

EXPLORING FINANCIAL AND DIGITAL LITERACY: HOW TECHNOLOGY ADOPTION ATTITUDE DRIVES MOBILE SERVICE INNOVATION IN CIREBON MSMEs

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Abstract:

Background: Financial and digital literacy are key factors in technology adoption among MSMEs. However, most studies still focus on usage intentions or frequency rather than innovative behavior. It is also important to study MSMEs in Cirebon because of their limited digital infrastructure, varying financial capabilities, and the prevalence of small-scale businesses, all of which influence technology adoption behavior.

Objective: To analyze the influence of digital and financial literacy on mobile service innovation, with the mediating of technology attitudes adoption, among MSMEs in Cirebon.

Design/Methodology/Approach: Data were collected via a questionnaire administered to 200 SMEs in the culinary, fashion, service, and handicraft sectors using purposive sampling, with the criteria being MSMEs that use digital technologies such as digital marketing, financial transactions, and customer service. Data analysis was conducted using SEM with SmartPLS 4.0.

Findings/Results: Digital and financial literacy significantly influence mobile service utilization through the mediation of technology attitudes adoption. The strongest influence is demonstrated by digital literacy on technology attitudes adoption, highlighting the importance of MSMEs' ability to use digital technology.

Conclusion: There is a need for integrated digital and financial literacy training programs that strengthen technology attitudes adoption. Mobile service providers also need to pay attention to ease of use and education to encourage positive user attitudes.

Originality/Value (Current State): This study reveals the mechanisms by which digital literacy and financial literacy shape the use of mobile services through technology attitudes adoption among digitally active SMEs in developing regions, an area previously studied primarily in terms of the intention to use technology.

Keywords: digital literacy, financial literacy, technology attitude adoption, mobile service innovation, MSMEs, omnichannel adoption

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INTRODUCTION

The role of SMEs as the backbone of the Indonesian economy contributes more than 60% to the national Gross Domestic Product and absorbs nearly 97% of the workforce, and to date, the number of SMEs has reached more than 64 million business units. The contribution of SMEs to Indonesia's national exports reached around 15.7% of total exports (Kementerian Koordinator Bidang Perekonomian Republik Indonesia, 2025). This figure shows that SMEs are the backbone of the Indonesian economy, especially in maintaining regional economic stability and creating new jobs. However, amid rapid digital transformation and increasing global competition, many MSMEs in Indonesia still face various limitations, such as access to markets, capital, and information. One strategic solution to overcome these obstacles is the use of mobile services, which include the use of digital financial applications, e-commerce, business social media, and internet-based communication services.

The Ministry of Communication and Information Technology noted that more than 28 million MSMEs have used digital technology, but most are still limited to marketing through social media. The use of technology for financial activities and customer services is still below 40%. (Hakim, 2024). Similarly, Fakhri (2024) 64% of MSMEs still face difficulties in adopting digital technology, not to mention various other challenges such as financial constraints, digital skill gaps, and cybersecurity challenges that continue to hinder MSMEs from adopting digital technology.

The acceleration of digital transformation requires business actors to be able to utilise digital technology in maintaining sustainable MSMEs (Viswanathan, 2022; Pea-Assounga & Sibassaha, 2024). This not only creates new opportunities, but as the omnichannel era develops, a major challenge for MSMEs is that they must adapt to technology (Baldivia & Chowdhury, 2025; Yuwono et al. 2024). Although digital technology is increasingly accessible, the reality is that many MSMEs are not yet ready, in terms of knowledge or financial capacity, to adopt mobile services in their entrepreneurial activities. Low levels of financial and digital literacy are major obstacles to integrating technological innovation into their business models (Affandi et al. 2024; Kusumawardhani et al. 2023; Rahayu et al. 2022).

In a global context, research conducted in BRICS countries emphasises the importance of literacy and digital financial access as pillars of innovation and sustainable economic development (Manoj et al. 2024; Novák et al. 2025) Digital finance has a significant influence on household entrepreneurial decisions, particularly in less developed regions. However, most studies still view literacy as a technical skill in the use of technology and have not yet adequately explained how literacy can drive behavioral changes toward more innovative use of mobile services within an omnichannel ecosystem. As a result, the digital transformation of SMEs often focuses solely on the use of technology, rather than on fostering innovation and long-term business sustainability (Yu et al. 2025; Xie & Chen, 2025)

Improved financial literacy is associated with the frequency of mobile banking use and the willingness to try new financial features, thereby opening up opportunities for mobile service innovations such as payment integration, digital microcredit, and loyalty programmes. (Almanaseer et al. 2024). However, the increased use of digital financial services does not necessarily mean that MSMEs have been able to leverage technology strategically to drive business innovation. In many cases, mobile services are still used merely as tools for transactions and communication, rather than as a means to improve efficiency, expand markets, or develop new service models. This situation indicates that financial capacity alone is not enough to drive digital transformation if it is not balanced by adequate digital capabilities. On the other hand, digital literacy encompasses technical skills in using devices and applications, the ability to assess the credibility of digital sources, and a basic understanding of cybersecurity (Ullah et al. 2022). When combined with financial literacy, it forms the construct of digital financial literacy, which shows that DFL is a strong predictor of the adoption of mobile banking and other financial technology services. Business actors with DFL are more capable of operating applications, understanding features, and feeling secure using the technology, making them more likely to explore innovative mobile service functions that combine financial and operational functions (Phan et al. 2023). However, high rates of digital service adoption do not necessarily indicate that MSMEs have been able to strategically leverage technology to drive business innovation. Many MSMEs use mobile technology merely as a tool for transactions and communication,

rather than to improve efficiency, expand their market reach, or create new business value. This situation indicates that technical and financial capabilities alone are insufficient to drive digital transformation if the ability to understand the strategic potential of technology in business development remains limited. Consequently, the use of mobile technology among SMEs tends to remain operational in nature and does not yet fully support omnichannel based business innovation.

Financial and digital literacy readiness is an important requirement for MSMEs to optimise the use of mobile services, not only as operational tools but also as drivers of innovation (Sri Hartanti, 2024; Safi et al. 2023). Financial literacy provides a foundation for understanding cash flow, investment, and risk management, while digital literacy enables businesses to utilise technology for marketing, transactions, and customer service. Increased digital literacy can drive efficiency, expand market reach, and open opportunities for technology-based innovation that is more adaptive to the needs of today's digital consumers. Furthermore, strong digital financial literacy can enhance the technology attitude adoption, which positively impacts the growth of SMEs in Indonesia (Hafiza et al. 2022).

Empirical literature examining the adoption of mobile applications and technologies consistently finds that attitudes serve as mediators between cognitive factors and actual usage intentions (Geddani et al. 2024). Thus, financial literacy and DFL are likely to influence mobile service innovation through attitude changes such as increased trust, decreased perceived risk, and higher perceived benefits, which then drive innovative actions (Gunnoo et al. 2023; Neves et al. 2023).

For MSMEs, transforming to omnichannel is not merely about adding digital channels, but requires process integration (inventory, payments, customer service) that enables mobile services to function as key contact points. Omnichannel strategies can enhance SME performance but require digital capabilities, infrastructure support, and organizational readiness that are directly linked to digital literacy and financial literacy (OECD, 2023).

Previous studies found that higher financial literacy significantly increased the adoption of electronic payment services and mobile payment applications in Japan, a developed country with high technology penetration (Long et al. 2023). However, this is different in Indonesia, a developing country with limited technology and digital

competency. This results in low optimization of mobile service usage because it is primarily used for personal communication rather than for business development. Most studies focus solely on usage intentions rather than on adoption attitudes that foster innovation or creativity in technology utilization. As a result, technology is often understood simply as a choice between use or not, rather than as a tool that can be strategically leveraged to create new value (Lai, 2017).

Given this gap, this study offers a novel approach by developing an integrated model that links financial literacy and digital literacy to innovation in omnichannel mobile services through attitudes adoption technology among SMEs in developing countries.

The use of technology in MSMEs is limited to communication and transactional functions, thus failing to create new business value and maximize competitiveness, particularly in developing countries with limited digital competencies and technological infrastructure. To address these issues, this study identifies digital literacy and financial literacy as fundamental factors that help SME operators understand, evaluate, and utilize technology more strategically within an omnichannel service ecosystem.

According to Ghrbeia & Alzubi (2024) individual competencies are crucial in determining how users understand and interact with new technologies. Additionally, this study integrates "technology attitude adoption" as a mediating variable to explain how literacy capabilities can drive behavioral changes toward more innovative technology adoption. This research is expected to serve as a foundation for the government and institutions supporting MSMEs in designing integrated literacy programs that not only improve technical skills in the use of technology but also foster an adaptive and innovative attitude adoption digital services.

The findings of this study are expected to provide a reference for MSMEs in adopting mobile technologies within their business activities. For external stakeholders, including the government, MSMEs support institutions, and technology service providers, the results are expected to serve as a policy reference for strengthening the integration of digital and financial literacy. This integration is expected to enable MSMEs to formulate effective strategies for optimizing technology utilization and enhancing the effectiveness of mobile services across various market channels.

METHODS

This study employed a quantitative research method with an associative approach to provide structured and objective data analysis. This method is rooted in the positivist paradigm, which examines a specific population or sample through statistical measurements. Furthermore, a causal associative research design is used to determine the underlying relationships and influences between two or more variables (Gennetian et al. 2022). The population of this study consists of MSME entrepreneurs in Cirebon City, specifically those operating in the food, fashion, services, and handicrafts sectors who are already using digital technologies such as digital marketing, digital financial transactions, and digital customer service. Primary data sources were obtained directly from MSME entrepreneurs in Cirebon City, while secondary data were sourced from academic journals, government reports, and official statistical publications related to MSME digitalization. This diversity of data sources ensures a comprehensive

and accurate foundation for testing the conceptual model. This study empirically explains the causal relationships between digital literacy, financial literacy, technology attitudes adoption, and mobile service innovation among MSME entrepreneurs in Cirebon City. To facilitate this analysis, the following indicators represent each variable in Table 1.

Data collection using primary data with a 5-point Likert scale was carried out by distributing questionnaires to MSMEs actors who have used with criteria such as digital marketing, digital financial transactions, and digital customer service. Because the population size could not be determined directly. Hair et al. (2021) stated that the minimum sample size should be 10 times the number of measurement items, accordingly with 20 measurement items multiplied by 10, so 200 samples were used in this study. This met the requirements and exceeded the recommended minimum limit, which is 10 times the number of indicators.

Table 1. Operational variable table of digital literacy, financial literacy, technology attitude adoption and mobile service innovation

Variable	Indicators	Reference
Digital Literacy (X1)	Ability to search for and use digital information Ability to use mobile applications/services for business Digital security awareness (cybersecurity) Ability to adapt to new technologies Understanding the ethics of technology use	(Law et al. 2018)
Financial literacy (X2)	Understanding of basic financial concepts (interest, inflation, risk) Cash flow management and business financial planning Debt and credit management Utilisation of digital financial products (mobile banking, e-wallets) Financial decision-making skills	(OJK, 2017)
Technology Attitude Adoption (Z)	Perceived usefulness Perceived ease of use Positive attitude toward mobile service use Tendency to try and accept new technology Confidence in adopting technology	(Ajzen, 2020)
Mobile Service Innovation (Y)	Intensity of mobile service use for transactions Use of mobile applications for marketing Use of mobile applications for business financial management Frequency of mobile service usage in daily business Integration of mobile services with offline-online channels (omnichannel)	(Gia-Shie Liu & Pham Tan Tai, 2016)

Data analysis in this study was conducted using Structural Equation Modeling with the help of the SmartPLS 4.0 application. This analysis technique was chosen because of its ability to analyze complex relationships between latent variables and its efficiency with non-normally distributed data. The analysis process is divided into two main stages, starting with the evaluation of the measurement model or outer model. This initial stage aims to test the validity and reliability of the research instrument, ensuring that each indicator accurately measures its respective construct. Next, the evaluation of the structural model or inner model is conducted to test the relationships between variables and assess the overall predictive power of the research framework.

The Influence of Financial Literacy on Mobile Service Innovation

Financial literacy reflects an individual's ability to manage finances, understand financial products, and make wise financial decisions, individuals with high financial literacy are better able to assess the benefits, costs, and risks of digital-based financial innovations such as mobile banking and e-wallets. Research (Destrin, 2024) that financial literacy has a significant effect on the ability of SMEs to innovate in the use of digital services. Similarly, (Basar et al. 2024) found that financial understanding encourages the adoption of new technologies because it increases trust in digital financial systems.

H₁ : Financial literacy has a significant effect on mobile service innovation.

The Influence of Digital Literacy on Mobile Service Innovation

Digital literacy is an individual's ability to understand, use, and adapt to digital technology (Nguyen et al. 2024) facilitating improved user efficiency and fostering the intent to use e-commerce in the digital realm and the international integration arena. This study investigates the joint impact of digital literacy on two similar but fundamentally different activities which are security control behavior and e-payment continuance intention. This research contributes to the growing field of literature in two ways. First, the study examines Digital Literacy, which distinguishes three broad dimensions - Tech Familiarity, Policy understanding, Awareness of institutional surveillance, and its association with Security control Behaviors

and E-payment continuance intention. Second, the study tests the mediator effect of Security control Behaviors on the relationship between Digital Literacy and E-payment Intention. The data were collected by using both offline and online survey methods across the national scope, employing a quota sampling approach to encompass a wide range of consumer demographics. Structural equation modeling with the sample of Vietnamese respondents was applied to test the influence of digital literacy on customers' security control behavior and intention to use e-payments. The results endorse that 1. A good level of digital literacy enables businesses and consumers to utilise mobile service features innovatively, such as digital payments, mobile customer service, and e-commerce platforms. A study by Al-Majali et al. (2024) proves that digital literacy contributes significantly to the development of digital financial services in various sectors. Meanwhile, Adel (2024) emphasises that digital literacy drives mobile-based innovation by increasing the ability to explore new technologies.

H₂ : Digital literacy has a significant effect on mobile service innovation.

The Influence of Financial Literacy on Technology Attitude Adoption

Technology attitudes adoption are influenced by perceptions of benefits and individual confidence in using new innovations, individuals with high financial literacy have greater confidence in the security, benefits, and efficiency of digital innovations in financial transactions (Yang et al. 2023). (Mahmud et al. 2023) state that financial literacy increases positive technology attitudes adoption of financial technology because individuals better understand its functions and risks. With more focused financial literacy, individuals better understand what it means to use digital payment, so they can make smarter financial choices (Rismayana et al. 2025).

H₃: Financial literacy has a significant effect on technology attitude adoption.

The Influence of Digital Literacy on Technology Attitude Adoption

Digital knowledge and skills play an important role in shaping positive attitudes towards the use of new technology (Febrianti and Sabandi, 2024). Users with high digital literacy are more confident and open to mobile-based innovations (Rahman et al. 2023).

Research Proskurnina et al. (2021) shows that digital literacy increases individuals' willingness to adopt digital services because it reduces perceived risk and increases perceived ease of use. Therefore, these theoretical insights provide a strong foundation for proposing the following hypotheses:

H₄: Digital literacy has a significant effect on Technology Attitude Adoption.

The Influence of Technology Attitude Adoption on Mobile Service Innovation

According to Technology Acceptance Model, shows that technology attitudes adoption use are the main predictors of intention and actual behaviour in adopting innovations. Individuals or organisations with positive attitudes adoptions digital innovation are more likely to implement mobile services creatively and sustainably. Research by (Ilieva et al. 2023) supports that a positive technology attitude adoption enhances innovation capabilities in digital services, including mobile apps and e-wallet services. Based on this, the following hypothesis is :

H₅:Technology Attitude Adoption significantly influences Mobile Service Innovation.

The Mediating Role of Technology Attitude Adoption

Technology Attitude Adoption can be a psychological mechanism that bridges the influence between financial

and digital literacy and mobile service innovation. Individuals who are financially and digitally literate will have a better perception benefits of technology, thereby increasing their positive technology attitudes adoption it and ultimately encouraging mobile service innovation (Rahman et al. 2023) . Research Arestha et al. (2025) ; Normawati et al. (2024) indicates that technology attitudes adoption mediate the relationship between literacy and innovation in the use of digital financial services in the SME sector. Accordingly, the following hypotheses are drawn:

H₆: Technology Attitude Adoption mediates the influence of Financial Literacy on Mobile Service Innovation.

H₇: Technology Attitude Adoption mediates the effect of Digital Literacy on Mobile Service Innovation.

Figure 1 illustrates the integration of user capability and system innovation as key drivers of technology adoption. This research paradigm positions digital literacy and financial literacy as internal user foundations that simultaneously influence technology attitudes adoption and ultimately strengthen a person's tendency to optimally use mobile services. This framework demonstrates that individual skills in managing digital and financial information, supported by innovative service updates, will shape positive user perceptions and attitudes. Ultimately, the synergy between literacy levels and innovation values is predicted to be a determining factor that strengthens a person's tendency to adopt and use mobile services sustainably.

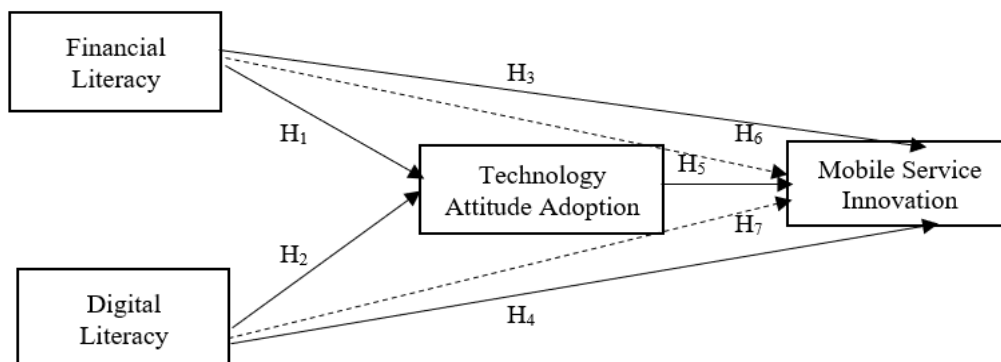


Figure 1. Conceptual framework of digital literacy, financial literacy, technology attitude adoption, and mobile service innovation

RESULTS

The study population consisted of MSME entrepreneurs in Cirebon City operating in various business categories, including culinary, fashion, crafts, and services. To obtain a representative picture of this population, a structured survey was conducted among active business owners in the region. This diverse industry background provides a comprehensive context for analyzing how digital and financial literacy varies across different types of small businesses. Based on the data collection process, a total of 200 respondents successfully completed the questionnaire and were included in the final analysis. The specific demographic characteristics of these respondents served as the basis for subsequent statistical testing.

The data presented in Table 2 summarizes the demographic profile of the 200 MSME owners who participated in this study. Most respondents were female (68%), while only 32% were male. In terms of business type, the culinary sector dominated research participation, accounting for 84% of participants, with the majority (56%) having been operating for less than five years. Age characteristics indicate that Millennials (aged 28–44) were the primary contributors, accounting for 38%. This profile indicates that the MSMEs in this study were predominantly managed by women, focused on the culinary sector, and were in the early stages of business development. Furthermore, the composition of business owners, dominated by the productive generation, indicates a good potential for

adapting to digital technology, despite their relatively limited managerial experience.

Each variable in this study consists of five main indicators. To improve construct validity, each indicator is measured using two questionnaire items. Therefore, each variable has ten measurement items in the SEM model. The model evaluation began with a convergent validity test using SmartPLS 4 to ensure that each indicator had a strong relationship with the latent construct it represented. Figure 2 shows the factor loadings for the variable's digital literacy, financial literacy, technology attitude adoption, and utilization of cellular services, which served as the basis for testing validity and reliability prior to conducting the structural equation modeling analysis.

Based on the results shown in Figure 2, each research indicator exhibits an external loading value that exceeds the standard threshold of 0.7. This indicates that the statement items in the instrument are highly relevant to the variables studied, including digital literacy, financial literacy, technology attitudes adoption, and mobile service innovation. These high loading values reflect the indicators' strong ability to explain the variance of their respective latent constructs. The consistency of these loading factors also ensures that measurement error in the model is at a minimal level, significantly strengthening the convergent validity of all research constructs. Therefore, it can be concluded that each indicator effectively represents its variable and is deemed valid for further structural model analysis.

Table 2. Demographic characteristics of respondents

Classification	Description	Frequency	Percentage (%)
Gender	Male	64	32
	Female	136	68
Sector	Culinary	168	84
	Fashion	14	7
	Craft	8	4
	Service	10	5
Long time in business	< 5 Years	112	56
	5-10 years	50	25
	>10 Years	38	19
Age (years old)	Over 60	4	2
	45 - 60	74	37
	28 - 44	76	38
	<28	46	23
Sales	Micro Firms	170	85
	Small Firms	28	14
	Medium-sized firms	2	1

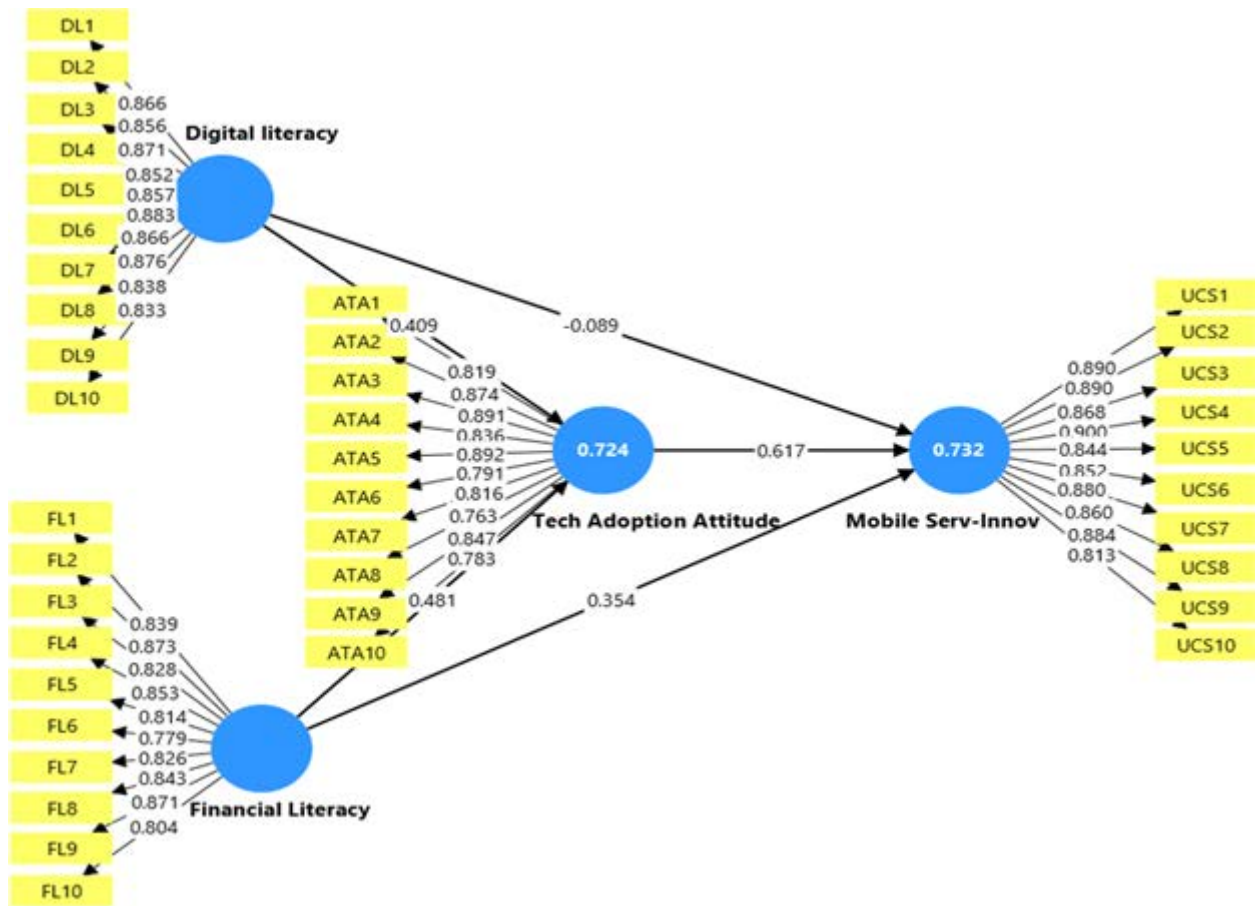


Figure 2. Measurement model: outer loadings of digital literacy, financial literacy, technology adoption attitude, and mobile service innovation

Based on the data in Table 3, all research variables have shown Average Variance Extracted (AVE) values that are above the threshold of 0.5. Achieving this value proves that all variable indicators used in this study are valid, which means that on average, the construct is able to explain more than 50% of the indicator variance. Reliability testing was also conducted by comparing cronbach's alpha and composite reliability. A model is considered reliable if both values are greater than 0.7 and because each parameter has a value above 0.8, which means the questions in the questionnaire are very consistent. Therefore, it can be said that this model has very high reliability and a very stable level of consistency for use in the next stage of analysis.

The results of the structural equation modeling and hypothesis testing, summarized in Table 4, indicate that financial literacy ($\beta = 0.481$; $p < 0.05$) and digital literacy ($\beta = 0.409$; $p = 0.000$) have a significant effect on technology attitudes adoption. Financial literacy also has a significant influence on mobile service innovation ($\beta = 0.354$; $p = 0.000$), whereas digital literacy does

not have a significant influence ($\beta = -0.089$; $p = 0.316$). Furthermore, Technology Attitude Adoption significantly influences mobile service innovation ($p = 0.000$) and mediates the relationship between financial literacy and digital literacy with mobile service innovation ($p = 0.000$).

The Influence of Financial Literacy on Technology Attitude Adoption

Financial literacy has a significant influence on the adoption of technology. These findings are consistent with the Technology Acceptance Model (TAM), which explains that an understanding of the benefits and risks of technology influences its acceptance. However, these findings indicate that low technology adoption among MSMEs is not only due to limited access to technology but also to entrepreneurs' limited ability to assess the economic benefits and strategic value of technology. Consequently, technology is often viewed as a cost burden rather than an investment to enhance business competitiveness. These findings are in line

with the research Koraag et al. (2025), that individuals with high financial literacy are better able to rationally assess the risks and benefits of digital innovations and are therefore more open to adopting technology.

The Influence of Digital Literacy on Technology Attitude Adoption

Digital literacy significantly influences attitudes toward technology adoption. The better MSMEs' ability to understand and use digital technology, the more positive their attitudes toward new technologies. MSMEs with high digital literacy tend to be more confident in using digital applications because they understand their benefits, how they work, and their security. However, these findings indicate that low technology adoption among MSMEs is not only caused by infrastructure limitations but also by a lack of ability to utilize technology optimally. As a result, technology is still largely used for basic functions and has not yet been leveraged to support innovation or business strategies. These results align with the Technology Acceptance Model (TAM) and are supported by research by Budi Sunarso et al. (2025); Krah et al. (2024) utilizing the Technology Acceptance Model (TAM, which show that digital literacy enhances perceived usefulness and technology acceptance among MSMEs.

The Influence of Financial Literacy on Mobile Service Innovation

The results of the analysis show that financial literacy has a significant impact on mobile service innovation. These findings indicate that MSME entrepreneurs with a good understanding of finance are better able to utilize mobile services not only for transactions but also to support business management and decision-making. An understanding of transaction security, cost efficiency, and financial management makes entrepreneurs more confident in integrating digital services into their business activities. However, these findings also show that the low level of mobile service innovation among SMEs is not solely due to technological limitations, but rather the business owners' limited ability to understand the financial benefits of such technology. Consequently, mobile services are often used merely as a payment tool, rather than as a means to enhance business efficiency and competitiveness. Thus, financial literacy serves as cognitive capital that encourages SMEs to utilize digital technology in a more strategic and productive manner. This is in line with the statements by Organization for Economic Cooperation and Development (2022) that financial literacy is not just about knowing how to count money, but also the ability to make smart financial decisions in new situations, including the use of digital technology.

Table 3. Validity test results for measurement model constructs

Variable	Average variance extracted (AVE)	Cronbach's alpha	Composite reliability (rho_c)
Technology Attitude Adoption	0.693	0.950	0.957
Digital Literacy	0.739	0.961	0.966
Financial Literacy	0.695	0.951	0.958
Mobile App Usage	0.754	0.964	0.968

Table 4. Hypothesis testing result of relationship among latent variables

Hypotheses	Relationship with Latent Variables	Original sample	Sample Mean	P-Values	Decision
H1	Financial Literacy → Technology Attitude Adoption	0.481	0.481	0.000	Accepted
H2	Digital Literacy → Technology Attitude Adoption	0.409	0.408	0.000	Accepted
H3	Financial Literacy → Mobile Service Innovation	0.354	0.354	0.000	Accepted
H4	Digital Literacy → Mobile Service Innovation	-0.089	-0.085	0.316	Rejected
H5	Technology Attitude Adoption → Mobile Service Innovation	0.617	0.613	0.000	Accepted
H6	Digital Literacy → Technology Attitude Adoption → Mobile Service Innovation	0.252	0.249	0.000	Accepted
H7	Financial Literacy → Technology Attitude Adoption → Mobile Service Innovation	0.297	0.295	0,000	Accepted

The Influence of Digital Literacy on Mobile Service Innovation

The research results show that digital literacy does not have a significant influence on innovation in the use of cellular services in the omnichannel era. This finding confirms that even though business actors have adequate digital capabilities, this does not automatically encourage innovation in the use of mobile technology, because other enabling factors such as motivation, technological experience, environmental support, and a positive attitude toward innovation are necessary for digital capabilities to be translated into concrete actions. Theoretically, these results reinforce the views of Proskurnina et al. (2021); Yuan et al. (2024) which confirms that digital literacy mediated by psychological and social factors, such as self-confidence and readiness to adopt technology. These findings differ from those of Dwi et al. (2022), which show that digital literacy has a significant effect on the optimisation of digital technology use, particularly in the adoption of mobile-based payment systems (QRIS), as it encourages the readiness and intention of MSMEs to adopt innovation.

This gap reflects the local context of MSMEs in Cirebon, where digital capabilities are not yet a major factor in the innovation of mobile service. The majority of customers still have offline consumption patterns, coming directly to the store to make transactions, even though payments are made digitally via QRIS, bank transfers, or e-wallets. This condition shows that the use of mobile services is still limited to payment systems and has not reached other digital activities such as promotion, online marketing, or application-based customer service. Therefore, even though the digital literacy level of MSME players has increased, the impact has not been comprehensively reflected in mobile service innovation, because consumer and business player behaviour is still oriented towards face-to-face interactions.

The Influence of Technology Attitude Adoption on Mobile Service Innovation

Hypothesis 5 testing show that technology attitude adoption has a significant influence on Mobile Service Innovation. This shows a positive technology attitude adoption is the main driver for business actors to innovate in mobile-based business activities. Individual technology attitudes adoption influence behaviour intention, which in turn encourages actual

behaviour in adopting innovation. In the context of MSMEs, a positive attitude reflects confidence, openness to change, and a clear perception of the benefits of digital technology. Conversely, business operators who view technology as complex or risky tend to use it only for basic functions. This suggests that barriers to innovation in mobile services are driven more by behavioral factors and mental readiness than by technological limitations. This is supported by Sari et al. (2022) which states that a positive attitude toward technology increases MSMEs' intention to innovate through mobile services.

Technology Attitude Adoption mediates the relationship between financial literacy and Mobile Service Innovation

Hypothesis 6 was accepted, indicating that financial literacy is more effective in driving mobile service innovation when accompanied by a positive attitude toward technology adoption. In practice, many business owners understand the benefits of digital payments and transaction efficiency but still use technology only to a limited extent because they do not yet view it as a strategic tool. There is a gap between cognitive ability and digital implementation among MSMEs. Financial literacy focuses on the capacity to understand technology, while the decision to innovate mobile services depends on the willingness to take risks, openness to change, and belief in the long-term benefits of technology. This is why MSMEs continue to stick to conventional business models even though they possess adequate financial understanding. The study of Nainggolan (2025) who demonstrates that financial literacy can drive the use of digital payments, though this depends on business owners' attitudes toward technology adoption.

Technology Attitude Adoption mediates the relationship between Digital literacy and Mobile Service Innovation

Meanwhile, the results of Hypothesis 7 confirm that digital literacy will only influence mobile services innovation if it is supported by mental readiness and trust in technology. This indicates that digital competence alone is not sufficient to drive innovative behavior, as the technology adoption process is also influenced by psychological factors and perceptions of the technology's benefits. These findings show that the Technology Acceptance Model (TAM) acts as a

catalyst that strengthens the relationship between digital competence and innovative behavior. In other words, the low level of mobile service innovation among MSMEs is not always caused by a lack of digital skills, but also because business owners have not yet fully convinced themselves that technology can provide strategic value for the development of their businesses. In line with this, use Pratiwi et al. (2024) and Evitasati (2023) explains that digital and financial literacy shape perceptions of the usefulness of technology, which in turn fosters positive attitudes toward technology and digital usage behaviors.

Managerial Implications

These findings indicate the need for digital training and financial literacy programmes integrated with modules to strengthen attitudes towards technology. This intervention can improve the readiness of MSMEs to face the omnichannel era and expand the adoption of mobile services. Meanwhile, companies providing payment applications or mobile services need to focus attention for user experience, ease of use, and user education to encourage a positive attitude among users so that they focus more on building trust and awareness of the benefits of services, which will accelerate the adoption of technology by MSMEs.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The findings indicate that digital and financial literacy significantly influence mobile service adoption through the mediating role of technology attitudes adoption. Meanwhile digital literacy partially has no significant effect on mobile service adoption. Strategies to increase mobile service adoption require more than simply teaching MSMEs how to use the services (technical skills). They must also address their psychological needs to foster a sense of need and benefit from the services.

Recommendations

MSMEs must strengthen integrated digital and financial literacy to build their readiness for mobile service innovations. Mobile service adoption should be gradual, based on business needs, starting with digital payment systems and mobile-based marketing, and integrated

into an omnichannel strategy to expand market reach and enhance the customer experience. Furthermore, ongoing training and mentoring are crucial to help MSMEs adapt to technological developments and maintain innovation in an increasingly digital business environment. The limitations of this study are that it only focuses on digital literacy, financial literacy, and technology attitude adoption, ignoring other factors such as digital infrastructure, business capital, or social support that may influence technology utilisation. In addition, the measurement of respondents' literacy and attitudes is subjective, and the study has not tested the effectiveness of the recommended interventions, so the practical implications are still theoretical. Further research is recommended to use a longitudinal approach to monitor changes in adoption behavior continuously over time, as well as integrate infrastructure and social support variables for more comprehensive results.

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