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Enhancing MSMEs competitiveness and sustainability through understanding economic management, digital literacy, and technology adoption in the digital era

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ABSTRACT

The low implementation of understanding economic management in the micro small medium enterprises has led to limitations in technology utilization, digital financial management, and data-driven marketing strategies. This study aims to analyse the influence of understanding economic management on the use of digital technology and its impact on micro small medium enterprises performance. The research approach used a mixed method with a sample of 229 micro small medium enterprises through stratified random sampling. Data were collected through surveys, observations, in-depth interviews with 30 business actors, and documentation. Analysis techniques included multiple linear regression and a mediation-moderation model. The results showed that all hypotheses were significant. The main findings indicate that understanding economic management has a positive effect on the use of digital technology, digital financial efficiency, and marketing strategies. The novelty of this study lies in the integration of the three theory acceptance model constructs, digital finance, and economic management in one model, capable of explaining technology adoption behaviour more holistically. In conclusion, the success of micro small medium enterprises digital transformation requires synergy between economic literacy, technological preparation, and institutional support.

1. Introduction

Technology continues to develop in the micro, small, and medium enterprises (MSMEs) sector, which is a pillar of the global economy, especially in Indonesia (Bella et al., 2024; Nastiti et al., 2025). According to the Ministry of Cooperatives and MSMEs of the Republic of Indonesia, 60% of MSMEs contribute to the gross domestic product and absorb more than 97% of the workforce in Indonesia (Anatan & Nur, 2023; Zuhroh et al., 2025). However, in fact, even though the contribution of MSMEs is very significant, many of these businesses still face various challenges in implementing effective management concepts,

especially in the context of understanding economic management (Lewandowska et al., 2023; Ciocoiu et al., 2024). The concept of understanding economic management focuses on optimizing resources to achieve better economic goals (Ramírez-Márquez et al., 2024). In this case, the importance of applying theory to practice, which is often an obstacle for MSMEs (Basit et al., 2024; Ahmadov et al., 2025). The challenges faced by MSMEs in implementing economic management in the digital era are complex (Bhuiyan et al., 2024; Rosyidiana & Narsa, 2024). One of these is the lack of understanding of effective digital strategies, where many MSMEs still use traditional methods to run their businesses, which hinders their potential for growth and competitiveness in an increasingly competitive market (Tereshchenko et al., 2024; Febriani et al., 2025). However, the opportunities offered by digital technology, such as e-commerce, digital marketing, and data analytics, can be a solution to overcome these challenges (Gallastegui & Vlachopoulou, 2023; Gallastegui & Forradellas, 2024). However, without a strong understanding of economic management, the implementation of this technology can be ineffective (Hendricks & Mwapwele, 2024; Stahl & Eke, 2024). One aspect that needs to be considered is financial management and the use of technology that is not yet optimal (Bhuiyan et al., 2024; Mang'ana et al., 2024). A study found that only approximately 30% of MSMEs use technology to manage marketing and business finances (Is et al., 2024). This has led to a slowdown in data-driven decision-making and in-depth analysis of business developments.

Difficulties in marketing and financial management are often the cause of failure to achieve business goals (Dhaigude et al., 2025; Setyadi et al., 2025). Human resource management (HRM) is also a significant challenge in technology use (Autsadee et al., 2023). In the digital age, the skills required to run a business are increasingly complex. However, many MSMEs lack skilled human resources to utilize information and communication technology. According to previous research, 50% of MSMEs lack digital skills training for their employees (Yuwono et al., 2024). This has an impact on low productivity and work efficiency and is negative for overall business development (Anakpo et al., 2023; Handoyo et al., 2023). The application of good economic management concepts in the MSME sector must also consider marketing (Kant et al., 2024). In the digital era, consumer interaction with products and services has changed drastically. Therefore, MSMEs must adapt their marketing strategies to reach a wider audience. However, many MSMEs actors do not have sufficient knowledge of digital marketing. According to research, only 40% of MSMEs utilize social media as a marketing tool, while most still rely on less effective conventional marketing methods (Bhuiyan et al., 2024). This highlights the need for better education and training in marketing management (Shalihati et al., 2025). The shift in consumer behavior that increasingly prioritizes experience and added value in shopping requires MSMEs to be more responsive and innovative.

Research shows that MSMEs that can adapt to digital trends and consumer preferences have a greater chance of surviving and growing (Loo et al., 2023; Hokmabadi et al., 2024). Therefore, the application of economic management theory that prioritizes innovation and adaptation is crucial. The importance of implementing economic management in the MSMEs sector is also inseparable from the support of the government and related institutions (Chaldun et al., 2024; Milovanović et al., 2025). In recent years, the Indonesian government has launched various programs to support MSMEs development, including providing access to digital technology and management training (Ichsan et al., 2023). However, the implementation of these programs often faces obstacles, such as a lack of socialization and understanding among MSMEs actors (Widiastuti et al., 2024). Many MSMEs have not yet taken advantage of government-provided facilities such as digitalization training and funding (Widyasari et al., 2024). In today's digital era, implementing economic management concepts in the MSMEs sector is crucial for improving competitiveness and

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business sustainability. Previous research has shown that MSMEs that adopt digital technologies, such as e-commerce and social media, can access broader markets and improve marketing efficiency (Bhuiyan et al., 2024; Mahyarni & Okfalisa, 2024). Economic management plays a role in data-driven decision-making, utilizing market analysis to understand consumer behavior and formulate competitive pricing strategies (Karanasiou et al., 2024; Setiawan et al., 2024). The application of efficient cost management principles also helps MSMEs manage resources optimally so that they can adapt to market changes (Hanna & Rajkumar, 2024). The study found that MSMEs that invest in digital training for their employees experience an increase in productivity of up to 30% (Raihan, 2024). Therefore, it is important to provide support in the form of training and access to technology so that MSMEs can maximize their digital potential for marketing and business (Bhuiyan et al., 2024).

Applying theory to the practice of economic management in the MSMEs sector in the digital era is a strategic step that can increase business competitiveness and sustainability (Quttainah & Ayadi, 2024). Amidst the rapid development of information technology, MSMEs must utilize digital platforms to market products, manage operations, and interact with customers (Prasetyani et al., 2025). One important concept of economic management is cost and benefit analysis, where MSMEs need to evaluate investments in digital technology, such as e-commerce and social media, to attract more consumers (Ayokunmi et al., 2025). In addition, the application of digital marketing principles, such as search engine optimization (SEO) and paid advertising, can help MSMEs reach a wider audience at a relatively low cost. Through the right marketing strategy, MSMEs can increase the visibility of their products in the global market (Ayokunmi et al., 2025). It is also important for MSMEs to understand consumer behavior in the digital era by using analytical data to identify rapidly changing market trends and preferences (Laila et al., 2024). Thus, MSMEs can adjust their products and services to be more relevant to consumer needs (Hurdawaty & Tukiran, 2024). Efficient supply chain management is also crucial in the digital context. MSMEs need to collaborate with suppliers and distributors through digital platforms to speed up the distribution process and reduce operational costs. The implementation of technology, such as a cloud-based inventory management system, can help MSMEs manage their stock more effectively (Febriani et al., 2025). In addition, training and development of digital skills for MSMEs are very important so that they can adapt to changes and utilize technology optimally. Support from the government and financial institutions in the form of access to financing and training is also needed to strengthen the capacity of MSMEs to implement economic management in the digital era. Policies that support innovation and digitalization provide MSMEs with opportunities to develop and contribute to the national economy (Jianing et al., 2024; Hermawan et al., 2025). The application of appropriate economic management concepts in the MSMEs sector can not only encourage business growth but also improve the welfare of society as a whole.

The urgency of this research lies in the strategic need to strengthen the digital and managerial capacity of MSMEs so that they can adapt to global market changes. Data from the Central Statistics Agency show that more than 50% of MSMEs do not have adequate digital skills training, and only around 30% utilize digital accounting software. This situation has the potential to reduce decision-making efficiency and long-term business resilience in the logistics industry. The novelty of this research lies in the integration of three main theories: the technology acceptance model (TAM), digital financial management theory, and digital marketing and consumer behavior theory into one conceptual model to explain the relationship between digital economic literacy, technology acceptance, and MSMEs performance in the era of digital transformation. Therefore, the research questions are as follows: What is the level of understanding of MSMEs actors regarding the concept of

economic management in the digital era? To what extent does the use of digital technology affect financial management and marketing strategies? How do government support and digital training contribute to increasing MSMEs competitiveness? Therefore, this study aims to analyze the influence of economic management understanding on the use of digital technology in marketing and finance and its impact on MSMEs performance and sustainability.

2. Literature Review and Hypothesis Development

2.1. Literature Review

2.1.1. Technology Acceptance Model

TAM was developed by Davis (1989) and states that the level of technology adoption by users is influenced by their perception of the ease of use and benefits of technology (Putro & Takahashi, 2024; Al-Shanableh et al., 2024). In the context of MSMEs in the digital era, a positive perception of the use of technology, such as accounting software and e-commerce platforms, will increase the likelihood of business actors adopting and utilizing the technology optimally (Chotisarn & Phuthong, 2025). According to Davis (1989), if business actors believe that a technology is easy to use and brings significant benefits, they are more likely to integrate it into their business processes (Urbani et al., 2024; Moshood et al., 2024). The application of this theory is important to understand the factors that influence the level of technology acceptance by MSMEs, so that training and socialization can be more focused on the aspects of perceived benefits and ease of use (Rehman & Mia, 2024). Government support in presenting information that facilitates technology adoption will also increase the success rate of MSMEs' digital transformation.

2.1.2. Digital Financial Management Theory

This theory is rooted in the concept of effective and efficient financial management through the use of digital technology, as stated by Panigrahi et al. (2024). They emphasized that the use of digital systems to manage cash flow, transaction recording, and financial analysis will improve accuracy, speed, and transparency in financial management (Liu et al., 2024). In the context of MSMEs, the application of this theory shows that the adoption of digital-based financial software allows business actors to monitor financial conditions in real time, make data-based decisions and improve business sustainability (Sestino et al., 2023). This study confirms that the ability to manage finances digitally is an important factor in increasing the competitiveness and sustainability of MSMEs, especially amid increasingly tight market competition (Iturrioz et al., 2015). Increasing capacity in digital financial management must be supported by adequate training and socialization from the government and financial institutions.

2.1.3. Digital Marketing Theory and Consumer Behavior Analysis

According to Chaffey (2015), effective digital marketing strategies include SEO optimization, consumer behavior analysis, and the use of social media to build long-term relationships with customers (Sánchez-Camacho et al., 2025). In the context of MSMEs, this theory emphasizes the importance of utilizing data and technology to understand consumer behavioral preferences and adjust offerings (Rosyidiana & Narsa, 2024). The use of data analytics helps business actors understand market trends and consumer characteristics and predict changes in demand patterns. This is in line with the principles of data-driven marketing that support more targeted decision-making, as well as more cost-effective yet effective

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marketing strategies for reaching the global market (Lagzi et al., 2025). This study highlights that mastery of digital marketing aspects is the key to MSMEs' success in competing in the digital era, and this must be supported by digital skills training and access to adequate technology.

2.2. Hypothesis Development

2.2.1. The Effect of Understanding Economic Management and Technology Acceptance Model on Utilization of Digital Technology

In general, economic management theory emphasizes efficient decision-making processes to optimally achieve business goals through the allocation of limited resources (Losada-Agudelo & Souyris, 2024). In the context of MSMEs, this theory shows that small business owners often face limitations in terms of capital, labor, and market access. Economic management aims to optimize inputs to produce maximum output at a minimal cost (Reardon et al., 2024). The applications of this theory include cost planning, profit analysis, and data-driven decision-making. In the digital age, this concept has evolved through the integration of information technology, enabling the automation of financial planning and evaluation processes (Radu & Herciu, 2025). MSMEs who understand this theory can avoid wasting resources and increase productivity. In this study, economic management theory is the basis for explaining how MSMEs players understand the relationship between business strategy and the use of digital technology in improving economic performance and business sustainability. **H_1: Understanding Economic Management affects the Utilization of Digital Technology. H_2: Technology Acceptance Model affects the Utilization of Digital Technology.**

2.2.2. The Effect of Utilization of Digital Technology on Digital Financial Management and Digital Marketing and Consumer Behavior

Davis (1989) developed the TAM to explain the factors that influence user acceptance of technology. The two main constructs of TAM are perceived usefulness and perceived ease of use (Yeoh et al., 2025). In the context of MSMEs, this theory is used to analyze the extent to which business actors accept and utilize digital technology, such as e-commerce, social media, and online accounting systems. If users rate a technology as useful and easy to use, its adoption rate will increase. Recent studies have shown that the level of digital literacy and trust in technology also influence the implementation of TAM in the MSMEs sector (Desmaryani et al., 2024). This theory provides a conceptual basis for variables in the use of Digital Technology while explaining the relationship between user perceptions of technology and increasing business marketing efficiency in the digital era. **H_3: Utilization of Digital Technology affects the Digital Financial Management. H_4: Utilization of Digital Technology affects the Digital Marketing and Consumer Behavior.**

2.2.3. The Effect of Digital Financial Management and Digital Marketing and Consumer Behavior on Competitiveness and Sustainability

This theory explains the importance of using technology-based financial systems to increase transparency, efficiency, and accuracy in financial management. Digital financial management integrates information technology into marketing processes, transaction recording, financial report analysis, and data-driven marketing decision-making (Restrepo-Carmona et al., 2024). In the context of MSMEs, this theory explains how digitalization can make it easier to monitor cash

flow, control costs, and measure profitability. Only around 30% of MSMEs in Indonesia utilize digital accounting software, so understanding of this theory is still low (Nurani et al., 2025). The application of this theory not only strengthens operational efficiency but also helps entrepreneurs make strategic decisions based on real-time financial data. Therefore, this theory supports the digital financial management and serves as a framework for measuring the extent to which digitalization improves the financial performance and resilience of MSMEs. **H_5: Digital Financial Management affect the Competitiveness and Sustainability. H_6: Digital Marketing and Consumer Behavior affects on Competitiveness and Sustainability.**

2.2.4. The Effect of Utilization of Digital Technology on Competitiveness and Sustainability through Employee Skill and Training and Government Support

Digital marketing theory explains the use of communication technology to build relationships between businesses and consumers to enhance the brand value. According to Kotler and Keller, digital marketing focuses on two-way interactions through online media, such as social media marketing, SEO, and content marketing (Li et al., 2022). In the context of consumer behavior, this theory highlights how preferences and purchasing decisions are influenced by online experience and trust in digital brands. Studies have shown that consumer data analysis helps MSMEs understand market trends and adjust product strategies (Wisnujati & Munir, 2023). This theory also supports the variables of digital marketing and consumer behavior, with the strategic use of consumer behavior data increasing loyalty, promotional efficiency, and business performance in the digital era. **H_7: The Effect of Utilization of Digital Technology affects the Competitiveness and Sustainability through Employee Skill and Training. H_8: The Effect of Utilization of Digital Technology affects the Competitiveness and Sustainability through Government Support.**

2.3. Research Model

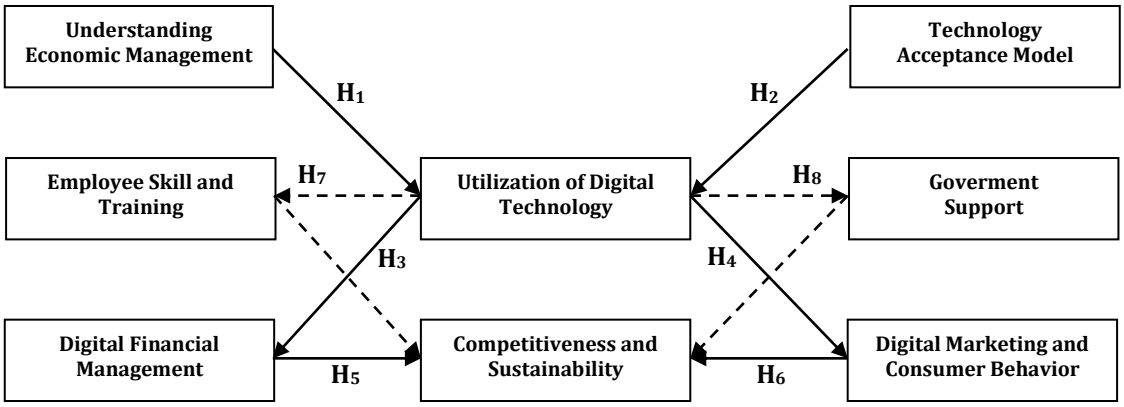

Figure 1. Research Framework

Figure 1 shows a model of the relationships between variables that explains how understanding economic management is a fundamental factor driving the use of digital technology in marketing activities and the financial management of MSMEs. The arrow leading from understanding economic management to the use of digital technology supports the first and second hypotheses, which state that the higher the understanding of economic management, the more optimal the adoption of digital technology and the

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improvement of MSMEs performance and sustainability. Furthermore, the use of digital technology, both in marketing and finance, is shown to influence the improvement of business efficiency and performance, in accordance with the third, fourth, fifth, and sixth hypotheses. The next arrow shows that MSMEs performance plays a significant role in improving business sustainability, in line with the eighth hypothesis. Furthermore, the relationship between digital marketing and understanding consumer behavior supports the seventh hypothesis, which states that the use of digital marketing helps MSMEs understand market preferences. Overall, the figure shows a causal flow that illustrates the multilevel influence of management, technology, performance, and MSMEs sustainability.

3. Research Methods

3.1. Population and Sampling Method

The research method used a mixed approach to gain a comprehensive understanding of the challenges faced by MSMEs in implementing business marketing management in the digital era (DeCuir-Gunby et al., 2024). A quantitative approach was used to collect data through a survey of MSMEs in Makassar, Indonesia. The study population comprised all 31.848 MSMEs registered with the local Cooperatives and MSMEs Office. Approximately 60% of these MSMEs operate in the culinary sector, while the remaining 40% operate in handicrafts and other industries. Given that Makassar is a large city with a large number of MSMEs, the researchers selected a sample of 229 MSMEs from the 60% of MSMEs operating in the culinary sector. The MSMEs were randomly selected using stratified sampling. The identified MSMEs were asked to participate in the study. Using a questionnaire consisting of various sections, such as collecting information on business profiles, level of understanding of economic management, utilization of digital technology, and attitudes toward digital marketing, the researchers sought to obtain accurate and relevant data for the study. Furthermore, a qualitative approach was used to delve deeper into the perceptions and experiences. In-depth interviews were conducted with 30 selected MSMEs owners, who were chosen based on certain criteria, such as length of operation, type of business, and success in utilizing digital technology. Interviews help researchers capture nuances and contexts that may not be captured in a survey.

3.2. Data Collecting Method

The data collection technique used a survey aimed at MSMEs registered with the Cooperatives and MSMEs Office in Indonesia. This survey was designed to obtain representative information regarding their business profiles, level of understanding of economic management, utilization of digital technology, and attitudes and experiences toward digital marketing. The questionnaire used in the survey was divided into several sections, each designed to elicit specific information from the participants. The first section relates to the business background, including the business type, year of establishment, and company size. The second section assessed MSMEs' understanding of economic management, with questions covering basic management concepts, cost management, and the use of data in decision-making. The third section focused on the use of digital technology, asking about the use of e-commerce platforms, social media, and accounting software to monitor cash flows.

Furthermore, the final section focuses on MSMEs' perceptions of digital marketing, including how they attract customers and the strategies used to market products online. With this approach, the researchers hoped to collect comprehensive and in-depth data that would provide a clearer picture of the current MSMEs conditions. In

addition to the quantitative approach, data collection techniques included observation, interviews, and documentation with 30 MSMEs owners. The researchers observed and recorded everything necessary and relevant to the research objectives. Interviews were also conducted to obtain direct information from business owners and to collect all documentation related to specific criteria, such as length of operation, type of business, and success in utilizing digital technology. These observations, interviews, and documentation aimed to delve deeper into the experiences and perceptions of MSMEs owners regarding the challenges they face in implementing economic management in the digital era. Through direct observation and open-ended questions, the researchers explored the individual perspectives and experiences of the participants regarding their understanding and implementation of digital management practices and strategies in their businesses.

The research indicators used to measure the implementation of economic management in MSMEs in the digital era are comprehensive and include six main indicators. The first indicator is economic management understanding, which assesses the extent to which MSMEs understand basic management concepts, management costs, and cost-benefit analysis, including economic management concepts, management practice theory, and cost-benefit evaluations in technology investments. The second indicator relates to the utilization of digital technology, which focuses on the use of e-commerce platforms, social media, and accounting software to support marketing and business financial recordkeeping. The third indicator is financial management, which assesses the ability of MSMEs to maintain cash flow, generate business profits, and utilize accounting software sustainably. Furthermore, the digital marketing indicator measures the implementation of digital marketing strategies, including the use of SEO and consumer behavior analysis as a basis for marketing decision-making. The fifth indicator is training and employee skills, which assesses the provision of digital skills training and business actors' perceptions of the importance of digital training for business success. Finally, the government or related institution support indicator assesses MSMEs' access to digital technology training and funding and business actors' participation in government-organized training programs.

3.3. Data Analysis Method

The data analysis technique used was descriptive statistics assisted by SPSS version 29 to ensure the accuracy and reliability of the results (Raman et al., 2024). The initial stage of the analysis included validity and reliability tests using item-total correlation values and Cronbach's alpha coefficients (>0.7) to ensure that each measurement instrument had a good internal consistency. Subsequently, a descriptive analysis was conducted to describe the respondents' profiles, their level of understanding of economic management, and the level of adoption and application of digital technology in MSMEs. Next, classical assumption tests were conducted, including tests for normality, multicollinearity, and heteroscedasticity, to ensure that the data met the requirements for multiple linear regression analyses. Inferential statistical data analysis techniques were also used to examine the relationships between variables, as formulated in the hypotheses. Multiple linear regression analysis was used to measure the influence of independent variables, such as the understanding of economic management and technology acceptance model, on the dependent variables, namely the utilization of digital technology, digital financial management, and the competitiveness and sustainability of MSMEs.

The regression coefficient (β) and significance level ($p<0.05$) were used to determine the strength and direction of the relationships between variables. In addition,

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mediation and moderation analyses were conducted to test the mediating role of perceived usefulness and ease of use of technology, as well as the moderating effects of employee skill and training, government support, and business size on the relationship between the main variables. Model testing was also accompanied by the calculation of the coefficient of determination (R^2) to determine how much variation in MSMEs performance can be explained by the research variables. Qualitative analysis was conducted on data from in-depth interviews with 30 selected MSMEs owners.

This analysis followed an interactive model that included three main stages: data reduction, sorting, and organizing important data based on themes such as digital strategy, financial management, and marketing adaptation. The data were presented in the form of a thematic matrix to display the relationship between perceptions, experiences, and digitalization practices in MSMEs. Drawing conclusions and verifying through data interpretation to understand the empirical context underlying quantitative results. The validity of the qualitative data was strengthened through triangulation of sources and methods, namely by comparing data from interviews, observations, and supporting documents, as well as conducting member checking with informants to ensure that the researcher's interpretations corresponded to the reality on the ground. The integration of quantitative and qualitative data was achieved through a convergent parallel design approach, in which both types of data were analyzed separately and then combined to gain complementary insights. Quantitative data provided statistical evidence of the relationships between variables, whereas qualitative data explained the rationale and context behind the results.

Table 6. Observation Interview and Documentation Coding

Category	Description	Source
Understanding Economic Management	Understanding of economic management concepts	Interview
Understanding Economic Management	Evaluation of costs and benefits of technology investment	Documentation
Utilization of Digital Technology	Use of e-commerce platforms	Observation
Utilization of Digital Technology	Effectiveness of accounting software	Interview
Financial Management	Monitoring business cash flow	Documentation
Financial Management	Periodic profitability assessment	Interview
Digital Marketing	Implementation of SEO in marketing strategy	Observation
Digital Marketing	Frequency of consumer behavior analysis	Interview
Employee Skills	Digital skills training for employees	Documentation
Employee Skills	Importance of digital training for business success	Interview
Government Support	Availability of government support for MSMEs	Observation
Government Support	Participation in government-provided training	Interview

Table 6 contains the coding results from the observations. Interviews and documentation, it is interpreted that there are six main categories representing important factors in managing digital-based businesses. First, the understanding economic management category indicates that business actors have a basic understanding of economic management concepts and can evaluate the costs and benefits of technology investments. Second, the utilization of digital technology emphasizes that the use of e-commerce platforms and the effectiveness of accounting

software play crucial roles in improving operational efficiency. Third, digital financial management highlights the importance of cash flow monitoring and regular profit evaluation. Fourth, digital marketing and consumer behavior describe the implementation of SEO strategies and consumer behavior analysis as market expansion efforts. Fifth, employee skills and training emphasize the importance of digital training for employees in supporting business success. Finally, government support indicates the availability of facilities and training provided by the government to MSMEs. These results indicate that the integration of managerial skills, digital technology, and external support is a key factor in increasing MSMEs competitiveness in the era of digital transformation.

4. Results and Discussion

4.1. Validity Test

This study conducted instrument validity and reliability tests to ensure that the instruments used for measurement were appropriate. Table 1 shows the validity test results. The validity test results show that all items in all indicator items have a calculated r-value of 0.644–0.759, which are greater than the table r-value of 0.361. Thus, the 48 statement items were declared valid and suitable for use as research instruments.

Table 1. Results of Validity Test

Variable	Item Indicator	R-Value
Understanding Economic Management	UEM1	0.682
	UEM2	0.715
	UEM3	0.644
	UEM4	0.701
	UEM5	0.668
	UEM6	0.732
	UEM7	0.689
	UEM8	0.754
Utilization of Digital Technology	UDT1	0.671
	UDT2	0.703
	UDT3	0.685
	UDT4	0.742
	UDT5	0.698
	UDT6	0.721
	UDT7	0. 734
	UDT8	0.759
Digital Financial Management	DFM1	0.694
	DFM2	0.712
	DFM3	0.683
	DFM4	0.726
	DFM5	0.701
	DFM6	0.738
	DFM7	0.719
	DFM8	0.745
Digital Marketing and Consumer Behavior	DMCB1	0.688
	DMCB2	0.704
	DMCB3	0.672
	DMCB4	0.731
	DMCB5	0.709
	DMCB6	0.743
	DMCB7	0.720
	DMCB8	0.752
Employee Skill and Training	EST1	0.667

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Variable	Item Indicator	R-Value
Goverment Support	EST2	0.692
	EST3	0.718
	EST4	0.736
	EST5	0.701
	EST6	0.724
	EST7	0.742
	EST8	0.758
	GS1	0.681
	GS2	0.699
	GS3	0.714
	GS4	0.732
	GS5	0.706
	GS6	0.741
	GS7	0.728
	GS8	0.755

4.2. Reliability Test

Table 2 shows the validity test results. The reliability test results showed that all items in the variable had a corrected item-total correlation of 0.598-0.681 and > 0.3, and Cronbach's alpha for all items was between 0.869-0.901 and > 0.7. Thus, all items in the variable are declared reliable and consistent as the research instruments.

Table 2. Results of Reliability Test

Variable	Item Indicator	Corrected Item–Total Correlation	Cronbach's Alpha
Understanding Economic Management	UEM1	0.612	0.879
	UEM2	0.645	0.875
	UEM3	0.598	0.883
	UEM4	0.631	0.878
	UEM5	0.604	0.881
	UEM6	0.659	0.872
	UEM7	0.620	0.880
	UEM8	0.671	0.869
Utilization of Digital Technology	UDT1	0.605	0.891
	UDT2	0.633	0.887
	UDT3	0.618	0.889
	UDT4	0.667	0.883
	UDT5	0.624	0.888
	UDT6	0.652	0.885
	UDT7	0.660	0.884
	UDT8	0.679	0.881
Digital Financial Management	DFM1	0.622	0.882
	DFM2	0.641	0.879
	DFM3	0.610	0.884
	DFM4	0.658	0.878
	DFM5	0.636	0.880
	DFM6	0.671	0.876
	DFM7	0.649	0.879
	DFM8	0.622	0.882
Digital Marketing and Consumer Behavior	DMCB1	0.615	0.889
	DMCB2	0.632	0.886
	DMCB3	0.601	0.891
	DMCB4	0.659	0.884

Variable	Item Indicator	Corrected Item–Total Correlation	Cronbach's Alpha
Employee Skill and Training	DMCB5	0.638	0.886
	DMCB6	0.670	0.882
	DMCB7	0.646	0.885
	DMCB8	0.675	0.881
	EST1	0.598	0.901
	EST2	0.621	0.897
	EST3	0.654	0.893
	EST4	0.668	0.891
	EST5	0.632	0.896
	EST6	0.659	0.892
	EST7	0.672	0.890
	EST8	0.681	0.888
Goverment Support	GS1	0.609	0.895
	GS2	0.626	0.892
	GS3	0.641	0.890
	GS4	0.662	0.887
	GS5	0.634	0.891
	GS6	0.668	0.886
	GS7	0.653	0.888
	GS8	0.676	0.884

4.3. Descriptive Analysis

The descriptive analysis in Table 3 shows an average variable value of 4.21. was categorized as moderate to high. The highest value was found in understanding economic management (Mean = 4.21; SD = 0.68), indicating a high level of economic knowledge among MSMEs. The lowest value was found for government support (Mean = 3.68; SD = 0.80), indicating the need for increased external support.

Table 3. Results of Descriptive Analysis

Variable	Mean	SD	Category	VIF	Tolerance
Understanding Economic Management	4.21	0.68	High	1.512	0.661
Utilization of Digital Technology	4.05	0.74	High	1.438	0.695
Digital Financial Management	3.92	0.81	High	1.347	0.742
Digital Marketing & Consumber Behavior	3.87	0.76	High	1.524	0.656
Employee Skill & Training	3.79	0.72	Medium	1.473	0.679
Government Support	3.68	0.80	Medium	1.351	0.740
Competitiveness and Sustainability	4.11	0.70	High	1.526	0.655

4.4. Classical Assumption Test

The classical assumption test in Table 4 shows that all variables have a normal distribution with a Kolmogorov–Smirnov significance value of 0.228 ($p > 0.05$). The multicollinearity test showed a VIF of 1.526 < 10 and a tolerance of 0.742 > 0.1, indicating no correlation between the independent variables. The heteroscedasticity test with a significance value of 0.231 ($p > 0.05$) indicates that the data are homoscedastic. These results indicate that all the assumptions were met. confirming that the regression model was suitable for use. This finding strengthens the validity of the empirical model and ensures that subsequent regression results objectively reflect the relationships between variables, without statistical distortion.

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Table 4. Results of Classical Assumption Test

Variable	Normality Test	Multicollinearity Test	Heteroscedasticity Test
Understanding Economic Management	0.176	Accepted	0.228
Utilization of Digital Technology	0.214	Accepted	0.196
Digital Financial Management	0.203	Accepted	0.217
Digital Marketing & Consumer Behavior	0.195	Accepted	0.231
Employee Skill & Training	0.161	Accepted	0.205
Government Support	0.189	Accepted	0.220
Competitiveness and Sustainability	0.177	Accepted	0.193

4.5. Multiple Regression Test

The results of the regression test in Table 5 show that all hypotheses are significant, with a p-value < 0.05, indicating a positive relationship. TAM has the greatest influence on the utilization of digital technology, followed by understanding economic management. The utilization of digital technology has a significant influence on digital financial management, digital marketing, and consumer behavior. Digital financial management, digital marketing, and consumer behavior have been proven to increase competitiveness and sustainability. The moderating effects of employee skill and training and government support were also significant. The determination value of R^2 = 0.684 indicates that 68.4% of the variation in MSMEs performance is explained by the model, while the remaining 31.6% is explained by external factors. These results confirm the strong predictive power of the model for the success of MSMEs digital transformation. Based on the results of the multiple linear regression test, all previously developed hypotheses were accepted because they had a significance value of p < 0.05.

Table 5. Results of Multiple Linear Regression Test

Hypothesis	Regression Coefficient	T-Count
Understanding Economic Management → Utilization of Digital Technology	4.812	0.000
Technology Acceptance Model → Utilization of Digital Technology	6.221	0.000
Utilization of Digital Technology → Digital Financial Management	5.473	0.000
Utilization of Digital Technology → Digital Marketing and Consumer Behavior	5.089	0.000
Digital Financial Management → Competitiveness and Sustainability	4.215	0.000
Digital Marketing and Consumer Behavior → Competitiveness and Sustainability	4.871	0.000
Employee Skill and Training×Utilization of Digital Technology → Competitiveness and Sustainability	2.653	0.009
Government Support×Technology Acceptance Model → Competitiveness and Sustainability	2.124	0.034

4.6. Mediation and Moderation Test

Table 6 shows the results of the mediation and moderation analyses, which show that the variables perceived usefulness and perceived ease of technology play a significant role in bridging the relationship between the main variables. The mediation effect of understanding economic management on perceived usefulness for the utilization of digital technology was indirect (β = 0.214; t = 3.984; p = 0.000; R^2 = 0.653), while mediation was through perceived ease of use (β = 0.186; t = 3.576; p = 0.001; R^2 =

0.642). The overall mediation effect appears in the relationship between perceived usefulness of technology and MSMEs performance (β = 0.232; t = 4.812; p = 0.000; R^2 = 0.671). Meanwhile, employee training was moderated (β = 0.176; p = 0.009; R^2 = 0.684). Government support (β = 0.141; p = 0.034; R^2 = 0.692) and business size (β = 0.118; p = 0.049; R^2 = 0.701) were significant. The combined model yielded R^2 = 0.711, meaning that 71.1% of the variation in MSMEs performance was explained by all variables in the model. These results confirm the important role of perception, training, and external support factors in strengthening the impact of digitalization on MSMEs competitiveness and sustainability.

Table 6. Results of Mediation and Moderation Test

Hypothesis	Indirect Coefficient	Direct Coefficient	Sobel Test / T-Value	Sig.	R^2
Understanding Economic Management → Perceived Usefulness → Utilization of Digital Technology	0.214	0.327	3.984	0.000	0.653
Understanding Economic Management → Perceived Ease of Use → Utilization of Digital Technology	0.186	0.294	3.576	0.001	0.642
Perceived Usefulness → Technology Utilization → Competitiveness and Sustainability	0.232	0.401	4.812	0.000	0.671
Perceived Ease of Use → Technology Utilization → Digital Financial Management	0.195	0.368	3.909	0.000	0.659
Employee Training×Technology Utilization → Competitiveness	0.176	-	2.653	0.009	0.684
Government Support×Technology Acceptance → Sustainability	0.141	-	2.124	0.034	0.692
Business Size×Utilization of Digital Technology → Performance	0.118	-	1.987	0.049	0.701
All Independent Variables → Performance	-	-	-	0.000	0.711

4.7. Discussion

4.7.1. Understanding of Digital Technology

All the studied variables were found to play a crucial role in supporting the success of digital transformation in the MSMEs sector. An understanding of financial management has been shown to be a fundamental factor influencing how businesses adopt digital technology. MSMEs with sound managerial knowledge understand the benefits and efficiencies offered by technology more easily, resulting in a faster and more effective adoption process. The technology acceptance model is a key factor in driving digital technology adoption. Businesses with positive perceptions of the ease and usefulness of technology are more likely to implement it in their operations. The utilization of digital technology plays a significant role in improving digital financial management systems and marketing strategies. Technology helps MSMEs monitor cash flows, maintain more accurate financial records, and conduct regular profitability analyses. The use of digital marketing strategies, such as SEO and consumer behavior analysis, increases market reach and promotional effectiveness. This implementation strengthens the competitive position of MSMEs by enabling rapid strategic adjustments to the market dynamics.

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4.7.2. Employee Skill and Training are An Important Foundation

This study found that digital training positively impacts individual and organizational performance. Employees who understand the use of digital tools can support production efficiency, customer service, and data-driven decision making. This capability creates an adaptive work culture that is ready to face future technological change. Employees trained to face the global world will be better prepared than those who are not. The training provided to employees must also be tailored to market needs and equip them with the skills to market their businesses. Other findings indicate that moderate employee training and government support strengthen the relationship between technology and MSMEs competitiveness. Employee training magnifies the positive impact of technology on business efficiency. Government support enhances business sustainability through facilitation and supportive regulation. The combination of these two factors creates a digital ecosystem that encourages innovation and independence among MSMEs. The research model shows that almost all the variables have a positive and significant relationship. This implies an increase in the managerial understanding. The utilization of digital technology, digital marketing capabilities, and external support collectively strengthens MSMEs competitiveness and sustainability. These results confirm that digitalization is not just a matter of technology but also involves the integration of human resource capabilities, government policies, and business strategies that adapt to changes in the digital environment.

4.7.3. Government and Institutional Involvement and Support

Government and institutional support also plays a significant moderating role. Government training programs, funding, and technical guidance encourage MSMEs to build their capacity to implement digital innovation sustainably. Mediation analysis showed that the perceived ease and usefulness of technology served as a bridge between economic understanding and digital technology adoption. This means that even if business owners understand the importance of economic management, technology adoption will only be optimal if they believe that the technology is beneficial and easy to use. This mediation process underscores the importance of digital literacy as a connecting factor between managerial skills and technology adoption.

4.7.4. Consistency of Findings with Theory

The findings of this study are consistent with the TAM proposed by Davis (1989). where the perception of ease and usefulness of technology directly influences an individual's intention to use it (Brown, 2002). In the context of this study, this perception acts as a mediator between economic understanding and the use of digital technology. In addition, resource-based view (RBV) theory supports the finding that employee skills and managerial abilities are valuable and difficult-to-imitate internal resources. Thus, they can create sustainable competitive advantages (Atobishi & Podruzsik, 2025). Rogers' organizational innovation theory is also reflected in these results. where technology adoption is influenced by the level of knowledge and resource readiness. and external environmental support (Amini & Javid. 2023). Overall, the results strengthen the theoretical foundation that the digital transformation of MSMEs is a combination of internal capabilities and external supporting factors that form an adaptive advantage in a dynamic business environment. The findings of this study align with those of studies that confirm that digital technology acceptance is influenced by perceived ease and benefits in

improving business efficiency (He et al., 2018). Similar results in other studies indicate that managerial skills are a determining factor in the success of technology adoption among MSMEs (Ngora et al., 2022). Digital training for employees contributes to increased productivity and innovation (Tariq et al., 2024). Government support through digitalization mentoring programs and incentives strengthens the competitiveness of MSMEs in Indonesia (Alexandro, 2025). Thus. The findings of this study not only reinforce previous results but also provide new empirical evidence on the role of interactions between variables that shape the success model of MSMEs digitalization.

Implications of this research for policymakers, businesses and training institutions. For the government, these results emphasize the need to strengthen digital literacy programmes and policy support that encourage technology adoption in the MSMEs sector. For businesses, these results demonstrate the importance of developing managerial capabilities and digital skills to optimally utilize technology in operations. For educational and training institutions, these results can serve as a basis for developing curricula relevant to the needs of the digital industry in the future. Furthermore, the practical implications emphasize that the success of digital transformation is determined not only by the availability of technology but also by the readiness of human resources and synergy between the public and private sectors.

This study's limitations include data that only cover specific regions; therefore, the results do not fully reflect the condition of MSMEs across Indonesia. Furthermore, the data used are largely cross-sectional, thus unable to capture changes in MSMEs behavior and performance longitudinally. The research instrument also relied on the respondents' perceptions. This may have been influenced by subjective biases toward digital technology. Another limitation lies in external variables, such as fiscal policy, macroeconomic conditions, and digital infrastructure, which have not been incorporated in depth into the model. Moderating factors such as organizational culture or leadership characteristics have also not been explicitly analyzed, even though these factors have the potential to influence the speed of adoption and effectiveness of digital transformation in the banking sector.

Further research should expand the scope of regions and business sectors to gain a more comprehensive understanding of MSMEs digitalization patterns across various contexts. A longitudinal approach is needed to monitor the dynamics of changes in business behavior and performance over the long term. Future research could also include variables such as organizational culture, digital leadership, and infrastructure readiness as moderating factors. From a policy perspective, future studies could assess the effectiveness of government programs supporting technology adoption, including cost-benefit analyses of digitalization incentives. Furthermore, mixed methods research, combining quantitative and qualitative analyses, is expected to provide a deeper understanding of how interactions between variables shape adaptive and sustainable digital strategies in the MSMEs sector.

5. Conclusion

The study's conclusions confirm that the implementation of economic management and the utilization of digital technology play a strategic role in increasing the competitiveness and sustainability of MSMEs in the era of digital transformation. The findings indicate that most business actors have adopted e-commerce platforms and digital marketing strategies; however, the effectiveness of their implementation remains limited

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due to a low understanding of technology-based financial management and a lack of digital training for employees. Understanding economic management is a crucial foundation influencing the acceptance and optimal utilization of digital technology. The higher the level of economic and digital literacy of MSMEs, the more effective the use of technology in business decision making. operational efficiency and data-driven marketing strategies. This study reveals that perceptions of the ease and benefits of technology are important mediating factors that bridge the gap between managerial knowledge and digital technology adoption. Employee training support and the role of the government have also been shown to strengthen the relationship between technology utilization and increased business competitiveness. Government involvement in providing training. Access to financing and digital assistance significantly influence MSMEs readiness to face global competition. This study confirms that the success of MSMEs digital transformation is determined not only by the availability of technology but also by the readiness of human resources, institutional support, and adaptive managerial capabilities. Improving digital literacy, continuous training, and collaboration between the public and private sectors are key to strengthening the position of MSMEs as resilient, innovative, and sustainable drivers of the national economy in the digital economy era.

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