefore, this moderating role is crucial, especially in developing countries, where the rate of fintech adoption often lags behind improvements in basic financial literacy. Thus, financial literacy is a critical factor determining the effectiveness of P2P lending in increasing the business sustainability of MSMEs. It reinforces the urgency of financial literacy programs and financial management training for small business owners as part of a sustainable digital financial inclusion strategy.

H₆ proposes that financial literacy moderates the mediated relationship between digital transformation and business sustainability through peer-to-peer lending, so that the mediated relationship is stronger at high literacy levels than at low literacy levels. The empirical findings indicate that financial literacy significantly moderates the mediating effect of digital transformation on business sustainability through peer-to-peer lending. The total effect size ($\beta = 0.170$, $p < 0.010$; table 4) thus confirms H₆. The results show that financial literacy significantly moderates the mediating effect of digital transformation on business sustainability through peer-to-peer (P2P) lending, with the relationship becoming stronger at higher levels of financial literacy. This finding reinforces the view that the success of a digital financing strategy depends heavily on the financial competence of business owners, especially among MSMEs operating with limited resources in a high-risk market environment. Previous studies have shown that digital transformation drives the adoption of P2P lending by providing digital infrastructure and opening access to innovative financial services (Kusumawati et al., 2024; Tao et al., 2017). However, financial literacy is key to converting this access to financing into sustainable business outcomes. Liu et al. (2023) emphasize that MSMEs with high financial literacy are better able to evaluate financial products, understand loan cost structures, and make strategic investment decisions. This moderation is important because P2P lending can be both an opportunity and a pitfall. Without literacy, businesses risk inefficient use of funds and even an increase in their debt burden (Hasan et al., 2024; Lusardi & Mitchell, 2023). Conversely, with good literacy, funds from P2P lending can be used to accelerate further digital transformation, product diversification, or market expansion, which directly impact long-term sustainability (Idris et al., 2023; Quintiliani et al., 2023). Thus, this hypothesis confirms that financial literacy serves as a critical catalyst strengthening the indirect pathway between digital and financial services through P2P lending. It means that digital strategies and innovative financing are insufficient without the cognitive readiness of business actors to understand, manage, and direct resources toward sustainable growth. This finding is relevant for the development of public policies and MSME mentoring programs, where financial literacy should be a key component of digital transformation and financial inclusion initiatives.

CONCLUSION

This study seeks to investigate a critical question: Is peer-to-peer (P2P) lending an effective solution in translating digital transformation (DT) into sustainable business outcomes for MSMEs? Contrary to initial expectations, empirical findings indicate that P2P lending neither significantly mediates nor directly influences the relationship

between digital transformation and business sustainability. The availability of alternative digital financing channels, such as P2P platforms, is insufficient to ensure improved business sustainability, particularly without adequate financial capabilities. Rather than acting as a straightforward financial enabler, P2P lending appears as a conditional or neutral mechanism, whose effectiveness is highly dependent on the level of financial literacy among business actors. In companies with low financial literacy, access to digital credit can lead to suboptimal outcomes such as debt traps, cash flow misalignments, and risky short-term financial behavior. However, for companies with strong financial knowledge, P2P lending can be strategically leveraged to fund innovation, strengthen digital capabilities, and improve overall financial resilience. Therefore, this study concludes that P2P lending is not a one-size-fits-all solution. Its success in supporting sustainable digital transformation hinges on strong financial literacy, responsible credit management, and strategic capital allocation. These findings challenge the common assumption that digital finance inherently drives inclusivity and sustainability. More broadly, this study underscores the triad of interdependencies necessary for sustainable digital transformation: (1) Strategic technology adoption across the board, from digitization to digitalization that already incorporates technology into business process strategies for competitiveness; (2) Adaptive transformation governance, which ensures that digital initiatives are embedded in organizational practices; and (3) Strong financial literacy, which empowers companies to make informed and sustainable financial decisions. Furthermore, policymakers need to encourage strategic collaboration between fintech lending providers and training institutions or MSME mentors, so that digital funding operates in an integrated manner and becomes an integral part of efforts to increase business capacity and sustainability.

The limitations of the study include a gap in the work for future researchers. Firstly, the cross-sectional study conducted in this work compromises the robustness of the temporal association between digital transformation and business sustainability. Thus, future researchers should study the association in a longitudinal study. Secondly, the study is limited to owners of micro and small enterprises in the food and beverage, retail, and service businesses. To increase the generalizability of this study, future researchers should embark on other specific sectors or industries. Lastly, the moderating role of external factors, such as mentorship, guidance, and training programs, has not been considered and should be empirically tested in future research.

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