Boosting MSMEs: how digital financial innovation and financial literacy fuel access to finances

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Abstract
Purpose – This study explores how digital financial innovation and literacy collectively promote access to finance and MSMEs growth in Bali, Indonesia. Intends to ascertain how these two factors combine to enhance access to finance and, subsequently, MSME growth. **Method** – Data collection was carried out through questionnaires using a quantitative approach. The study targeted the owners of MSMEs in Bali, using purposive sampling to select 200 respondents who have actively utilized digital financial services. The data were analyzed using structural equation modeling (SEM) to quantify the associations among key variables. **Findings** – The results show that financial literacy is an important mediator in ensuring digital financial innovation translates into access to finance and, subsequently, MSME growth. This, therefore, offers strong proof that a boost in financial literacy among MSME owners in developing countries will further sweeten the benefits of digital financial innovations into better chances of securing finance for business expansion. The research explores how financial literacy and digital financial innovation expand access to finance and MSME development in Bali, using disruptive innovation theory, theory of access to finance, theory of financial literacy, and TAM. Evidence confirms financial literacy as an essential mediator, increasing the impact of digital finance. **Implications** – Theoretically, this integrates multiple frameworks; practically, it demands increased financial literacy awareness to harness digital innovation value to MSME development and inclusion fully.
Keywords: digital financial innovation, financial literacy, access to finance, MSME growth.

Introduction

MSMEs are very imperative in all different world economies. Most countries depend heavily on MSMEs for gross domestic product contributions and employment purposes (Adam et al. 2024). MSMEs highly contribute to every nation's economy (Wube and Atwal 2024). Masadeh et al. (2024) emphasize that MSMEs support large-scale industry sectors. Indrawati et al. (2024) affirm that MSMEs form the backbone of most national economies. MSMEs contribute to more than 60% of the national GDP and absorb more than 97% of the workforce in Indonesia. With this critical role, MSMEs not only act as drivers of economic growth but also as poverty-reducing and job-creating enterprises (Nursini 2020). Despite their potential, MSMEs face several challenges that hinder their growth and sustainability (Dahmiri et al. 2024). Future challenges will encompass digital literacy, productivity, finance, branding, and marketing (Ha and Chuah 2023). Among the most crucial adaptations to these challenges is digital financial innovation, facilitating easier access to financial services for MSMEs. Integrating fintech products, mobile banking, and digital payment systems has significantly promoted financial inclusion, enabling MSMEs to make transactions conveniently and obtain funding opportunities.

As of early 2023, the internet penetration in Indonesia was at 77.0%, corresponding to approximately 212.9 million users. Significantly, cellular mobile connections amounted to 353.8 million, surpassing the population and reflecting the country's extensive mobile connection (We Are Social 2023). Digitalization among MSMEs surged from 7 million in 2020 to 24 million in 2023 (Fathurrahman and Fitri 2024; Februadi, Firmansyah, and Rafdinal 2025). Digital finance is one important way financial inclusion is improved (Xue, Dong, and Jiang 2024). Mothobi and Kebotsamang (2024) reiterate that digital finance increases access to quality financial services. Fintech platforms enable easier financial transactions, such as online loans and digital payments (Wahyundaru et al. 2024). Despite these developments, MSMEs are still lagging in financial literacy, which inhibits them from optimizing digital financial innovation (Rosyidiana and Narsa 2024). Financial literacy is a knowledge, skill, and attitude in managing financial well-being (Cho 2024). Knowledge management is significant in organizational performance (Jasin et al. 2024). Poor financial literacy remains a significant barrier to MSME growth (Miswanto et al. 2024). Low financial literacy restrains MSMEs from utilizing digital financial services to their best, leading to inefficient financial decision-making and capital accessibility. It becomes necessary to augment financial literacy to ensure MSMEs' potential to avail of digital financial innovations, leading towards higher financial inclusion and business sustainability. Only 40% of Indonesian MSMEs have access to formal financial institutions, often due to limited knowledge of financial products and risk management (Priyadi et al. 2021). Financial literacy is key to prudent financial decision-making (Arpaci, Aslan, and Kevser 2024). Digital literacy in financial matters plays an important role in shaping access to digital financial products and services (Aryan et al. 2024). Digital literacy is equally important in shaping access (Hood 2024).

The Covid-19 pandemic hastened the use of digital finance, thus putting pressure on MSMEs to change to survive on digital platforms (Munawar et al. 2024). The digitalization process for MSMEs is still uneven (Zabri 2024). Existing studies have yielded conflicting evidence on the contribution of digital finance to MSME financial access. Some researchers highlight digital financial innovation as a key enabler facilitating MSME access to financial services (Mothobi and Kebotsamang 2024). Others, however, argue that financial literacy is a prerequisite for effectively leveraging financial innovation, implying that without sufficient financial knowledge, MSMEs may struggle to benefit from digital financial services (Arpaci, Aslan, and Kevser 2024). Concurrently, other work finds no significant correlation, suggesting that other drivers, such as regulatory systems or financial infrastructure, would be more likely to influence MSME access to finance (Xiao, Lin, and Wang 2024). Besides, discrepancies also exist in the correlation between digital financial innovation and financial literacy. Some have said that digital innovation will raise financial literacy levels through the accessibility of financial education and real-time financial management systems (Uthaileang and Kiattisin 2023). Others posit that the complexity of digital finance could, in fact, further increase the gap in financial awareness, particularly in MSMEs with minimal historical exposure to finance technology (Amnas, Selvam, and Parayitam 2024). Further, available literature indicates conflicting evidence for whether financial literacy leads to increased access to finance directly. Some findings are consistent with the argument that financially literate entrepreneurs can secure more funding (Gao and Ren 2023), while others suggest that financial literacy alone is insufficient in the absence of institutional presence and financial products offered (Pellegrino and Abe 2022).

The role of financial access in MSME development is contested. Other studies note that greater access to finance is equivalent to higher investment, innovation, and business expansion (Anatan and Nur 2023), while others deduce that excessive reliance on external finance could lead to financial distress and unsustainable business expansion (Khan 2022). In addition, the role of digital financial innovation in MSME expansion remains inconclusive. At the same time, some findings have shown that fintech interventions significantly enhance business performance and financial inclusion (Gu et al. 2023). Others argue that their impact is not evenly distributed and that small and less technologically equipped MSMEs do not leverage digital financial solutions to the best of their capabilities (Zhu and Wang 2022). Despite the rise in literature on financial literacy and digital financial innovation, their interaction's impacts on MSME financial access have not yet been extensively researched. Past research has failed to clearly illustrate whether financial literacy facilitates or hinders the optimization of digital financial services. This is particularly true in emerging economies like Indonesia, where MSMEs are the economy's driving force, yet continue to grapple with financial inclusion. Hence, further research is needed to clarify the interplay between digital financial innovation, financial literacy, and MSME access to finance, and their joint impact on business growth.

Although digital financial innovation and financial literacy generate much interest around MSME financial inclusion, the interactive impact of these two variables has received little attention from scholars in a single analytic model. While most past studies have explored the role of digital financial innovation or financial literacy as individual independent drivers in MSME access to finance, few have been concerned with understanding how they interact. This study makes a new contribution by analyzing financial literacy as a mediating variable that mediates how far digital financial innovation promotes MSMEs' access to finance. Although earlier studies only viewed financial literacy as a direct driver, this study structures it as an environmental variable that can enable or hinder the effect of digital innovation. As noted by Xiao, Lin, and Wang (2024), the moderating effect of financial literacy is still an under-researched area, particularly in developing economies.

The current study also addresses the conflicting findings of past research, part of which discusses the benefits of digital financial innovation (Mothobi and Kebotsamang 2024). The remaining portion discusses the need for adequate financial literacy in taking full advantage of such innovations (Arpaci, Aslan, and Kevser 2024). By presenting both constructs in one empirical model, this study tries to gain a deeper insight into the success of MSMEs in navigating financial access constraints in the digital era. This study's primary goal is to empirically examine how financial literacy mediates the impact of digital financial innovation on MSME financial access. This research is beneficial in Indonesia, where MSMEs employ more than 97% of workers but lack financial literacy and have poor financial inclusion. By delineating the conditions under which financial digital instruments are most effective, this study offers policy-relevant advice to policymakers, fintech platforms, and banking institutions to design interventions to enhance financial literacy and MSME access to finance.

Literature review

Disruptive innovation theory

This concept was coined by Christensen (2018), who described how simple, affordable innovations disrupt already set markets. In this context, digital financial innovations such as fintech may be thought of as disruptive innovation, allowing micro, small, and medium enterprises access to financial products that were previously unattainable (Pellegrino and Abe 2022). This theory, therefore, aids in justifying the argument that with innovation, new opportunities will be opened to MSMEs and hence increased competitiveness, translating into economic growth.

Technology acceptance model

The technology acceptance model (TAM) explains the adoption and utilization of technology by users based on two primary constructs: perceived usefulness (PU) and perceived ease of use (PEOU). PU is the extent to which a user believes that technology will enhance performance, while PEOU is the extent to which technology is easy to utilize (Hasni, Farah, and Adeel 2021). They influence attitude toward use (ATU), further influencing behavioral intention (BI) and actual system adoption. TAM provides a model of MSME uptake of services like mobile banking, e-wallets, and digital payment systems in digital financial innovation. As described by Murtiningrum and Aligarh (2024), MSMEs are likely to adopt these innovations where there are evident benefits and ease. Moreover, connectivity with regional financial institutions can enhance MSME sustainability through higher adoption of digital financial products. Through eliminating financial impediments and optimization, TAM explains how financial innovation in the digital environment fuels MSME expansion and sustains success.

Resource-based view (RBV)

The resource-based view (RBV) is the central strategic management theory that assumes competitive advantage for a firm hinges on the possession and management of assets that are valuable, rare, inimitable, and non-substitutable (Mlinarič and Wasowska 2015). Regarding MSME financial access, RBV requires firm-specific factors such as financial literacy and adoption of digital financial innovation as important resources that determine business results (Sreenu 2024). In other words, well-informed, financially knowledgeable MSMEs will likely employ digital finance innovations more effectively than those without sound financial knowledge (Kumar et al. 2024). Accordingly, this study employs RBV as a conceptual framework to discuss how financial literacy, as an intangible capability, synergizes with digital finance innovation to drive MSME financial inclusion in Indonesia.

MSMEs Growth

MSMEs growth may be that the growth of a firm is affected by its internal capabilities in resource allocation and innovation adoption (Tang et al. 2022). Firms need internal absorptive capacity to improve their innovation performance because this capacity can influence the effectiveness of innovation activities (Sancho-Zamora et al. 2021). In this context, access to finance and digital financial innovation are key for MSMEs to expand operations, increase productivity, and achieve business sustainability (Pellegrino and Abe 2022). Also, MSMEs' ability to adapt to technological and financial changes is another important determining factor for growth in a competitive business environment. The more active digitalization that an MSME embraces, when it comes to marketing, advertising, transactions, communication, and funding, the more resilient they are, thereby enabling them to maintain their performance even in crisis conditions (Kurniawan, Maulana, and Iskandar 2023). To thrive, MSMEs must adjust their business models to align with market trends and focus on building and expanding customer relationships. As a dynamic capability, adaptation allows MSMEs to transform and integrate resources, helping them counter disruptions and recover, ultimately ensuring resilience and long-term performance (Arraya 2024).

Digital financial innovation

Digital financial innovation contributes significantly to making MSMEs more sustainable and growing by ensuring effective, inclusive, and adaptive financial services (Gu et al. 2023). It comprises mobile banking, e-wallets, peer-to-peer lending, and digital payments platforms, among other technologies that enable MSMEs to manage finances and gain access to the market (Rizopoulos and Zachariadis 2024). In the wake of Murtiningrum and Aligarh

(2024), MSMEs' adoption of digital financial innovation is stimulated by perceived usefulness, convenience, and compatibility with business models. Digital financial innovation, in this study, is addressed in terms of how access to regional financial institutions fosters MSME sustainability through digital financial products. By gaining easier access to financial services, MSMEs have better cash flow management, working capital acquisition, and business growth financing (Deb and Baruah 2022).

Financial literacy

Financial literacy is gaining insight into financial concepts individuals may use to set base decisions (Maheshwari et al. 2025). In this theory, much emphasis has been placed on understanding financial information and its use in making constructive decisions. A high level of financial literacy can enhance entrepreneurs' capabilities of managing finances and making superior investment decisions, reducing the chances of business failure. Financial literacy is one of the most important aspects of business financial management and access to finance (Shi, Ali, and Leong 2025). Financial literacy involves skills, knowledge, and behaviors that enable individuals to make well-informed decisions about their money. Definitions of financial literacy vary, but most agree that it includes an understanding of financial concepts (Ramalho and Forte 2019). Financial literacy is essential for business owners to enhance their capacity to make wiser financial decisions, manage risks, and seize available funding opportunities (Bancoro 2023).

Access to finance

Access to finance is defined as the availability of capital that an individual or company can avail and utilize various finance-related services, namely loans, credit, and investment. MSMEs play an important role in this area and often have difficulties in their development process because of limited access to capital (Sitaniapessy, Usmanij, and Ratten 2022). This concept describes the factors that affect access to finance, such as business characteristics, the economic environment, and governmental policies. In most cases, MSMEs are constrained in access to finance, given that a lack of understanding and knowledge of financial products and uncertainty of risks essentially brings about an informational problem. Access to finance is fundamental in supporting business growth, particularly for MSMEs that often face difficulties obtaining funding (Bongomin et al. 2017). Adequate access to financing enables businesses to invest in innovation, increase productivity, and accelerate economic growth. Business loans, government policies, and environmental, social, and governance (ESG) practices play a significant role in this process (Tengfei and Ullah 2024). ESG practices can benefit a country's economic growth in various ways: mitigating risks, improving reputation, and, by extension, facilitating easier access to capital.

On the other hand, financial institutions resort to credit rationing for some borrowers, MSMEs included, due to problems of information asymmetry and default risk (Antoine, Stanislas, and Gustave 2021). These risks lead financial institutions to limit access to credit for specific borrowers. Providing collateral can help minimize credit rationing for firms, particularly MSMEs, by reducing the lender's risk in case of default (Saifurrahman and Kassim 2022). This results in many small businesses struggling to secure loans, despite their growth potential. Thus, inclusive financial policies and digital financial innovations are essential to widen the access of financing for MSMEs; adopting digital financing platforms facilitated by AI and ML has enormous potential for MSMEs (Pellegrino and Abe 2022).

Hypothesis development

Disruptive innovation theory explains how technological advancement transforms industries through reduced costs and improved accessibility. In finance, digital financial innovation is disruptive because it breaks the traditional barriers and renders financial services affordable and accessible. Konijnendijk and Roest (2017) state that fintech products significantly widened financial access for the unbanked, while Zhao et al. (2024) highlighted that digital finance lowers the transaction cost and physical distance. Furthermore, Mhlanga (2024) emphasized that big data and AI combined in fintech enable enhanced credit risk analysis, enabling banks to serve unserved MSMEs. Despite these developments, the success of digital financial innovation relies on financial literacy, which affects people's ability to take up and apply fintech tools effectively (Abdallah, Tfaily, and Harraf 2025). Without proper financial literacy, MSMEs may be unable to leverage digital finance to its maximum for their business needs.

H1: digital financial innovation positively affects access to finance.

The technology acceptance model (TAM) theorizes that individuals adopt financial technology based on perceived usefulness and ease of use. Consistent with the financial literacy theory, financial digital innovation increases financial awareness in terms of affordable financial products, real-time information, and experiential learning, allowing MSME owners to make sounder financial decisions (Uthaileang and Kiattisin 2023). The frequent use of fintech services also boosts financial literacy by offering automated money advice and real-time information (Amnas, Selvam, and Parayitam 2024). Financial literacy is also critical in averting financial mismanagement, a key MSME constraint. It fills gaps in knowledge and fosters a productive capital structure, leading to better financial access and growth opportunities (Hussain, Salia, and Karim 2018). Reddy, Wallace, and Wellalage (2024) found that financially literate MSME owners are more adept at managing financial products, recording accounts, and analyzing financial statements, enhancing their credit access.

H2: digital financial innovation positively affects financial literacy.

Access to financial resources is a significant MSME growth drive, as postulated by the resource-based view (RBV). This theoretical tradition emphasizes that firms with higher financial acumen and resource management capabilities have greater prospects of accessing external finance and resource management (Valle et al. 2022). Financial literacy enhances MSME entrepreneurs' ability to handle complex financial arrangements, make wise borrowing decisions, and optimize financial planning (Atkinson 2017). In line with the theory of financial literacy, financial literacy plays a significant role in determining the ability of a company to access funds. Very financially literate MSMEs can compare financing sources, improve creditworthiness, and make better use of digital financial systems (Gao and Ren 2023). Financial digitization enhances credit availability, reduces transaction costs, and increases security, further boosting MSME financial inclusion (Pellegrino and Abe 2022).

H3: financial literacy positively affects access to finance.

Disruptive innovation theory explains how technology transforms industries by providing greater product and service access, affordability, and efficiency. Disruptive digital financial innovation disrupts traditional banking models by breaking down the financial barriers, thus providing MSMEs with more extensive access to finance. Digital financial innovations lower transaction costs, improve credit accessibility, and create alternative financing channels, critical for MSMEs' development (Sun and Zhang 2024). Using digital financial products allows MSMEs to obtain funds more easily, which they can then invest in innovation, expand their markets, and enhance competitiveness (Anatan and Nur 2023). In line with the theory of access to finance, financial inclusion is a key driver of business expansion. MSMEs require sufficient funding to expand operations, innovate, and enhance competitiveness (Khan 2022). With limited access to finance, MSMEs are constrained from expanding their business and adopting new technology, and thus, pose a significant barrier towards sustainable growth (Calderon 2024).

H4: access to finance positively affect MSMEs growth.

Disruptive innovation theory explains how technological innovation transforms existing industries by rendering services more accessible, affordable, and inclusive (Christensen et al. 2018). In the financial sector, digital financial innovation is disrupting conventional banking models, enabling MSMEs to access new financing sources that were previously out of reach due to the cost and strict conditions for lending (Gu et al. 2023). Mobile banking, e-wallets, and peer-to-peer lending are complementary financial channels that reduce MSMEs' dependence on traditional financial institutions (Zhu and Wang 2022). By eliminating barriers such as geographical limitations, transaction costs, and credit rationing, digital financial innovation fosters broader financial inclusion, thus supporting the development of MSMEs. According to financial literacy theory, financial knowledge raises an entrepreneur's ability to access finance and effectively utilize funds (Susan 2020). Higher financial literacy helps MSME owners to make effective investment decisions, manage risks, and obtain the most from credit utilization, all of which are elements of improved business performance (Abdallah et al. 2024). Firms with satisfactory financial literacy can leverage digital financial tools to allocate resources more effectively, leading to sustainable business development.

H5: digital financial innovation affects MSMEs growth through access to finance.

Financial literacy theory asserts that enhanced comprehension of finances makes MSMEs more capable of securing and leveraging finance more effectively. Resource-based view (RBV) suggests that financial literacy is a source of strategy advantage, which adds financial risk management ability, maximizes the capital structure, and improves financial decision-making to boost business development. Individuals with good financial literacy can analyze sophisticated financial products, determine risk, and invest to maximize returns, making their companies more competitive (Alshebami and Marri 2022). Furthermore, digitalized financial innovations can enhance financial literacy by providing easily accessible financial facilities and timely education platforms that make MSME owners skilled decision-makers (Millaningtyas et al. 2024). Increased financial inclusion by digital financial products facilitates access to credit at a lower cost, allowing MSMEs to expand operations and stimulate economic development (Anthanasius Fomum and Opperman 2023). Leveraging financial literacy and digital finance, MSMEs can enhance their businesses' sustainability, generate employment opportunities, and foster national economic development.

H6: financial literacy affects MSMEs growth through access to finance.

The technology acceptance model (TAM) offers a sound basis for explaining how financial innovation in digital form affects the growth of MSMEs through access to finance and financial literacy. TAM argues that people embrace new technology based on perceived ease of use and perceived usefulness, which is important for MSMEs in adopting digital finance tools. Fintech solutions would likely be incorporated by MSME owners when solutions are simple and present a financial value. Such incorporation makes financial availability and literacy greater for MSME owners. By disruptive innovation theory, fintech innovation bridges the funding gap by facilitating cheap financial instruments and services through which MSMEs can get maximum utilization out of resources and bring high-quality decisions (Amnas, Selvam, and Parayitam 2024). Additionally, Sandhu, Dayanandan, and Kuntluru (2025) highlight that fintech solutions enhance financial inclusion by expanding access to digital financial information and services, ensuring that MSMEs, particularly those in underserved areas, can participate in the financial ecosystem. Moreover, better financial literacy using fintech products reinforces the capabilities of MSMEs to employ financial instruments effectively for business development and survival (Fitriyah, Hermawan, and Sudarsono 2023). Economic awareness with financial literacy facilitated using digital methods encourages fraud prevention, ensuring long-term financial stability and business success (Choung, Pak, and Chatterjee 2025).

H7: digital financial innovation affects MSMEs growth through financial literacy and access to finance.

The technology acceptance model (TAM) presents an alternative perspective on how digital financial innovation affects access to finance through financial literacy. TAM argues that the use of fintech products by MSMEs is influenced by perceived usefulness and ease of use. Provided those digital financial innovations—such as mobile banking and e-payment systems—are easy to use and useful, MSME owners are likely to integrate them into their financial activities, with the outcome being increased financial literacy and enhanced access to capital. In keeping with disruptive innovation theory, fintech innovations reduce traditional banking impediments and increase financial inclusion by providing accessible, affordable financial products and services to MSMEs (Basdekis et al. 2022). Malhotra (2023) further affirms that mobile banking and electronic payment systems facilitate financial transactions, while Cahyawati, Nantungga, and Tumewang (2023) add that fintech innovations empower MSMEs with financial literacy tools for better decision-making. Gu et al. (2023) also argue that microfinance and digital banking products allow small businesses to adopt more efficient financing models.
H8: digital financial innovation affects access to finance through financial literacy.

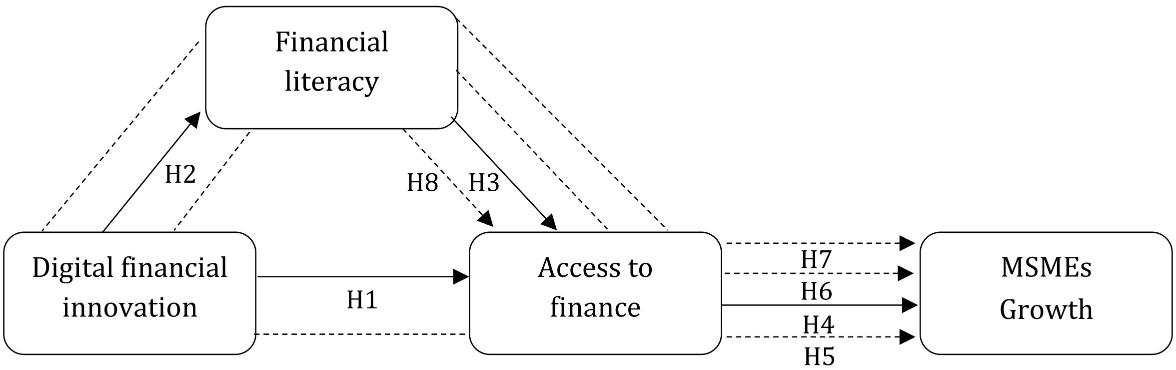

Figure 1 conceptual framework model

Method

This research was conducted in Bali, Indonesia, focusing on MSMEs that have acquired business legality through the decentralized fund from the Directorate General of Small and Medium Enterprises. The emphasis on MSMEs is because of their important contribution to the economy at the grassroots level, considering the enormous strides being accomplished in both the technological and business milieu. The data used in this research is primary data. Data collection was premised on a quantitative methodology approach through administering questionnaires to the owners of MSMEs as respondents. The population of the MSMEs listed in the Province of Bali totaled 16,650. The sampling was conducted using purposive sampling, targeting MSMEs that meet the following criteria: (1) have utilized digital financial innovation services, (2) have accessed financing successfully, and (3) have owners who can be assessed for their financial literacy level using standardized measurement instruments for financial literacy and obtained the number of samples as many as 200 MSMEs actors. This provides sufficient variability in financial literacy, access to finance, and adoption of digital financial innovation with sufficient strength in hypothesis testing. To guarantee validity and dependability, the indicators were modified from earlier research. Several statements on a Likert scale are used to quantify each indication to gauge participants' opinions and experiences, as seen in Table 1.

Table 1 operational variables

Variables	Indicators	Statements	Scale
Digital financial innovation (Malhotra 2023)	1. Use of digital banking for financial transactions	1. I use digital banking services for daily financial transactions.	Likert
	2. Accessibility of financial services through digital platforms	2. I find digital financial platforms make it easier to access financial services.	
	3. Preference for digital payments	3. I prefer digital payments over cash transactions.	
	4. Understanding of digital financial tools	4. I understand the features available in the digital financial applications I use.	
	5. Contribution of digital financial innovation to business financing	5. I believe digital financial innovation helps improve access to business financing.	
Financial literacy (Abdallah, Tfaily, and Harraf 2025)	1. Understanding basic financial management	1. I understand basic financial management concepts such as budgeting and saving.	Likert
	2. Awareness of loan types and risks	2. I can differentiate between different types of loans and their associated risks.	
	3. Ability to manage business finances	3. I have sufficient knowledge to manage my business finances effectively.	
	4. Awareness of digital financial services	4. I understand the benefits and risks of using digital financial services.	
	5. Confidence in financial decision-making	5. I feel confident in making financial decisions based on my knowledge.	
Access to finance (Hussain, Salia, and Karim 2018)	1. Ease of obtaining business financing	1. I find it easy to apply for business financing.	Likert
	2. Availability of various financing options	2. I have access to various financing options tailored to my business needs.	
	3. Role of digital services in financing	3. Digital financial services help streamline the financing process.	
	4. Reduced collateral requirements	4. I can secure financing without excessive collateral requirements.	
	5. Benefits of financial institutions' digital innovations	5. My business benefits from financial institutions' digital innovations in obtaining funding.	
MSMEs growth (Pellegrino and Abe 2022)	1. Revenue growth	1. My business revenue has increased over the past year.	Likert
	2. Impact of digital financial innovation	2. Digital financial innovation has contributed to my business growth.	
	3. Expansion opportunities through financing	3. Access to finance has allowed my business to expand operations.	
	4. Investment in new technology	4. I have invested in new technology to enhance my business performance.	
	5. Market reach and competitiveness	5. My business has improved in terms of market reach and competitiveness.	

The questionnaire will measure the variables relevant to digital innovation, access to financing, financial literacy, and MSME growth. Measurement for all variables was done using a Likert scale. Likert-type questions can be adapted for various economic contexts (Claveria

2021). A Likert scale is generally presented in a standard format, containing a series of statements for which a number is prepared, and the respondents are asked to indicate their agreement or disagreement by choosing options ranging from strongly agree to strongly disagree. In this research, the statements in the questionnaire are closed-ended and measure the perceptions and attitudes of the respondents regarding the four key variables: digital financial innovation, access to finance, financial literacy, and MSME growth. The questions were designed using a Likert scale, which allows the respondent to assess the statements presented by choosing his or her level of agreement from "strongly agree" to "strongly disagree."

Each variable is represented by several statements relevant to the context of MSMEs in Bali, representing their perceptions of using fintech services, the ease of access to financing, the level of financial knowledge, and the effect of innovation and financing on business growth. The design of the questions enables data collection to reflect the relationship among variables for analysis using the PLS-SEM method. These questions are supposed to assess the extent to which digital financial innovations in general support the respondent, how their financial literacy influences access to financing, and the immediate and indirect impact of those factors on the growth of their business. Data analysis in this research employed partial least squares-structural equation modelling (PLS-SEM) using SmartPLS version 4.0. PLS-SEM is a higher-order statistical approach that could analyze complex relationships among variables in economic studies. This approach enables a simultaneous test of both measurement and structural models; hence, it is appropriate to assess the linkages among digital financial innovation, access to finance, financial literacy, and MSME growth.

Results and discussion

Respondent's profile

Based on the questionnaire that has been distributed to respondents, the profile of all respondents can be collected as shown in Table 2.

Table 2 respondent's profile

Characteristics	Amount	Percentage (%)
Gender:		
Male	112	56.00
Female	88	44.00
Age:		
Under 30	25	12.50
30 – 40	66	33.00
Over 40	109	54.50
Company Age:		
Less than 5 years	18	9.00
5 - 10 years	52	26.00
More than 10 years	130	65.00

Source: primary data (processed, 2025)

Table 2 shows that the targeted research consisted of 200 MSMEs in Bali. Males were slightly dominated by gender, at 56.0%, while females accounted for 44.0%. The composition of the age groups represents 54.5% of the owners over 40 years, which indicates that these owners are seasoned businesspeople with considerable experience. In the meantime, 33.0% of the respondents are within the age brackets of 30-40 years, while 12.5% are below 30 years. Concerning the age of the companies, 65.0% of the MSMEs are operating for over 10 years, indicating established businesses, whereas 26.0% have been in business between 5 to 10 years and only 9.0% running for less than 5 years. These figures show a good representation of experience and age, which is important in analyzing the impact of digital financial innovation, financial literacy, and access to finance on the MSMEs' growth and sustainability.

Reliability and validity results

Table 3 shows the analysis results, suggesting that most of the indicators have exhibited an Outer Loading of ≥ 0.7, which is good as it suggests that the indicator plays a strong role in achieving the construct. However, those whose values are between 0.4 and 0.7 can still be retained if their removal does not enhance AVE and CR significantly (Khuzainey et al. 2020). The AVE ranges from 0.535 up to 0.580, which indicates they have met a minimum threshold of ≥ 0.5, which suggests reasonably good convergent validity. In addition, Cronbach's Alpha ranges from 0.771 up to 0.812. Indicated suggests good internal reliability, while the composite reliability (CR) range from 0.84 up to 0.898, which indicates strong internal consistency.

Table 3 reliability and validity results

Variables	Statements	Outer loading	AVE	Cronbach's alpha	Composite reliability
Digital financial innovation (DFI)	DFI1	0.889	0.575	0.809	0.879
	DFI2	0.696			
	DFI3	0.891			
	DFI4	0.443			
	DFI5	0.780			
Financial literacy (FNL)	FNL1	0.974	0.552	0.771	0.898
	FNL2	0.909			
	FNL3	0.862			
	FNL4	0.483			
	FNL5	0.410			
Access to finance (ATF)	ATF1	0.919	0.580	0.789	0.840
	ATF2	0.876			
	ATF3	0.840			
	ATF4	0.435			
	ATF5	0.685			
MSMEs Growth (GOM)	GOM1	0.747	0.535	0.812	0.867
	GOM2	0.716			
	GOM3	0.701			
	GOM4	0.640			
	GOM5	0.839			

Source: primary data (processed, 2025)

Hypothesis results

Table 4 reveals that digital financial innovation has a significant and positive effect on access to finance, as the path coefficient of 0.413 confirms, a value of the T-statistic, 4.721 > 1.96, and a P-value of 0.000 < 0.05; H1 is accepted. Also, digital financial innovation has a significant and positive effect on financial literacy, as exhibited by the highly significant path coefficient of 0.943 at T-statistic = 117.722 and P-value = 0.000; H2 is accepted. The results also validate that financial literacy has a significant and positive effect on access to finance, with a path coefficient of 0.555, T-statistics = 6.142, and P-value = 0.000; H3 is accepted. Besides, access to financing has a significant and positive effect on MSMEs growth, as indicated by a path coefficient of 0.679, a T-statistic of 21.083, and a P-value of 0.000; H4 is accepted.

Table 4 hypothesis results

Hypothesis	Original sample	Sample mean	Standard deviation	T-statistics	P-values
H1: DFI → ATF	0.413	0.405	0.087	4.721	0.000
H2: DFI → FNL	0.943	0.944	0.008	117.722	0.000
H3: FNL → ATF	0.555	0.564	0.090	6.142	0.000
H4: ATF → GOM	0.679	0.685	0.032	21.083	0.000
H5: DFI → ATF → GOM	0.280	0.279	0.067	4.187	0.000
H6: FNL → ATF → GOM	0.377	0.385	0.056	6.736	0.000
H7: DFI → FNL → ATF → GOM	0.356	0.363	0.054	6.561	0.000
H8: DFI → FNL → ATF	0.524	0.532	0.087	6.016	0.000

Source: primary data (processed, 2025)

Table 4 shows that digital financial innovation indirectly influences the growth of MSMEs through access to finance, with a path coefficient of 0.280. The effect is statistically significant, supported by a T-statistic of 4.187 and a P-value of 0.000; H5 is accepted. Similarly, financial literacy indirectly contributes positively to MSME development through access to finance. The path coefficient of 0.377 indicates a strong direct influence of financial literacy on increasing access to finance, indirectly contributing to MSME development. This is confirmed by a T-statistic of 6.736 and a P-value of 0.000; H6 is accepted. Further, digital financial innovation indirectly affects MSME growth through access to finance and financial literacy, with a path coefficient of 0.356. This is a highly significant pathway, with a T-statistic of 6.561 and a P-value of 0.000; H7 is accepted. Finally, digital financial innovation positively affects access to finance through financial literacy. The path coefficient of 0.524 indicates the dominant role of financial literacy in bridging the digital financial innovation-access to finance gap. The path is significant statistically, with a T-statistic value of 6.016 and a P-value of 0.000; H8 is accepted.

Digital financial innovation and access to finance.

The results show that digital financial innovation positively affects access to finance. The findings indicate that such innovation significantly enhances the access of MSMEs to finance by lowering transaction costs and bridging geographical gaps. Grounded in disruptive innovation theory, digital financial innovation represents a transformative force that reshapes traditional financial services by introducing accessible, low-cost alternatives, especially for previously underserved markets. Empirical evidence from this study shows that MSMEs utilizing fintech services such as mobile banking, e-wallets, and peer-to-peer lending enjoyed easier and quicker access to the capital, particularly in rural regions. This concurs with Zhao et al. (2024), who also emphasized the role of fintech in lowering financial service costs for previously excluded parts. Also, Mhlanga (2024) references the capacity for AI and extensive data to advance credit risk scoring and make more inclusive credit decisions.

These findings also match Malhotra (2023), who asserts that digital finance, particularly mobile banking and digital payments, reduces financial limitations on MSMEs located in rural areas. Data from field surveys also show the overall increase in the use of digital services among MSMEs in the last five years, indicating a favorable trend towards business resilience and financial inclusion. The message is that digital financial innovation is an efficient instrument and a force of transformation that enables inclusive finance, specifically for overlooked regions. These results hold significant policy implications for policymakers and financial institutions, as they highlight the necessity to facilitate the development and growth of digital financial infrastructure. Facilitating access to fintech products, especially in rural and underserved areas, can induce local economic growth, reduce regional gaps, and enhance the long-term sustainability of MSMEs. Moreover, targeted digital literacy programs and regulatory policies that foster innovation and protect users can maximize the benefits of digital finance for inclusive growth.

Digital financial innovation and financial literacy

The result shows that digital financial innovation positively affects financial literacy. This indicates that fintech significantly enhances the financial literacy of MSME entrepreneurs. Entrepreneurs gain financial literacy by exposing themselves to digital platforms offering real-time information, automated advice, and transparent financial products. This supports the financial literacy theory and studies by Uthaileang and Kiattisin (2023), indicating that fintech improves financial knowledge and behavior. Moreover, this finding aligns with the technology acceptance model (TAM), which posits that perceived usefulness and ease of use as critical determinants of new technology acceptance among users. To this end, MSME owners who find fintech platforms useful and easy to use are more likely to utilize them, thereby increasing their use of financial content and tools, ultimately triggering higher levels of financial literacy.

The results agree with Amnas, Selvam, and Parayitam (2024), who assert that fintech channels provide instantaneous feedback and interactive features, favoring learning by doing. Abdallah, Tfaily, and Harraf (2025) also verify that during crises like the Covid-19 pandemic, online platforms contributed significantly to MSMEs' financial education. Nevertheless, there are still areas of digital illiteracy—entrepreneurs unaware of digital tools cannot enjoy these innovations to the maximum possible extent. This indicates that although fintech encourages money literacy, systematic financial education continues to be critical to mitigate inequality in digital finance take-up. The results have implications for the necessity of inclusive digital literacy programs, especially in marginalized communities, to allow fintech gains to be equitably shared. Policymakers and development agencies must prioritize integrating digital literacy training into financial education programs to combat the digital divide. Fintech providers must also make their platforms intuitive and include educational components in their services to facilitate ongoing learning by MSME users.

Financial literacy and access to finance

The results show that financial literacy positively affects access to finance. The study confirms that access to finance can be improved with the assistance of financial literacy. Financially more literate entrepreneurs are better positioned to manage complex financial systems, increase creditworthiness, and utilize fintech tools properly. This finding supports the resource-based view (RBV) and is consistent with the evidence presented by Valle et al. (2022) that indicates positive financial literacy increases the capability to obtain financing. Apart from that, Gao and Ren (2023) observe that financially literate entrepreneurs are more likely to use financial technology to manage finances strategically. Through improved financial literacy, MSMEs have a better opportunity of accessing capital and becoming long-term sustainable enterprises.

The study concurs with Hussain, Salia, and Karim (2018), who established that financially literate people are more capable of accessing markets, managing financial products, and fulfilling documentation requirements. Despite this, literacy gaps remain, particularly among informal MSMEs. Targeted training and financial education programs must be scaled up to close this gap. Therefore, enhancing financial literacy is both an educational goal and a strategic priority to increase MSMES' creditworthiness and access to finance. The consequences of these findings are twofold: firstly, they reinforce the call for comprehensive policy structures that tie together financial literacy programs and larger financial inclusion agendas. Secondly, they suggest that lenders, especially microfinance institutions and digital lenders, benefit from their alignment with education efforts to build borrowers' financial capability, reducing default risks and expanding their target base of potential customers. Closing literacy gaps can unlock higher access to formal financing channels, thus triggering the sustainable growth of the MSME.

Access to finance and MSMEs growth

The results show that access to finance positively affects MSMEs growth. Access to funding has been established as a key driver of MSME development. Companies with enhanced financial access will likely achieve faster growth, increase revenues, and enhance competitiveness. This aligns with disruptive innovation theory and a study by Khan (2022), who stated that online-based financial innovations, such as mobile banking and peer-to-peer lending, provide external sources of finance that are not dependent on conventional banks. Moreover, Sun and Zhang (2024) state that digital financial innovations reduce transaction costs and increase access to credit, thus directly contributing to MSME growth and competitiveness. Therefore, improving access to finance will also lead to the development of small and medium enterprises.

Access to finance allows MSMEs to invest in productivity and growth (Pellegrino and Abe 2022). However, stringent formal institution requirements still constrain many MSMEs, particularly in developing economies. Thus, while digital innovations are helping, the regulatory frameworks and inclusive financing policies must shift to attain the full potential for growth in all MSMEs. The findings imply that they will make the financial ecosystem more enabling, simplify compliance procedures, and enhance innovation in lending. Policy makers must focus on regulatory reforms that balance risk management with broader access, especially for micro and informal enterprises. Additionally, partnerships between governments, financial institutions, and fintech companies can accelerate the development of tailored financing solutions that respond to the specific requirements of a diverse range of MSMEs, ultimately supporting more inclusive economic growth.

Role of mediation access to finance between digital financial innovation and MSMEs growth

The results show that access to finance can mediate the relationship between digital financial innovation and MSMEs growth. The study also illustrates that digital financial innovation, besides increasing access to finance, indirectly contributes to MSMEs growth. Access to digital financial services allows businesses to acquire money easily, eventually expanding their business. This evidence supports financial literacy theory and aligns with Gu et al. (2023) findings that recognize online lending and mobile banking as crucial sources of finance for small firms. In addition, Zhu and Wang (2022) find that a better degree of financial literacy enables MSMEs to use digital financial tools more efficiently, promoting better financial management and sustainable development. These findings are also consistent with disruptive innovation theory, which contends that disruptive technologies commence by serving the needs of underserved markets prior to eventually revolutionizing entire industries. Digital financial tools are, in this instance, disruptive innovations facilitating new finance avenues for MSMEs, particularly those excluded from traditional systems.

Wider digital adoption enabled MSMEs to raise capital better and employ it strategically towards sustainable growth. However, the execution of such innovation hinges on whether entrepreneurs can effectively utilize them—they are tied to their economic understanding and IT skills. Fintech, then, is not enough; simultaneously investing in training and digitalization must be assured to bring out its maximum potential. The findings of such implications emphasize the need to move beyond the simple provision of access to digital tools and take a holistic approach to digital financial inclusion. It is a step that needs to be taken through investment in capacity-building interventions, enhancing financial and digital literacy. In addition, efforts to develop more robust digital infrastructure, especially in rural or underdeveloped regions, are necessary for achieving inclusive access. By combining technology, education, and favorable policy alone, the full potential of digital finance can be optimized for the sustainable growth of MSMEs.

Role of mediation access to finance between financial literacy and MSMEs growth

The results show that access to finance can mediate the relationship between financial literacy and MSMEs growth. From the resource-based view (RBV) perspective, financial literacy can be understood as an intangible asset of MSMES that results in a competitive advantage. Financially literate business owners possess improved decision-making knowledge, which results in efficient capital management and increased business sustainability. This is echoed by Alshebami and Marri (2022), whose contention is that financially literate business owners are best positioned to maximize risk management and capital optimization. Millaningtyas et al. (2024) also emphasize the contribution of digital financial innovations towards facilitating improved financial planning and enhanced financial access, leading to sustainable MSME growth. Increased financial literacy is therefore a primary driver of business capability development among small and medium-sized businesses. The evidence presented by these results suggests that financial literacy is both a requirement and a catalyst for growth and that its development must be married with technological advancement. The importance of these results stems from the challenge they pose for targeted education programs to increase financial literacy among MSME owners, specifically in developing economies. Financial institutions and policymakers should prioritize designing holistic programs that integrate financial literacy with digital skills. In addition, financing MSMEs to build human and technology capital will enable them to effectively harness available finance opportunities to grow and compete in a fast-changing market sustainably.

Role of mediation financial literacy and access to finance between digital financial innovation and MSMEs growth

The results show that financial literacy and access to finance can mediate the relationship between digital financial innovation and MSMEs growth. The study's empirical results affirm that financial innovation in the online environment spurs MSME growth by increasing knowledge of money and access to finance. The findings concur with disruptive innovation theory and the research conducted by Sandhu, Dayanandan, and Kuntluru (2025), which identifies that fintech instruments simplify financial gap filling and promote sounder financial decisions. Besides, the greater the level of financial literacy, the more effectively MSMEs can maximize the use of financial instruments, reduce financial risks, and achieve business stability (Fitriyah, Hermawan, and Sudarsono 2023). The results also aligned with the technology acceptance model (TAM), as perceived usefulness and ease of utilizing digital finance tools are essential determinants for MSME owners towards embracing such an innovation. Suppose MSME entrepreneurs perceive digital financial services as effective and convenient to use. In that case, they will embrace them, raising their financial literacy and growth. Therefore, bridging the gap between financial innovation and deeper financial literacy further augments small and medium-sized businesses' growth. The results imply that financial literacy education should be integrated with encouraging the use of digital finance instruments. Policy and financial institutions need to emphasize creating an ecosystem that focuses on technology adoption and financial literacy at the same time. The dual focus shall ensure that MSME owners are provided with financial products and empowered to utilize them in their own capacity, thereby leading to better financial management, reduced risk, and sustainable business growth.

Role of mediation financial literacy between digital financial innovation and access to finance

The results show that financial literacy can mediate the relationship between digital financial innovation and access to finance. As revealed by this research, digital financial innovation has been shown to improve capital access through improved financial literacy. This aligns with disruptive innovation theory and Basdekis et al. (2022) research that points to fintech as a democratizing force in financial services. Additionally, Malhotra (2023) observes that e-payments and mobile banking remove conventional banking constraints, whereas Cahyawati, Nantungga, and Tumewang (2023) find that digital financial literacy tools allow MSMEs to make sound financing decisions. Technology facilitates the financial inclusion of MSMEs by providing exposure to well-arranged and efficient financing products. Fomum and Opperman (2023) assume that fintech adoption increases levels of financial literacy but note that infrastructure deficits limit its capacity to contribute in rural regions. Further, drawing from the technology acceptance model (TAM), ease of use perception and perceived usefulness of digital money instruments highly influence their adoption by MSME owners. If these tools can be used without difficulty and considered to be useful, MSME entrepreneurs will use them, which will increase their financial literacy as well as availability of finance. Therefore, policymakers need to focus on improving both digital and financial infrastructure to make the most out of the opportunities offered by fintech. Policy recommendations of the findings highlight that augmenting financial and digital literacy, as well as expanding the scope of digital financial products, must remain the central plank of development policies addressing MSME expansion. Financial institutions and policymakers should focus on bridging gaps in infrastructure, particularly rural districts, to drive balanced access to fintech services. In addition, promoting digital literacy through training and education programs will be able to provide MSMEs with improved financial options, enhancing their long-term viability and financial inclusion even more.

Conclusions

This research casts critical light on how financial literacy is linked to digital financial innovation and its impact on MSME growth regarding wider access to finance. The results indicate that financial literacy is a significant intermediary variable between access to finance and proper utilization of digital financial innovation, enabling MSMEs to maximize the value propositions of digital offerings. Theoretically, this study is grounded on grand theories that are collectively strong in offering an integrated framework. The resource-based view explains how intangible assets such as financial literacy and digital competency serve as strategic assets that enhance firm competitiveness. Disruptive innovation theory attests that digital financial innovation offers effortless, accessible, and affordable financial products that have the potential to transform conventional financing systems and empower MSMEs to enter previously untapped markets. The technology acceptance model accounts for how ease of use perception and perceived usefulness influences MSME adoption of web-based financial instruments, influencing their behavioral intention and actual usage. Additionally, the financial literacy theory indicates the importance of financial capability and competencies in making sound financial decisions, and access to finance focuses on structural and information barriers to MSME access to funding and investment. Finally, the MSMEs Growth theory emphasizes internal firms' abilities to learn and adopt innovation as drivers of growth, productivity, and sustainability. Overall, the above theoretical perspectives emphasize technology, knowledge, and institutional access synergy as drivers of long-term MSME development and financial access.

The study also comes with some limitations. Firstly, it does not reflect variations in the impact of digital financial innovations across business sectors, which could have varying adoption rates and issues. Second, while the research establishes a robust link between access to finance and financial literacy, it does not consider potential moderation effects of socio-cultural variables, which may influence MSMEs' adoption of digital financial services. Third, the research investigates short-term impacts but opens avenues for investigating long-term impacts of digital financial innovation on MSME development. Future research can transcend these constraints by examining how digital financial innovations affect MSME growth in the long term and testing the sectoral effects of different financial instruments, such as mobile banking and peer-to-peer lending. Research must also examine the role of socio-cultural determinants in shaping financial literacy and digital financial service use among MSME owners in different regional settings. These factors will provide a more accurate view of the long-term sustainability of online financial innovations in mitigating MSMEs. The findings have significant implications for policymakers, financial institutions, and MSME owners. Financial institutions and digital service providers must expand access to financial instruments in the digital environment and invest in targeted financial literacy programs. Digital literacy programs to serve MSME owners can enhance their ability to access financial technologies, leading to better financial management and access to capital.

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