UNS Fintech Center | Bulletin of Fintech and Digital Economy

Digital Transformation of MSMEs through Online Lending: An Alternative Strategy for Inclusive Economic Growth in Indonesia

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Abstract:
This study investigates the impact of fintech lending on the digital transformation of Micro, Small, and Medium Enterprises (MSMEs) and its subsequent effect on economic growth in Indonesia, as measured by Gross Domestic Product (GDP). Using secondary data and a multiple regression approach, the results show that fintech lending has a positive and significant effect on MSME digitalization, and MSME digitalization also has a positive and significant effect on GDP. Furthermore, MSME digitalization is tested as a mediating variable between fintech lending and GDP, confirming its strategic role in transmitting digital financial access into economic output. However, the simultaneous effect of all independent variables on GDP in the regression model is not statistically significant, which may be attributed to the small number of observations. These findings highlight the importance of digital infrastructure and access to alternative financing in empowering MSMEs and enhancing inclusive economic development, while also indicating the need for broader datasets in future research.

JEL: D63, O33

Keywords:
Financial Technology, MSME digitalization, economic growth, inclusive economy, peer-to-peer lending, digital transformation, financial inclusion, QRIS adoption, online loans, Indonesia MSMEs

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DOI:
https://doi.org/10.20961/bfde.v4i2.107346

1. Introduction

In recent years, fintech lending or online lending has become one of the fastest-growing digital financial innovations, especially in Indonesia (Simamora & Muda, 2022; Nopiah et al., 2023). The Peer-to-Peer (P2P) lending model not only offers a fast and easy financing alternative for individuals who lack sufficient assets to apply for loans at traditional banks but also has a positive empirical impact on regional economic growth (Nopiah et al., 2023). Theoretically, neoclassical economic growth frameworks such as Solow (1956) and the Cobb-Douglas production function position technology, including financial technology, as a key factor in enhancing productivity and the efficient allocation of capital and labor. In this context, fintech lending has the potential to enhance the financing capacity of SMEs, which have historically faced difficulties in accessing formal capital sources (Solow, 1956).

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Empirical research also supports this assumption. Simamora & Muda (2022) in the ICSST proceedings found that fintech lending serves as an alternative financing solution for MSMEs, although the influence of the number of borrowers and deposits shows varying results. Meanwhile, a panel data study by Nopiah et al. (2023) shows that fintech lending significantly influenced regional economic growth during the 2019-2022 period. Aspects of inclusion and equity are also important focuses. Salim et al. (2025) studied gender inclusion in fintech lending in Indonesia and found that the proportion of female users and good governance practices have a positive impact on GDP. This indicates that fintech lending not only expands access to financing but also activates the economic participation of previously underserved groups. However, while many studies highlight credit access and the direct effects of fintech on the economy, research on the role of fintech lending in driving SME digitalization and the impact of such digitalization on GDP remains limited. The study by Rahmadi et al. (2023) uses fintech as an intervening variable between MSME production growth and GDP during the pandemic, and finds a positive direct effect of fintech on GDP, but does not investigate MSME digitalization as a transformation pathway. Therefore, this study aims to address this gap and is expected to provide a more holistic picture of the mechanism of SME digital transformation as the main pathway for fintech lending to support inclusive economic growth. The relationship between fintech lending, SME digitalization, and economic growth has become an important topic of discussion in contemporary economic literature. Theoretically, the basic framework underlying this analysis can be traced back to Solow's (1956) neoclassical growth model, which emphasizes that long-term economic growth is influenced by the accumulation of capital, labor, and, most importantly, technological progress. In this context, fintech lending is seen as a form of financial technological progress that can improve the efficiency of capital allocation, especially in the informal sector and SMEs, which have traditionally been underserved by formal financial institutions.

The digitization of MSMEs can be positioned as a form of productivity augmentation in the small business sector, which is consistent with the Cobb-Douglas production function logic adopted in economic growth models. In this model, technology acts as a multiplier factor for the productivity of inputs such as capital and labor. When MSMEs adopt digital technology, they have the potential to increase output with the same inputs, which in turn can drive aggregate economic growth. However, the relationship between fintech and economic growth through SME digitalization still yields varying empirical results. Some studies indicate that fintech lending can expand access to financing and support SME digital transformation, which then contributes to increased national output (Tang, 2019; Haddad & Hornuf, 2019). On the other hand, challenges such as low digital literacy, unequal access to technology, and credit risk can also hinder these positive impacts (Zetzsche et al., 2020). Therefore, it is important to empirically examine whether fintech lending truly serves as a catalyst for SME digitalization and to what extent such transformation contributes to national economic growth. This study is expected to provide a more comprehensive understanding of the role of financial technology in building a more inclusive and productive economy, particularly in developing countries like Indonesia.

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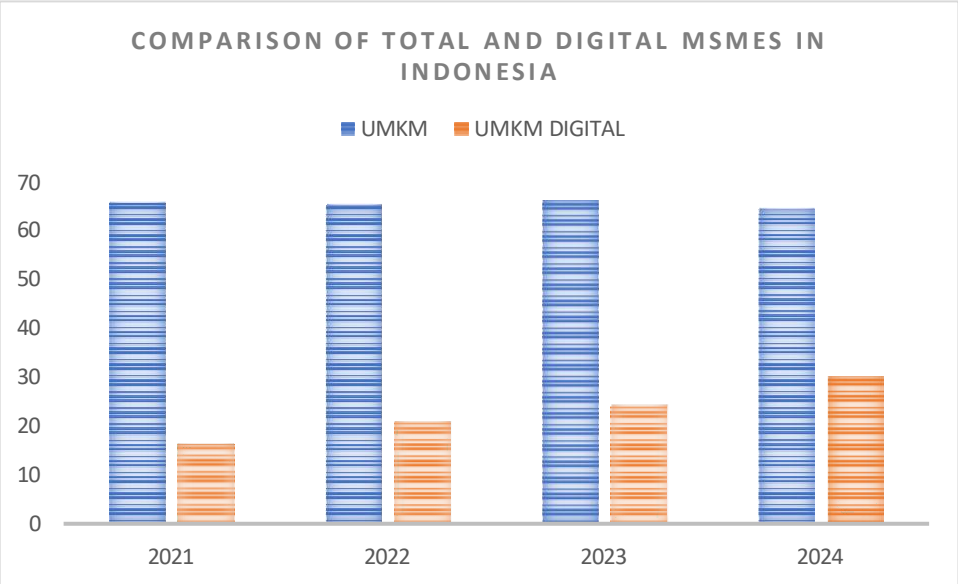

Figure 1. Comparison of Total And Digital MSMEs In Indonesia
Source : Data diolah, 2025.

Indonesia is one of the countries with the largest number of MSMEs in Asia, with more than 64.2 million business units contributing around 61% of GDP and employing 97% of the national workforce. Although Indonesia has a very large number of MSMEs, namely more than 64 million units during the period 2021 to 2024, the proportion of MSMEs that have entered the digital ecosystem is still relatively low. In 2021, out of a total of 65.46 million SMEs, only around 16.14 million (approximately 24.6%) had been digitized. This number has indeed increased over the past four years, reaching 30 million digital SMEs by 2024, but it still indicates that the majority of SMEs have not yet leveraged digital technology in their business operations. This underscores the significant digital gap in Indonesia's SME sector. This situation highlights the importance of financial technology, such as fintech lending, in driving SME digitalization. Online loans are seen as a fast and inclusive financing alternative for micro, small, and medium-sized businesses, particularly in supporting the adoption of digital technologies such as e-commerce platforms, QRIS-based payment systems, and other digital financial services. Thus, studies on the impact of fintech lending on the digitization of MSMEs, as well as the impact of MSME digitization on economic growth (GDP), are highly relevant. This study aims to answer whether the expansion of fintech lending can accelerate the digital transformation of MSMEs and to what extent MSME digitization contributes to national economic growth. This disparity is quite evident when compared to the digital literacy of MSMEs in several other Asian countries. For example, in 2020, the penetration of SME digitalization in Indonesia was only 13%, far behind China's 48% or Japan's 54%. This situation shows that although the number of SMEs in Indonesia is very large, their ability to access and utilize digital technology is still limited, even though digitalization has proven to increase productivity and turnover. To accelerate this process, the Indonesian government has set a target of 30 million SMEs going digital by 2024. This support is provided through various initiatives, such as digital training, QRIS integration, and e-commerce and e-payment programs initiated by the Bank of Indonesia (BI), the Ministry of Cooperatives and SMEs (Kemenkop), and the National Development Planning Agency (Bappenas).

As a financial instrument, fintech lending is expected to serve not only as a source of quick capital, but also as a catalyst for the digitalization of MSMEs. However, there has been no comprehensive research that empirically tests the mediating path between fintech lending, MSME digitalization, and economic growth as measured by GDP figures. Understanding this path is crucial given the large scale of MSMEs in Indonesia and the increasingly broad potential for socio-economic impact. Therefore, this study focuses on mapping this mediation model, with the hope of contributing relevant academic findings and policy support for the development of a more inclusive digital economy in Indonesia.

2. Literature Review

2.1. The Relationship Between Fintech Lending and Economic Growth

Fintech lending has become one of the financial innovations believed to be capable of strengthening economic growth, especially in developing countries such as Indonesia. Referring to the economic growth theory by Schumpeter (1912) and King & Levine (1993), financial innovation plays an important role in accelerating capital allocation and boosting economic productivity, which ultimately drives an increase in GDP. This is reinforced by the IMF (2024) report, which shows that digital lending has a positive and significant impact on global GDP per capita growth. In Indonesia, various empirical studies support this finding. Research by Pramaisshella and Fisabilillah (2023) found that fintech lending contributes significantly to Indonesia's GDP with a coefficient of 0.5477. Similar results were also found by Perdini et al. (2023), which showed that fintech lending contributes 68.18% to national economic growth. Additionally, research by Primasari et al. (2022) using the SYS-GMM method on provincial panel data found a two-way effect between online loan growth and economic growth. These findings underscore that fintech lending not only expands access to financing but also accelerates the digital transformation of SMEs, which in turn drives inclusive economic growth in Indonesia.

2.2. The Relationship Between Fintech Lending and the Digitalization of MSMEs

Fintech lending has been proven to drive the adoption of digital technology by MSMEs in Indonesia through increased access to financing and ease of transactions. For example, Miahendita (2023) found that the amount of funding from P2P lending contributed directly to increased MSME profitability, even though it was not always the assets that demonstrated fintech's ability to strengthen micro business capabilities (Miahendita, 2023). Meanwhile, Serang, Kalsum, and Pasagi (2022) stated that fintech and digital payments open up inclusive opportunities for SMEs, while accelerating the adoption of QRIS and e-commerce, although digital literacy remains the main challenge. A more specific study on digital payments by Alifiyah & Purwanti (2024) shows that the combined use of QRIS and marketplaces has a significant positive impact on increasing SME income in Malang. A systematic approach also emerges from the study by Hartutik et al. (2023), which shows how sharia-based fintech in Sidoarjo not only provides alternative capital but also encourages MSMEs to integrate digital payment systems into their operations. Thus, the literature consistently demonstrates that fintech lending serves as a catalyst for MSME digitalization, both through increased capital and the integration of payment technology, all of which lead to the acceleration of digital transformation in the MSME sector in Indonesia..

2.3. The Relationship Between MSMEs Digitalization and Economic Growth

MSME digitalization plays an important role in driving national economic growth, especially in developing countries such as Indonesia. The digitalization process includes the adoption of technology in operational activities, marketing, and payment systems, which can increase efficiency, expand market access, and strengthen the competitiveness of micro, small, and

medium enterprises. According to the OECD (2021), digitalization boosts SME productivity and accelerates economic recovery post-COVID-19 pandemic. Research by Alifiyah and Purwanti (2024) shows that the use of QRIS and digital marketplaces by SMEs in Malang significantly increases income and expands the consumer base, directly contributing to local economic growth. Additionally, a study by Apriyanti et al. (2022) confirms that the use of digital technology by MSMEs in Indonesia has a positive impact on increasing sales volume and business value added, thereby contributing to GDP. These results are in line with the Asian Development Bank (ADB, 2020) report, which states that the digitization of MSMEs in Southeast Asia can increase regional GDP by up to 1.5% through increased productivity and market expansion. However, challenges such as limited digital literacy, ICT infrastructure, and personal data protection remain obstacles to optimizing the role of digitization. Therefore, the success of SME digitalization in driving economic growth heavily depends on comprehensive policy support, education, and technological inclusion.

3. Data and Methodology

This study uses secondary data obtained from various reliable sources such as the Financial Services Authority (OJK), Bank Indonesia (BI), the Central Statistics Agency (BPS), and the World Bank. The data used is annual data (time series) covering the period from 2018 to 2024, which represents a significant growth phase in the development of the digital financial ecosystem in Indonesia. This period was chosen because it reflects the phase of massive expansion of fintech lending, increased adoption of digital payment systems (especially QRIS), and accelerated digital transformation of MSMEs driven by the post-COVID-19 economic recovery program. The approach used in this study is quantitative, employing multiple regression analysis to test the relationships between variables, as well as mediation analysis based on the Baron & Kenny (1986) approach and bootstrapping from the PROCESS Macro (Hayes, 2017) to determine whether SME digitalization (through QRIS) mediates the relationship between fintech lending and economic growth.

The regression model specifications in this study are as follows:

1. Model of Fintech Influence on Digital MSMEs

$$UD_i t = \alpha_0 + \alpha_1 FL_i t + \varepsilon_i t$$

2. Model of the Influence of Digital MSMEs on GDP

$$PDB_i t = \beta_0 + \beta_1 UD_i t + \varepsilon_i t$$

3. Combined Mediation Model

$$PDB_i t = \gamma_0 + \gamma_1 FL_i t + \gamma_2 UD_i t + \varepsilon_i t$$

Explanation :

FL = Fintech Lending
UD = Digital MSME
PDB = GDP
E = error term

All data will be analyzed using statistical software such as SPSS, tailored to the technical requirements of regression analysis and mediation testing. Before analysis, the data will first be tested using classical assumption tests to ensure normality, as well as autocorrelation and heteroscedasticity tests to ensure the validity of the regression model.

4. Result and Discussion

Before performing linear regression analysis, it is necessary to test the classical assumptions to ensure that the regression model used meets the basic statistical requirements. Classical assumption testing aims to avoid bias and errors in drawing conclusions from the regression results. The assumptions tested include normality, multicollinearity, heteroscedasticity, and autocorrelation. If all these assumptions are met, the regression model can be considered valid and suitable for further analysis.

Table 1. Classical Assumption Tests

Classical Assumption Test	Indicator	Test Results	Criteria	Conclusion
Normalitas	Kolmogorov-Smirnov Sig.	0.071	Sig. > 0.05	Data normally distributed
Multicollinearity	Tolerance / VIF	1.000 / 1.000	Tolerance > 0.1; VIF < 10	No multicollinearity
Heteroscedasticity	Sig. FL terhadap ABS_RES	0.620	Sig. > 0.05	No heteroscedasticity
Autocorrelation	Durbin-Watson	1.991	1.5 < DW < 2.5	No autocorrelation

Source : Data processed, 2025.

Table 2 shows the descriptive statistics used to provide an overview of the characteristics of the data for each research variable used in the period from 2021 to 2024. The variables analyzed include fintech lending, the number of digital MSMEs, and GDP.

Table 2. Descriptive Statistics

Year	Pindar distribution	GDP	DIGITAL MSMEs
2021	155.90	16.976.751,40	16.40
2022	215.54	19.588.459,90	20.76
2023	238.77	20.892.348,50	24.00
2024	300.92	22.138.964,00	30.00

Source : Data processed, 2025.

Based on the table, it is known that the fintech lending variable has a minimum value of Rp155.90 trillion and a maximum value of Rp300.92 trillion. Table 2 shows that the distribution of funds through peer-to-peer (P2P) lending platforms in Indonesia has increased significantly from year to

year. The variable for the number of SMEs that have entered the digital ecosystem in Indonesia, which serves as an indicator of SME digitalization, shows a minimum value of 16.4 million and a maximum value of 30 million merchants, with an average of 22.79 million merchants. This figure reflects the massive digital acceleration by SMEs in Indonesia over the past few years. Meanwhile, the GDP (current prices) variable shows a minimum value of Rp16,976,751 trillion and has increased annually. This indicates that, in general, Indonesia's economic growth during the observation period has tended to increase, in line with digital transformation and the expansion of the technology-based financial sector. Thus, through these descriptive statistics, it can be concluded that there is a clear growth dynamic in the three main variables of the study, reflecting the potential link between the growth of fintech lending, the adoption of digital technology by MSMEs, and the increase in national economic output.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.150	1.622		.709	.552		
	FL	.095	.007	.995	13.680	.005	1.000	1.000

Dependent Variable : UD

The regression analysis results indicate that the online loan distribution variable has a significant effect on the number of MSMEs entering the digital ecosystem in Indonesia, with a significance level of 0.005. Since the significance level is less than 0.05 ($p < 0.05$), it can be concluded that the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This means that, statistically, there is a significant relationship between the increase in funding disbursement from fintech lending platforms and the growth of SME digitalization, which in this context is represented by the number of SMEs that have begun to adopt digital technologies such as QRIS, e-commerce, or other digital financial platforms. Thus, the larger the value of online loan disbursement, the greater the tendency for SMEs to enter the digital ecosystem. These results support previous literature stating that inclusive financing access through fintech can drive technology adoption and digitalization in the SME sector (Fauziah et al., 2023; Wati et al., 2022) and strengthen the argument that digital financial services play a strategic role in micro-scale economic transformation in Indonesia. Based on the regression analysis results, a coefficient value of 0.095 was obtained for the Online Loan Distribution variable on the dependent variable Number of MSMEs entering the digital ecosystem. The positive coefficient value of 0.095 indicates that every one-unit increase in online loan distribution will be followed by an increase of 0.095 units in the SME digitalization variable, assuming other variables remain constant. Thus, it can be concluded that online loan distribution has a positive and significant effect on the increase in the number of SMEs that have been digitalized.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	11409574.367	1650438.278		6.913	.020		

UD	372512.336	70762.972	.966	5.264	.034	1.000	1.000

The results of simple linear regression analysis show that the variable of MSME digitalization (UD) has a positive and significant effect on GDP. The regression coefficient (B) value of 372,512.336 indicates that every one-unit increase in the number of SMEs entering the digital ecosystem will increase GDP by Rp372,512,336, assuming all other variables remain constant. The significance value (Sig.) of 0.034 is below the 5 percent threshold (α = 0.05), meaning that the influence of the UD variable on GDP is statistically significant. Additionally, the standard beta coefficient value of 0.966 indicates that SME digitalization makes a very strong contribution to Indonesia's economic growth. The calculated t-value of 5.264, which far exceeds the t-table value, further strengthens the evidence that the influence of the independent variable on the dependent variable is significant. No multicollinearity issues were found, as indicated by the VIF value of 1.000 and Tolerance of 1.000. This finding reinforces the understanding that the digital transformation undertaken by SMEs, particularly through the integration of financial technologies such as QRIS, e-commerce, and other digital payment systems, can play a crucial role in driving national economic output growth. This finding aligns with previous studies, such as those by Lukman et al. (2022) and the OECD (2020), which highlight the importance of digitalization in enhancing competitiveness and the contribution of SMEs. This finding is in line with previous studies such as those cited by Lukman et al. (2022) and the OECD (2020), which highlight the importance of digitalization in improving competitiveness and the contribution of MSMEs to GDP.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.007	2	.004	24.484	.141[b]
	Residual	.000	1	.000		
	Total	.007	3			

a. Dependent Variable: LOG_PDB

b. Predictors: (Constant), LOG_UD, LOG_FL

The results of the ANOVA test on the multiple regression model show an F-value of 24.484 with a significance value (Sig.) of 0.141. This test aims to determine whether the constructed regression model is statistically significant or not. In this context, the significance value is greater than 0.05, i.e., 0.141 > 0.05, which means that the regression model is not statistically significant at the 5% significance level. In other words, simultaneously, the variables LOG_UD and LOG_FL do not have a significant effect on the dependent variable LOG_PDB.

Although the F value is quite large (24.484), the high significance indicates that these findings should be interpreted with caution, as they may be influenced by the very small sample size (residual df = 1, meaning there are only 4 data points). A very limited number of data points can cause statistical results to be unstable and unable to be strongly generalized. Therefore, although the R^2 value and individual regression coefficients may appear favorable, the model as a whole cannot yet be considered statistically valid.

In the context of scientific research, it is important to increase the number of observations so that the constructed regression model can be tested more reliably, and the F-test results can reflect the actual relationship between fintech lending, SME digitalization, and economic growth (GDP).

5. Conclusion

This study aims to examine the effect of fintech lending on the digitization of MSMEs and its impact on economic growth (GDP) in Indonesia, using a mediation model approach. The regression analysis results show that fintech lending has a positive and significant effect on the digitization of MSMEs with a significance value of 0.005 and a regression coefficient of 0.095. This means that an increase in fintech lending can drive the digitalization of MSMEs in Indonesia. Furthermore, the digitalization of MSMEs has a positive and significant effect on GDP, with a significance value of 0.000 and a regression coefficient of 0.521. This indicates that the higher the level of digitalization of MSMEs, the greater their contribution to national economic growth. However, the results of the simultaneous multiple regression test indicate that the model is not significant overall, with an ANOVA significance value of 0.106 (> 0.05). This means that the collective relationship between fintech lending and SME digitalization on GDP has not been proven to be statistically significant. These findings indicate that although each variable has a significant partial effect, their simultaneous contribution to economic growth remains limited. Therefore, additional support is needed, such as improving digital literacy, expanding technological infrastructure, and implementing policies that support the digital financial ecosystem, so that the potential of SME digitalization in driving the economy can be optimized.

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