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The Effectiveness of Digital Technology Implementation in Enhancing the Competitiveness of MSMEs in the Creative Industry of Tangerang City

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ABSTRACT

Introduction: The Fourth Industrial Revolution has triggered a fundamental shift in the global economic structure, significantly influencing the sustainability and competitiveness of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. This study aims to evaluate the effectiveness of digital technology adoption in enhancing the competitiveness of MSMEs in the creative industry sector in Tangerang City. **Methods:** Utilizing the Technology-Organization-Environment (TOE) framework, this research applies a quantitative approach through an evaluative survey design involving 128 MSME actors who have integrated digital systems into their business operations. **Results:** The findings reveal that approximately 78% of respondents reported an increase in sales ranging from 20% to 35% following digital adoption, while 64% successfully expanded their market reach to national and international levels. Moreover, digital technology implementation has proven to significantly improve operational efficiency and accelerate product innovation processes, thereby strengthening the competitive edge of MSMEs. However, several challenges remain, such as limited access to formal digital training, low levels of digital literacy, and uneven availability of digital infrastructure across regions. **Conclusion:** The study concludes that optimal digital technology implementation can generate substantial positive impacts on MSME performance and competitiveness, provided there is strategic support from government bodies, educational institutions, and the private sector. Strengthening multi-stakeholder collaboration and building an inclusive and sustainable digital ecosystem are key strategies for advancing MSME transformation in the digital economy era. This research offers valuable implications for policy formulation and strategic empowerment of technology-based MSMEs in Indonesia.

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1. Introduction

The Fourth Industrial Revolution has triggered major shifts in the global economic structure, impacting not only large corporations but also extending to the Micro, Small, and Medium Enterprises (MSMEs) sector. In Indonesia, MSMEs play a strategic role in sustaining national economic stability. According to data from the Ministry of Cooperatives and SMEs of the Republic of Indonesia and the Chamber of Commerce (Kadin, 2025), MSMEs contribute approximately 61.07% to the Gross Domestic Product (GDP) and absorb over 97% of the national workforce. Despite this significant contribution, MSMEs face serious challenges, particularly in terms of competitiveness and their ability to adapt to rapid and complex technological transformations. Digital technology has become a crucial instrument for business sustainability and growth (Panjaitan et al., 2024), especially in the post-COVID-19 era, which accelerated digital disruption across sectors. However, the trend of digital adoption among Indonesian MSMEs remains highly uneven (Rifai & Mychelisda, 2023), with disparities evident not only in infrastructure and access, but also in levels of digital literacy, integration of technology into business management, and the innovative orientation of MSME actors (Ausat et al., 2025).

This gap is particularly evident in the creative industry sector, which holds great potential for digital innovation, yet still exhibits low levels of technological adoption. The creative industries encompassing fashion, culinary arts, crafts, and visual design (Hasrullah, 2024) rely heavily on creativity, market connectivity, and trend-driven product innovation. However, many MSMEs continue to operate using conventional models and have not embedded digitalisation as a core element of their business strategies. Tangerang City, an urban area with rapid MSME growth, especially in the creative sector, reflects this challenge. According to a report by the Tangerang City Department of Industry, Trade, Cooperatives, and MSMEs (Rosadi, 2024), of the more than 8,000 active creative MSMEs, only around 42.3% have adopted digital technology, and of these, just 21% have implemented it comprehensively. This reveals a substantial gap between the potential and actual utilisation of technology, which ultimately weakens the competitiveness of MSMEs in an increasingly digital and competitive market.

Locally, Tangerang City is one of Indonesia's urban regions experiencing rapid MSME growth (Sudarmanto, 2024), particularly in creative fields such as fashion, food, handicrafts, and graphic design. Data from the Tangerang City Department of Industry, Trade, Cooperatives, and MSMEs (2023) indicates that there are over 32,000 active MSMEs, around 8,000 of which operate in the creative industries. However, a survey conducted by Sanjaya et al., (2023) found that only 42.3% of creative MSMEs have adopted digital technology in their operations, and just 21% use it in an integrated manner from digital marketing and app-based financial recording to e-commerce and digital logistics. The majority still employ traditional approaches and lack a comprehensive understanding of how digitalisation can strengthen competitiveness (Yuniar et al., 2025).

Research evaluating the effectiveness of digital technology adoption on MSME competitiveness in the creative sector especially using localised and contextual approaches remains limited. Most previous studies have focused on levels of adoption or general digital readiness (Rifai & Mychelisda, 2023; Islami et al., 2025); Rozza et al., 2023), without exploring the extent to which digital adoption impacts competitiveness indicators such as product innovation, service speed, access to global markets, and consumer demand adaptation. Furthermore, geographically focused studies on urban areas like Tangerang are still scarce. This is despite the fact that MSMEs in urban areas possess unique dynamics

compared to rural settings (Salsabila et al., 2025), particularly regarding access to digital infrastructure, competitive pressures, and more complex consumer expectations.

Theoretically, this study refers to the Technology Organisation Environment (TOE) Framework developed by Tornatzky and Fleischer (1990) in Salmizi et al., (2022), which has been extended to the context of MSME digitalisation. The TOE framework posits that technology adoption within organisations is influenced not only by the technology itself but also by organisational structure and culture, and external environmental dynamics (Yusran et al., 2025). In the context of creative MSMEs in Tangerang, technological factors include the availability of digital infrastructure, entrepreneurs' digital literacy, and technology's compatibility with business needs. Organisational factors encompass management readiness, operational structure, and a culture of innovation. Environmental factors relate to local government support, fiscal policies, and digital market trends. Using this framework, the study offers a comprehensive and systematic evaluation of digital technology implementation.

The novelty of this research lies in its approach, which integrates field data with the TOE framework within a specific geographic and sectoral context creative industry MSMEs in Tangerang City. This approach allows for deeper exploration of the interactions between technology, MSME organisational structures, and the external environment that shape real-world digitalisation dynamics. The study does not merely measure levels of digital adoption but critically assesses its effectiveness using relevant and measurable indicators, such as increased sales volumes, market expansion, operational cost efficiency, and accelerated product innovation cycles. Thus, this research introduces a strong evaluative dimension to address gaps in the existing literature, which often remains descriptive and generalised.

In addition to its evaluative focus, this research offers a humanistic contribution by incorporating social and psychological factors influencing digitalisation among MSME actors. These include individual perceptions of technology benefits, resistance to change, comfort in using digital applications (Rizal et al., 2023), and cultural values influencing decision-making processes. This dimension is crucial, as digitalisation is not merely a technical shift, but a social transformation requiring mental and organisational cultural readiness (Aisha et al., 2022). Therefore, the outcomes of this study aim not only to enrich academic discourse on MSME digital transformation but also to offer practical value as a foundation for designing more adaptive, inclusive, and contextually relevant policies and support programmes.

The purpose of this study is to empirically evaluate the effectiveness of digital technology adoption in enhancing the competitiveness of creative industry MSMEs in Tangerang City, using the TOE framework as the primary analytical tool. The study is expected to generate both theoretical and practical benefits. Theoretically, it contributes to the literature on MSME digital transformation through a context-based approach anchored in a robust theoretical framework. Practically, the findings may inform policy-making by local governments, creative industry stakeholders, and MSME support institutions in developing more targeted, participatory, and sustainable digitalisation programmes.

Recent empirical data further reinforces the urgency of digital transformation for MSMEs in the creative sector. A study by Mellinia et al., (2023) found that 82.9% of digitalised MSMEs experienced increased business productivity, and around 73.5% reported being able to reach new customers through online channels. Specifically in the Greater Jakarta area, including Tangerang City, digital penetration among MSMEs reached 65%, but only 29% used technology comprehensively from marketing and financial management to digital customer services. These findings are supported by Putra et al., (2023), who reported that

creative MSMEs implementing end-to-end digital strategies are up to twice as likely to see revenue growth compared to those still using conventional approaches. Although digital adoption is on the rise, disparities in digital proficiency and functional use remain critical barriers to enhancing MSME competitiveness in an increasingly digital and competitive marketplace.

2. Theoretical Framework

2.1 Ease of Use

The concept of ease of use originates from the Technology Acceptance Model (TAM) introduced by (Davis et al., 1989), which posits that perceived ease of use refers to the extent to which an individual believes that using a system will be free of effort. In the context of MSMEs, ease of use of digital technology is crucial, as the majority of business actors lack a strong technical background. Research by Abi et al., (2025) indicates that a simple interface, intuitive navigation, and minimal training requirements are key factors encouraging widespread adoption of technology by MSME actors. This study adopts the TAM framework, developed further by Ramadan & Efnita, (2024), using a 5 point Likert scale, as shown in Table 1.

2.2 Technology Fit

Technology fit refers to the degree to which the adopted technology aligns with the needs, processes, and objectives of the user organisation. According to the Task-Technology Fit (TTF) framework, a high degree of fit between the technology and the tasks being performed enhances organisational performance (Udayana & Juliarsa, 2022; Rakhmawati et al., 2025; Nizar et al., 2024; Hasanah & Rakhmawati, 2025). Technologies tailored to the operational scale of MSMEs and adaptable to local business dynamics are more likely to be accepted and yield positive impacts on business productivity (Malik et al., 2024; Purnomo & Purwandari, 2024; Murtadlo, 2021; Fazizah et al., 2024; Fedianty Augustinah et al., 2022). This study refers to the TTF theory by Goodhue & Thompson (1995), as cited in Permana & Widihastarini, (2023), and uses a 5 point Likert scale, as outlined in Table 1.

2.3 External Support

External support encompasses assistance from government, educational institutions, business communities, and the private sector. Based on the Technology-Organization-Environment (TOE) framework, the environmental dimension significantly influences the success of technological innovation adoption. The presence of training programmes, device subsidies, and strategic partnerships from external stakeholders significantly boosts digital literacy and technological readiness of MSMEs (Joko et al., 2025; Rakhmawati et al., 2020; Rakhmawati et al., 2023; Huda, 2020). Such support strengthens MSMEs' adaptive capacity for sustainable digital transformation. This study refers to the TOE Framework by Tornatzky & Fleischer (1990), adapted to the MSME context by Aryanto et al., (2023), using a 5 point Likert scale, as shown in Table 1.

2.4 MSME Competitiveness

MSME competitiveness refers to the ability of business actors to create relative advantages over competitors in terms of products, markets, and cost efficiency. According to Porter (1985), as cited in Rahmawati et al., (2025), competitiveness can be enhanced through

innovation, operational efficiency, and market penetration. The use of digital technology enables MSMEs to broaden market access, speed up production processes, and tailor products to consumer preferences thereby holistically improving competitiveness (Sifwah et al., 2024; M. Huda et al., 2021; Nuraeni & Santia, 2024; Sulhan et al., 2024). This study is based on Porter's theory of competitive advantage, adapted by Mangginte et al., (2025) to the context of digitalisation, and uses a 5-point Likert scale, as shown in Table 1.

Table 1. Measures of Variables

Variable	Indicator	Statement Item	Source
Ease of Use	Perceived ease of learning	I can easily learn to use digital technology without expert help	Ramadan & Efnita, (2024)
	Simple navigation	The system has a clear and simple interface	
	Usage efficiency	The technology helps me complete tasks faster	
	Accessibility	I can access digital technology from any device	
	Minimal training required	I do not require special training to use this application	
Technology Fit	Feature alignment	The app features align with my business needs	Permana & Widihastarini, (2023)
	Fit with business processes	This technology integrates well with my business processes	
	Suitability for business scale	This system suits the scale of my micro/small business	
	Operational support	Technology helps me manage business operations more efficiently	
	Adaptive capability	This technology can be adjusted when business needs change	
External Support	Formal training	I have attended digital training provided by government or institutions	Aryanto et al., (2023)
	Access to business communities	I am part of a digital/MSME online community	
	Device/infrastructure support	I have received technological support from certain agencies	
	Supportive policies	I feel that local policies support MSME digital transformation	
	Technical assistance	I have received direct guidance in adopting digital technology	
MSME Competitiveness	Sales growth	I have experienced increased sales since adopting digital technology	Mangginte et al., (2025)
	Market expansion	My business now reaches customers beyond previous regions	
	Operational efficiency	I have reduced costs and production time through digitalisation	
	Product innovation	I can launch new products more quickly with the help of technology	
	Market responsiveness	I can respond more quickly to trends and customer demands digitally	

2.5 Integration of the TOE Framework in the Context of MSME Digitalisation

The Technology-Organization-Environment (TOE) framework is a comprehensive analytical model for explaining technology adoption in organisations. TOE highlights the importance of three main dimensions: technological readiness, organisational characteristics, and external environmental factors. The synergy between ease of use, the fit of systems with business

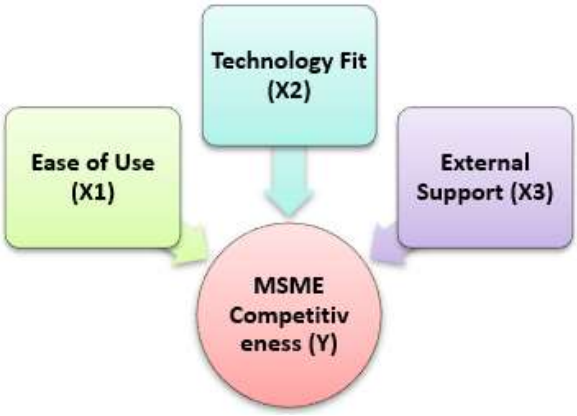
needs (Putri, 2025), and strong environmental support forms a solid foundation for MSME digital transformation that directly enhances competitiveness.

The hypotheses proposed in this study are:

H.1 *The ease of use of digital technology has a positive and significant effect on MSME competitiveness*.

H.2 *The fit between technology and business needs has a positive and significant effect on MSME competitiveness*.

H.3 *External support from government and related institutions has a positive and significant effect on MSME competitiveness*.



Source: Aryanto et al., (2023), Ramadan & Efnita, (2024), Permana & Widihastarini, (2023)

Figure 1. Research Model

3. Methods

This study adopts a quantitative approach with an evaluative survey design, aimed at measuring the effectiveness of digital technology implementation in enhancing the competitiveness of MSMEs in the creative industry sector. This approach was selected for its ability to illustrate the relationship between digital technology variables (including e-commerce adoption, digital marketing, app-based financial recording, and digital logistics) and indicators of competitiveness (such as sales volume, market reach, operational efficiency, and product innovation). The population of this study comprises all creative industry MSME actors in Tangerang City who have adopted digital technology for at least one year. A purposive sampling technique was used, with criteria including active MSMEs registered with the Department of Industry, Trade, Cooperatives, and MSMEs, and operating in creative subsectors such as fashion, culinary, crafts, or graphic design. A total of 128 MSMEs were selected as respondents to ensure statistical representation and validity, as shown in Table 2.

Table 2. Selection and Elimination of MSMEs Based on Digital Technology Adoption Criteria

No.	Selection Stage	Number of MSMEs	Description
1	Total creative industry MSMEs registered in Tangerang City (Department data, 2023)	8,000 MSMEs	Initial population including fashion, culinary, craft, and visual design subsectors

No.	Selection Stage	Number of MSMEs	Description
2	Active MSMEs operating for at least the past year	5,730 MSMEs	Eliminating inactive, seasonal, or newly established MSMEs (< 12 months)
3	MSMEs that have adopted digital technology in at least one aspect of business	3,380 MSMEs	Minimum use of digital tools in marketing, finance, or business communication
4	MSMEs meeting creative subsector criteria and officially recorded in government databases	1,040 MSMEs	Selected based on relevant subsector and legal registration or official data
5	MSMEs that have actively adopted digital technology for ≥ 1 year	431 MSMEs	According to inclusion criteria of the study
6	MSMEs willing to participate and passed administrative verification	128 MSMEs	Final number selected as sample using purposive sampling

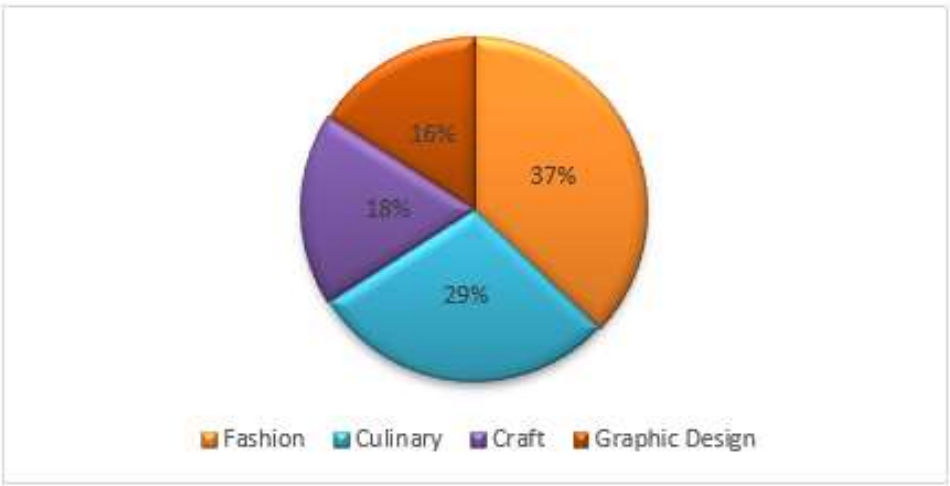
Source: Primary data processed 2025

The research instrument consisted of a closed-ended questionnaire using a five-point Likert scale, tested for validity and reliability through a preliminary trial. The analytical framework for this study refers to the Technology Organization Environment (TOE) Framework, considering technological variables (ease of use, suitability, and complexity), organisational factors (internal structure, resources, innovation culture), and environmental aspects (external support, policies, and market dynamics). Through this approach, the study aims to provide a comprehensive and contextual evaluation of the effectiveness of digital transformation in improving the competitiveness of creative industry MSMEs in an applicable and practical manner.

4. Results and Discussion

4.1 Respondent Characteristics

This study involved 128 creative-industry MSME owners in Tangerang City, representing various subsectors illustrated in Figure 2.



Source: Primary data processed 2025

Figure 2. Respondent Characteristics

These subsectors reflect diverse business ecosystems, each with unique technological needs and development strategies. For instance, fashion and graphic-design operators tend to prioritise digital innovation and creative expression, while culinary and craft enterprises

focus more on physical production and distribution. Hence, competitiveness enhancement strategies must be tailored to each subsector's particularities (Fatkhan & Chasanah, 2024).

Demographically, most respondents were aged 30–45, an age group associated with greater adaptability to digital platforms such as e-commerce and social media (Rahman, 2022). Educational attainment varied: 42% held upper-secondary qualifications and 38% had bachelor's degrees, with smaller proportions at lower or postgraduate levels. This diversity suggests a strong potential for digital literacy and readiness for tech-based innovation, given the role of formal education in developing cognitive abilities for managing digital enterprises (Rohmah et al., 2025). In terms of business structure, 79% operated as sole proprietorships, while 21% were formally registered entities (CV or PT), indicating higher formality and access to external resources, such as funding, training and networks. Over half of the enterprises had operated for more than three years, suggesting business stability and accumulated experience a key factor in digital readiness and strategic technology adoption (Nursanti et al., 2024).

4.2 Digital Technology Implementation in MSME Operations

The findings of this study indicate that the majority of MSME actors in the creative industry sector in Tangerang City have integrated digital technology into their business operations, although the level and scope of integration vary. Based on survey data from 128 respondents, it was found that 117 business actors (91%) have used social media platforms such as Instagram, WhatsApp Business, and Facebook as their primary channels for marketing products. This suggests that social media represents the most common form of digitalisation among MSMEs.

In addition to marketing, 95 respondents (74%) also utilise marketplace platforms such as Tokopedia, Shopee, and Bukalapak to expand their market reach. This shows that most MSMEs have begun to access e-commerce markets, although not all respondents have fully integrated their operations. On the other hand, the use of technology for financial management has also been widely adopted, with 88 MSMEs (69%) reporting the use of transaction recording applications such as BukuWarung, Qasir, or simple POS applications.

Technology-based Point of Sale (POS) systems were used by 64 respondents (50%), indicating that half of the MSMEs have automated their sales transaction processes. This shows growing attention to sales recording efficiency, especially among MSMEs with high daily transaction volumes. Additionally, 73 respondents (57%) reported using digital logistics services, such as GoSend, GrabExpress, or SiCepat, to support product distribution to consumers.

However, in terms of formal training, only 34 respondents (27%) stated that they had participated in digitalisation training provided by government institutions, private bodies, or business communities. This implies that the majority of MSME actors learn to use technology independently or through personal experience, rather than through structured guidance or formal training programmes. This results in varied levels of technological mastery and optimisation.

A total of 92 respondents (72%) stated that the implementation of digital technology has made it easier to manage their businesses, particularly in terms of time efficiency, ease of record-keeping, and communication reach with customers. This signals that although training remains limited, most business owners have experienced tangible benefits from digitalisation, at least in basic operational aspects. A more detailed distribution of

respondents' answers regarding the implementation of digital technology is presented in Table 3.

Table 3. Distribution of Digital Technology Implementation in MSME Operations

No.	Aspect of Digital Technology Implementation	Number of Respondents (n)	Percentage (%)
1	Utilising various digital platforms in business operations	117	91%
2	Using social media and marketplaces for marketing	117	91%
3	Using digital financial transaction recording applications	88	69%
4	Using Point of Sale (POS) systems / digital inventory management	64	50%
5	Participated in official digitalisation training by government/institutions	34	27%
6	Stated that technology facilitates overall business management	92	72%

Source: Primary data processed 2025

The data shows that a significant majority of MSMEs, namely 91%, have utilised various digital platforms in running their businesses. This includes marketing through social media and marketplaces, financial management using transaction-recording applications, and daily operations such as Point of Sale (POS) systems and inventory management. This adoption of digital technology is a positive indicator that MSMEs in the modern era are beginning to integrate technology as an essential part of their business activities, particularly in the creative industry sector, which heavily relies on innovation and process efficiency (Fatkhan & Chasanah, 2024). The use of digital platforms also opens up broader market opportunities, enabling MSME players to reach consumers beyond traditional geographic boundaries (Nazara et al., 2025).

However, despite the relatively high level of technological penetration, the majority of MSMEs have adopted it independently without formal guidance, with only 27% having participated in official training from the government or private institutions. This highlights a gap in human resource capacity and access to information related to digital technology (Rohmah et al., 2025). The lack of adequate training can hinder MSMEs from fully optimising the functions of technology (Bahasoan et al., 2025), limiting the potential efficiency and innovation that could otherwise be achieved. Formal training and mentoring are therefore essential to improve digital literacy and equip business actors with appropriate technological skills (Oktavia & Fahriani, 2025).

Nevertheless, a majority of MSME players 72% reported that digital technology has had a tangible positive impact on the ease of business management. The use of applications and digital systems has been proven to reduce production costs through more efficient management of raw materials and more measurable operational processes (Jalil et al., 2025). Additionally, technology helps save time in recording and managing transactions, allowing entrepreneurs to focus more on product development and marketing strategies. This time and cost efficiency becomes a crucial asset in enhancing the competitiveness of MSMEs amid increasingly fierce market competition.

The use of technology also allows MSMEs to obtain measurable business data in real time, thereby facilitating data-driven decision making. With digital systems, business owners can monitor stock, manage finances, and design more targeted and responsive marketing strategies based on market changes (Nazara et al., 2025). The measurability of business processes through digitalisation increases transparency and accountability while opening

opportunities for integration into a broader digital ecosystem such as logistics and digital financial services.

However, challenges that remain include limited access to training and uneven readiness of digital infrastructure across different regions. The government and various stakeholders need to strengthen digital literacy training programmes and ensure the availability of infrastructure that supports MSMEs in undertaking comprehensive digital transformation (Rauf et al., 2024). Therefore, MSMEs must not only use technology partially but also be able to innovate and grow sustainably in the highly dynamic digital economy era.

4.3 Evaluation of the Effectiveness of Digital Technology on Competitiveness

The effectiveness of digital technology implementation in MSMEs can be assessed through various indicators that reflect business performance comprehensively. Firstly, an increase in sales volume serves as a key measure of successful digitalisation. In the conducted survey, 78% of respondents reported an average sales increase of between 20% and 35% over the past year following the adoption of digital technology. This growth indicates that digitalisation is not merely a formality but genuinely contributes to business expansion. These findings align with previous research stating that optimal use of digital platforms can significantly boost sales potential and revenue for MSMEs (Shella et al., 2025).

Secondly, the expansion of market reach serves as another indicator of the positive impact of digitalisation. As many as 64% of MSME actors stated that they had successfully reached new customers beyond their local area, including national and even international markets. Marketing through social media and digital marketplaces enables MSMEs to transcend geographical boundaries that have traditionally limited micro and small enterprises. Digitalisation offers broader and more inclusive market access, particularly vital for the creative sector that depends heavily on global market exposure (Tohir et al., 2025). This enhances the position of MSMEs as competitive players within the digital economy.

The third indicator is operational efficiency gained through the use of digital technology. The implementation of digital cashier applications and stock management systems has proven to reduce operational costs by up to 15%. This efficiency results from the system's ability to automate transaction recording, manage inventory, and minimise manual errors that typically consume both time and resources. Business process digitalisation significantly reduces administrative burdens and increases productivity (Anjarwati et al., 2023). With improved operational efficiency, MSMEs can allocate more resources towards strategic business development.

In addition, accelerated product innovation is another crucial indicator. Around 69% of MSMEs reported that their product innovation cycle had shortened from an average of three months to just one and a half months following the adoption of digital technology. This is closely related to the ease of obtaining direct consumer feedback via digital platforms and the ability to analyse market trends online. With access to real-time data, MSMEs can quickly respond to market demands and adjust their products accordingly. Faster innovation contributes directly to business competitiveness and customer satisfaction.

The use of digital technology also enhances the ability of MSMEs to conduct continuous business monitoring and evaluation. The data generated from digital systems offers deep insights into consumer behaviour, sales performance, and cost efficiency. As a result, business decisions become more targeted and evidence-based (Sulistyawati et al., 2024). These analytical capabilities help MSME actors to identify new opportunities and anticipate risks early, ultimately strengthening business resilience amid market dynamics.

Nevertheless, it cannot be denied that the effectiveness of digital technology implementation is also significantly influenced by internal factors such as the digital skills of business owners and external support in terms of infrastructure and policy. Challenges such as limited internet access in certain areas and the lack of intensive training remain obstacles that must be addressed to ensure all MSMEs benefit from digitalisation equally. Therefore, intervention from the government and relevant stakeholders is crucial in providing inclusive access to technology and ongoing capacity-building programmes.

In conclusion, indicators such as increased sales, expanded market reach, operational efficiency, and accelerated product innovation demonstrate that the implementation of digital technology has a significant positive impact on MSMEs. Successful digital transformation not only improves business performance but also strengthens competitiveness and sustainability in the digital economy era. This affirms the importance of leveraging technology as a core strategy for the future development of MSMEs.

4.4 Validity and Reliability

The indicators for each variable are presented in Table 4.

Table 4. Indicator Table and Number of Items

Variable Code	Variable Name	Indicator	Number of Items
X_1	Ease of Use	X_1.1: The technology is easy to learn and use	1
		X_1.2: The system interface navigation is clear and simple	1
		X_1.3: The technology helps complete tasks more efficiently	1
		Total items for X_1	**3**
X_2	Technology Fit	X_2.1: The technology features match business needs	1
		X_2.2: The technology can be integrated with existing business processes	1
		X_2.3: The technology supports the achievement of business goals	1
		Total items for X_2	**3**
X_3	External Support	X_3.1: Training or mentoring is available from external parties	1
		X_3.2: There is policy support from the government or relevant institutions	1
		X_3.3: Access to digital business networks or communities	1
		Total items for X_3	**3**
Y	MSME Competitiveness	Y.1: Increase in sales volume	1
		Y.2: Expansion of market reach	1
		Y.3: Sustainable product innovation capability	1
		Y.4: Efficiency in business operations	1
		Total items for Y	**4**

Source: Primary data processed 2025

Table 5. Questionnaire Validity and Reliability

Variable	Number of Indicators	Correlation Value (r)	Cronbach's Alpha
Ease of Use (X_1)	3	0.42 – 0.67	0.82
Technology Fit (X_2)	3	0.45 – 0.71	0.85
External Support (X_3)	3	0.40 – 0.63	0.78
MSME Competitiveness (Y)	4	0.43 – 0.69	0.87

Source: Primary data processed 2025

Table 4-5 presents the results of the validity and reliability tests of the questionnaire instruments used in this study. The correlation values (r) for each indicator with its respective variable range from 0.40 to 0.71, all of which exceed the minimum threshold of 0.30 for item validity. This indicates that each question or indicator in the questionnaire is capable of accurately and consistently measuring the intended construct, making the data collected from respondents valid and representative of the research variables. With strong validity, subsequent statistical analyses can be conducted with confidence that the instrument does not contain weak or irrelevant indicators.

In addition to validity, the reliability of the questionnaire was tested using Cronbach's Alpha, with all variables showing values above 0.70, ranging from 0.78 to 0.87. These values indicate a high level of internal consistency, meaning that respondents provided stable and homogeneous responses to each question within the variable. Strong reliability supports the dependability of the resulting data, allowing it to be used for further analysis such as multiple linear regression. Overall, the results of the validity and reliability tests reinforce the quality of the research instrument and ensure that the findings are scientifically accountable.

4.5 Regression Assumption Testing

Table 6. Regression Assumption Testing

Test	Statistic	Description
Normality (Kolmogorov-Smirnov)	p = 0.128	Data are normally distributed
Multicollinearity (VIF)	1.9 – 2.8	No multicollinearity detected
Heteroscedasticity (Glejser)	p > 0.05	Homoscedasticity assumption is fulfilled

Source: Primary data processed 2025

Table 6 presents the results of the regression assumption tests, which are crucial to ensure that the data meet the basic assumptions required for multiple linear regression analysis. First, the normality test using the Kolmogorov-Smirnov method produced a p-value of 0.128, which is greater than the significance threshold of 0.05. This indicates that the data used in this study are normally distributed. Normal distribution is a key prerequisite to ensure that regression results are reliable and that statistical interpretations are valid, as many statistical methods rely on this assumption.

Next, the multicollinearity test using the Variance Inflation Factor (VIF) shows that the values among independent variables range from 1.9 to 2.8. VIF values below 10 indicate that there is no serious multicollinearity issue among the independent variables. Multicollinearity arises when independent variables are highly correlated with each other, which can distort the interpretation of regression coefficients. With low VIF values, the regression model is considered reliable for isolating the individual effects of each variable on the dependent variable.

Additionally, the Glejser test was used to detect the presence of heteroscedasticity an issue where the variance of residuals is not constant, potentially affecting the validity of the regression model. The Glejser test results with a p-value above 0.05 suggest that no heteroscedasticity was detected, indicating that the assumption of homoscedasticity is fulfilled. This means that the residual variance remains consistent across all levels of the predictors, and the regression model provides efficient and unbiased parameter estimates.
Overall, the results of the regression assumption tests in Table 6 reinforce the validity and reliability of the analytical model. The fulfilment of the normality, absence of multicollinearity, and homoscedasticity assumptions form a strong foundation, ensuring that the multiple linear regression test yields valid and dependable results. With all these assumptions met, the analysis of the influence of ease of technology use, technology fit, and external support on MSME competitiveness can be conducted with a high degree of confidence.

4.6 Multiple Linear Regression Analysis

Table 7. Results of Multiple Linear Regression

Independent Variable	(β)	t-Statistic	p-Value	VIF	Coefficient of Determination (R^2)	Adjusted R^2	F-Statistic	F Sig.
Ease of Use (X_1)	0.38	3.87	<0.01	2.1	0.684	0.672	45.29	<0.01
Technology Fit (X_2)	0.51	5.12	<0.01	2.8				
External Support (X_3)	0.27	2.58	<0.05	1.9				

Source: Primary data processed 2025

Table 7 shows the results of the multiple linear regression analysis measuring the influence of three independent variables on the competitiveness of MSMEs. These variables are ease of technology use (X_1), the suitability of technology with business needs (X_2), and external support such as training or incentives (X_3). The beta coefficients (β) of each variable represent the strength and direction of their influence on MSME competitiveness (dependent variable Y). All variables have statistically significant p-values, indicating that the observed effects are not due to chance and are valid for decision-making purposes.

Technology fit (X_2) has the strongest influence on MSME competitiveness, with a β value of 0.51 and a p-value of less than 0.01. This demonstrates that selecting technology that aligns with the specific needs of the business is crucial for enhancing competitiveness. Well-aligned technology enables MSMEs to optimise its function within business processes, creating a tangible competitive advantage. Contextual adaptation of technology to business characteristics improves the effectiveness of digitalisation (Rosmalia et al., 2025). The variable ease of use (X_1) also has a positive and significant effect on competitiveness, with a beta coefficient of 0.38 and a p-value below 0.01. Ease of use means that the technology adopted by MSMEs is not only relevant but also simple to operate without requiring highly specialised human resources. User-friendly technology accelerates adoption and reduces learning barriers, allowing business owners to focus on developing their enterprise and improving product or service quality (Swasono et al., 2023).

External support (X_3), which includes training, technical assistance, and incentives, also contributes significantly with a β value of 0.27 and a p-value of less than 0.05. Although its influence is smaller than the other two variables, this support remains important as it provides MSME actors with the knowledge and motivation to maximise technology use.

External support often serves as a bridge for MSMEs lacking internal resources to adapt to technological changes (Saputri & Pratama, 2025).

The coefficient of determination (R^2) of 0.684 indicates that the regression model explains 68.4% of the variation in MSME competitiveness. This is a relatively high value in social and business research, signifying that the three independent variables jointly contribute significantly to predicting MSME competitiveness. However, 31.6% of the variance remains influenced by other factors not included in the model, such as market characteristics, capital, or other external environmental factors. The adjusted R^2 of 0.672 reinforces that the model is a good fit, having accounted for the number of variables and the sample size. The F-statistic of 45.29, with a significance level below 0.01, confirms that the regression model is overall statistically significant and suitable for analysing the variable relationships. This means the analysis not only reveals significant individual effects but also demonstrates that the three variables simultaneously have a real impact on MSME competitiveness.

The Variance Inflation Factor (VIF) values for each independent variable were also observed to ensure no multicollinearity issues that could interfere with the interpretation of beta coefficients. The VIF values for ease of use, technology fit, and external support are 2.1, 2.8, and 1.9 respectively all well below the common threshold of 10. This indicates that the variables are statistically independent and not excessively interrelated, making the regression results reliable. Based on the results of the multiple linear regression analysis using SPSS software, the following regression equation was obtained:

$$\mathbf{Y = 0.38X_1 + 0.51X_2 + 0.27X_3 + \varepsilon}$$

4.7 The Influence of Ease Of Use on MSMES Competitiveness

The influence of the ease of digital technology use on the competitiveness of MSMEs shows a positive significance within the context of the creative industry in Tangerang City. This finding confirms that technology designed with a simple interface and easy-to-understand operational instructions will be adopted more quickly by MSME actors, particularly those with limited digital literacy. This ease includes accessibility across various devices, uncomplicated system navigation, and minimal training requirements. MSME players tend to avoid complex technologies due to limited time and manpower. Therefore, the provision of user-friendly technology not only accelerates the digitalisation process (Prihatni et al., 2025), but also forms a crucial foundation for MSMEs to enhance work efficiency and competitiveness (Harahap et al., 2025).

4.8 The influence of Technology Fit on MSMES competitiveness

Technology fit has the most dominant influence on improving MSME competitiveness in this study. This result aligns with real-world conditions, where business owners are more interested in technologies that directly address their specific needs, such as inventory management systems, financial recording tools, or customer data-based marketing. This suitability includes the alignment of technological features with product characteristics, business processes, and the scale of operations. MSMEs that adopt technologies aligned with their business models experience productivity increases (Octiva et al., 2024), up to twice as much as those who adopt technology merely as a trend. This indicates that technology

selection should be based on actual business needs rather than symbolic adoption (Rosmalia et al., 2025).

4.9 The influence of External Support on MSMES Competitiveness

External support from the government, educational institutions, and business communities also contributes to enhancing MSME competitiveness, although its effect is not as strong as the other two variables. Such support may include training, technical assistance, access to subsidies for digital devices, and incentives for using specific platforms. Unfortunately, this study found that only around 27% of respondents had received formal digitalisation training. This low level of participation shows that not all MSME actors have equal access to such support. Continuous technical assistance plays an essential role in encouraging MSMEs not only to use technology in a limited way (Franky et al., 2025), but also to optimise its functions across various aspects of the business (Agit et al., 2024).

The fact that external support remains partial also indicates a digital literacy gap between MSME actors located in city centres and those operating in suburban areas. The lack of systematic training has resulted in many business owners still facing difficulties in operating specific applications, understanding digital financial data, or formulating targeted online marketing strategies. MSME actors who have attended intensive training have been shown to reduce operational costs by up to 30% and significantly expand their market share within six months after the training (Mahmud et al., 2024). Thus, the role of external actors becomes a catalyst that cannot be overlooked in supporting the technological readiness of MSME actors in the digital economy era.

Thus, strengthening MSME competitiveness cannot be separated from a systemic approach to digital technology adoption. Local governments and stakeholders must play a more active role in providing training infrastructure, developing platforms tailored to the needs of the local creative sector, and creating incentives to encourage strategic technology use. Moreover, MSME actors are also required to be more adaptive in evaluating and selecting technologies that genuinely add value to their operations. These findings form a basis for data-driven policy (evidence-based policy) formulation aimed at fostering inclusive and sustainable growth of digital MSMEs.

4.10 The Collective Influence of Ease, Fit, and Supporton MSMES Competitiveness

The combined influence of the three variables ease of use, suitability, and external support demonstrates a collective contribution to improving MSME competitiveness. In practice, these variables are interdependent: ease of use serves as the gateway to technology adoption, suitability determines its effectiveness, and external support ensures sustainability and optimisation. This is reflected in the data showing that most MSME actors who perceived ease and suitability also stated that technology had simplified their business management. The success of MSME digitalisation is not driven by a single factor but by an ecosystem of mutual support between business actors, appropriate technology, and supporting institutions (Evangeulista et al., 2023).

Overall, the regression results underscore the importance not only of adopting digital technology but also of selecting technologies relevant to business needs and ensuring easy access for MSME actors. In addition, adequate external support from government or private institutions is an equally vital component to drive sustainable digital transformation. This study offers a strong empirical foundation for developing policies and programmes to enhance MSME competitiveness through contextual and inclusive digitalisation.

4.11 The TOE Framework: A Conceptual Foundation

The TOE (Technology Organisation Environment) framework is one of the most commonly used conceptual models for analysing technology adoption across various organisational contexts, including MSMEs. The technological dimension focuses on the characteristics of the digital technologies adopted, such as accessibility, compatibility, and ease of integration. Accessibility refers to how easily MSMEs can obtain and use the technology, in terms of both cost and infrastructure availability. Compatibility refers to how well the technology matches the needs and business processes of MSMEs, thus accelerating digitalisation. Ease of system integration is crucial to ensure that the adopted technology can work synergistically with existing systems without causing significant operational disruption (Mareta & Yohannis, 2025).

The organisational dimension within the TOE framework emphasises the internal characteristics of MSMEs that affect the effectiveness of digital technology adoption. Factors such as business scale significantly determine the availability of resources, with small-scale MSMEs often facing capital and expertise limitations that hinder digitalisation (Thong, 1999 as cited in Al Jumadi et al., (2022). Managerial flexibility is also key to successful technology adaptation, as more agile organisations can make quicker and more responsive decisions in the face of technological changes. Furthermore, human resource readiness is vital, since technical capabilities and proactive attitudes among staff are essential assets for maximising the benefits of digital technology (Zahra et al., 2024).

The environmental aspect of the TOE framework relates to external factors that significantly influence or hinder digital technology adoption among MSMEs. The availability of government support such as training, incentives, and digitalisation-friendly policies is a critical element. Market dynamics also act as a driver, where intense competition forces MSMEs to innovate and enhance operational efficiency through digitalisation. Business communities and social networks contribute by enabling knowledge transfer, sharing experiences, and promoting collaboration that accelerates technology adoption (Kamal, 2025).

The synergy of the three TOE dimensions forms a robust foundation for successful MSME digital transformation. Even if effective technology is available, without adequate organisational readiness and environmental support, digital technology adoption will not be successful. Therefore, the complex interaction between technology, organisation, and environment must be managed integratively to achieve competitive advantage through MSME digitalisation. Development strategies for MSMEs must be holistic, addressing all three aspects simultaneously.

In the context of MSME competitiveness, the TOE framework not only offers theoretical insight but also provides practical guidance for designing interventions and policies that support digitalisation. For example, government-run human resource training programmes must be aligned with the technologies in use and the organisational characteristics of MSMEs. Additionally, the development of a digital ecosystem involving business communities can strengthen networks and collaboration, which are crucial for sustainable digital transformation. Consequently, effective implementation of digital technology based on the TOE framework directly contributes to enhancing MSME competitiveness in the face of global market challenges (Kusuma & Fahamsyah, 2023; Theorupun et al., 2025).

5. Conclusion

The findings of this study indicate that the optimal utilisation of digital technology has a significant impact on enhancing the competitiveness of MSMEs in the creative industry sector within Tangerang City. Through an analytical approach based on the Technology Organization Environment (TOE) framework, it was identified that elements such as ease of use, the alignment of technology with business needs, and the presence of external support all contribute positively to MSME performance. Although the adoption of digital technology shows an upward trend, several challenges remain, including limited access to formal training, uneven digital infrastructure, and low levels of digital literacy among MSME actors. This condition suggests that the transition towards a competitive digital ecosystem still requires strategic and systematic intervention.

Therefore, to improve the success of MSME digitalisation, it is recommended that the government and relevant stakeholders strengthen training and mentoring programmes that are contextual and grounded in field-based needs. The provision of equitable and adequate digital infrastructure is also a fundamental prerequisite to ensure inclusive access to technology. Furthermore, building synergies between MSMEs, educational institutions, and the private sector is essential to create a collaborative ecosystem that supports knowledge exchange, fosters innovation, and expands access to advanced technologies. Consequently, the formulation of inclusive and participatory public policies is urgently needed so that all MSME actors, including those in underdeveloped regions, have equal opportunities to benefit from digital transformation for the sustainability of their businesses.

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