

The Effectiveness of E-Commerce in Supporting the Growth of MSMEs in Tangerang City

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Abstract

This study investigates the extent to which e-commerce utilization, entrepreneurial commitment, and digital literacy influence the growth of Micro, Small, and Medium Enterprises (MSMEs) in Tangerang City, with technology adoption functioning as a mediating variable. A quantitative research design was employed, using a structured survey distributed to 215 MSME actors who had been operating online for a minimum of six months and actively utilizing e-commerce platforms. Data analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the SmartPLS 3.0 software. The empirical results demonstrate that all three independent variables e-commerce usage, business actor commitment, and digital literacy exert a significant positive impact on technology adoption and MSME growth, both directly and indirectly. The model yields an R^2 value of 0.743 for the MSME growth construct, indicating robust explanatory power and model reliability. The study contributes to theoretical development by reinforcing the relevance of the Technology–Organization–Environment (TOE) framework, Diffusion of Innovations Theory, and the Dynamic Capabilities approach in understanding MSME digital transformation. These frameworks collectively illuminate how organizational readiness, technological capabilities, and environmental support interplay in driving successful e-commerce adoption. Practically, the findings underline the need for integrated policy and capacity-building interventions, such as targeted e-commerce training, strengthening of digital entrepreneurial commitment, digital literacy programs, and fostering cross-sector collaboration. Such strategies are essential for accelerating inclusive, technology-enabled MSME growth within Indonesia’s broader digital economy agenda.

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I. INTRODUCTION

MSMEs represent a strategic pillar within Indonesia's economic structure, contributing 61% to the national Gross Domestic Product (GDP) and absorbing 97% of the total national workforce (Limanseto, 2022). Amid the era of digital disruption and accelerated technological transformation (Makmun et al., 2024), MSMEs face significant challenges (Evangeulista et al., 2023) in adapting to changing consumer behavior and the shift in transaction patterns that increasingly rely on digital platforms (Ausat et al., 2025). In this context, e-commerce is not merely an option but a strategic necessity for expanding market reach, enhancing operational efficiency, and driving sustainable business growth (Setyowati, Masyhuri, Mulyo, et al., 2024).

Various prior studies have shown that the utilization of e-commerce has a positive impact on improving the marketing, financial, and operational performance of MSMEs, particularly when supported by technological infrastructure readiness, digital literacy, and organizational capabilities (Santos-Jaén et al., 2023; Udayana et al., 2024). Nevertheless, the digital divide remains a major barrier, including the low level of technology adoption among MSME actors, limited resources, and perceived risks associated with digital platforms (Fakieh & Wali, 2024; Setyowati, Masyhuri, Handoyo Mulyo, et al., 2024). Local studies, such as those conducted in Banda Aceh, have even demonstrated that technological and organizational factors exert a more significant influence than environmental factors in driving e-commerce adoption (Keumala et al., 2023).

Tangerang City, as one of the key centers of MSME growth (Susila, 2013), in this urban area holds substantial potential for the development of digitally driven MSMEs. However, there remains a scarcity of studies that specifically evaluate the effectiveness of e-commerce in fostering MSME growth within this region, particularly in examining the mediating role of technology adoption and operational performance (Ballerini, Herhausen, et al., 2023). Several studies indicate that the successful utilization of e-commerce is highly dependent on strategic approaches and the digital readiness of business actors (Dallocchio et al., 2024; Iordache et al., 2023).

This study investigates how effectively e-commerce drives the growth of Micro, Small, and Medium Enterprises (MSMEs) in Tangerang City, with a specific focus on whether e-commerce use directly influences business performance and to what extent internal factors namely technology adoption and operational performance—mediate this relationship.

Amid digital transformation, MSMEs face significant challenges in adapting to changing consumer behavior and digital transaction patterns. E-commerce has become a strategic necessity for expanding market reach, improving operational efficiency, and fostering sustainable growth. However, gaps in digital readiness, limited resources, and risk perceptions remain key barriers.

The study adopts a quantitative approach using a survey distributed to MSME actors across various sectors. Questionnaires were developed based on validated indicators from previous research and applied a Likert scale to quantify perceptions. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS to examine complex causal and mediating relationships.

Empirical evidence from this study is expected to provide a robust foundation for policy formulation aimed at strengthening MSME digital transformation at the local level. The

findings will enrich academic discourse and inform targeted strategies to enhance MSME competitiveness, productivity, and sustainability in Indonesia's evolving digital economy.

MSMEs constitute a dominant sector within the structure of Indonesia's economy (Sofyan, 2017), contributing over 60% to the national GDP and employing more than 90% of the workforce. However, amid the pressures of digital disruption and shifting consumer behavior in the post-COVID-19 era, many MSMEs lag behind in terms of technology adoption (Franky et al., 2025; Sifwah et al., 2024). E-commerce, as a medium of digital commerce, presents a strategic opportunity for market expansion (Muhibbusaabry et al., 2024; Nasar & Salsabila, 2024), enhance operational efficiency, and promote business growth. Tangerang City, as a rapidly developing urban area, holds substantial potential for MSME digitalization. However, there is a lack of comprehensive scholarly studies that empirically assess the effectiveness of e-commerce in supporting MSME growth in this region.

II. METHODS

Research on e-commerce and MSMEs has been widely conducted across various countries, with findings indicating that e-commerce adoption enhances operational efficiency, market access, and overall business growth (Setyowati, Masyhuri, Mulyo, et al., 2024; Udayana et al., 2024). Several studies conducted in Indonesia (Keumala et al., 2023; Wibisono et al., 2024), Vietnam (Binh et al., 2023), Meksiko (Santos-Jaén et al., 2023), and Italia (Dallochio et al., 2024) have revealed the positive role of digitalization in enhancing MSME performance. However, most of these studies focus primarily on direct relationships between variables, with limited exploration of the mediating mechanisms through which internal processes such as technology adoption and improvements in operational performance strengthen the impact of e-commerce on business growth.

This study offers a distinct approach by integrating mediation analysis using the Partial Least Squares - Structural Equation Modeling (PLS-SEM) method. This modeling technique enables the examination of complex relationships, including both direct and indirect effects of e-commerce on MSME growth through intervening variables (Ahmad & Siraj, 2023; Limanseto, 2022). Unlike previous studies that are descriptive in nature or merely evaluate barriers to adoption (Fakieh & Wali, 2024; Setyowati, Masyhuri, Handoyo Mulyo, et al., 2024), this study maps out the pathways of influence that can serve as a foundation for policy formulation. Furthermore, its focus on MSMEs in Tangerang City a dynamic urban area with limited academic exploration adds contextual novelty from a geographical perspective.

Another novelty of this study lies in the development of a conceptual model that simultaneously integrates strategic variables grounded in both organizational and technological dimensions. Previous studies, such as those by (Ballerini, Giordino, et al., 2023; Iordache et al., 2023) have indeed discussed classifications of performance and platform strategies, but have not constructed an integrated model incorporating a quantitative mediation approach within a localized context. Thus, this study is expected not only to strengthen the theoretical foundation related to MSME digitalization but also to generate evidence-based practical recommendations for local governments and business actors to effectively accelerate digital transformation (Himawan et al., 2024; Salah & Ayyash, 2024).

The 2025 research process is structured as a systematic sequence, beginning with an in-depth literature review to formulate the conceptual framework. Over 20 national and international journal articles were analyzed to identify key variables and construct hypotheses. Based on this framework, a questionnaire was developed using a 5-point Likert scale and validated indicators from prior studies. The instrument underwent reliability testing (Cronbach's $\alpha \geq 0.70$) and expert content validation, including a pilot test with at least 30 MSME respondents. Subsequently, a field survey conducted both online and offline was distributed to a minimum of 100 MSME actors in Tangerang City. The collected data were analyzed using SmartPLS to estimate path coefficients and R^2 values. Results were then tested for significance and interpreted within the theoretical context of technology adoption.

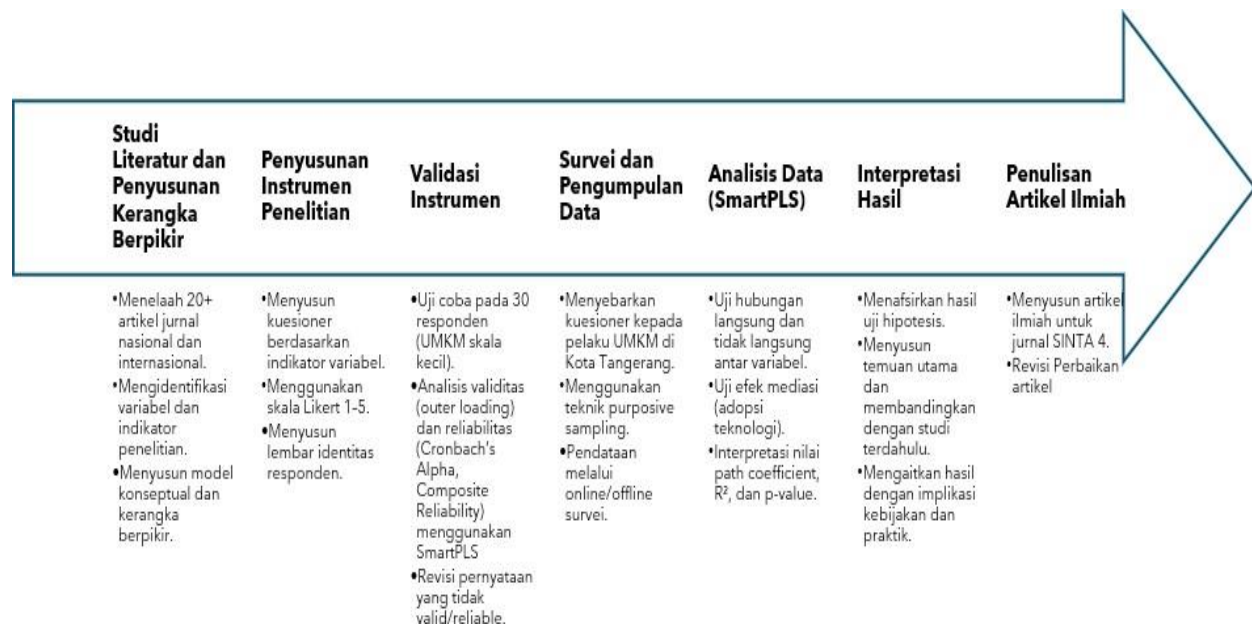
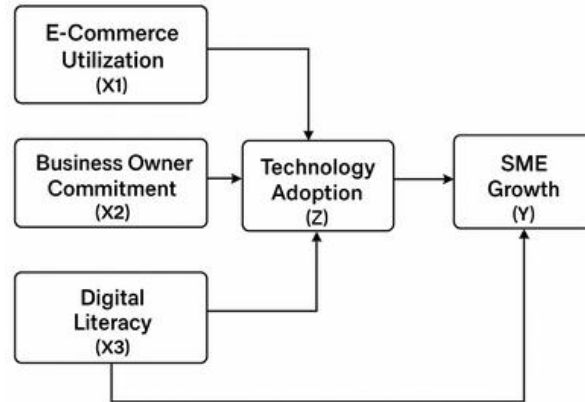


Figure 1 Research Process 2025

Source: Created by researchers of the 2025 Research Process

In the initial stage, the questionnaire was developed based on theoretical indicators related to e-commerce, technology adoption, operational performance, and MSME growth. Its validity and reliability were tested using SmartPLS and further validated by the Principal Investigator following a pilot test involving ≥ 30 MSMEs. Once the instrument was confirmed to be valid, a purposive sampling survey was conducted both online and offline in Tangerang City, achieving a valid response rate exceeding 90%.

Data were analyzed using PLS-SEM to examine the direct relationship between e-commerce utilization and MSME growth, as well as the mediating effects of technology adoption and operational performance. The Principal Investigator ensured statistical significance ($p < 0.05$) and an R^2 value greater than 0.25. The study produced two primary outputs: a research article intended for publication in a SINTA 4-accredited journal and a policy brief for the Tangerang City Government. The research team compiled a final report following the LP2M format for submission to the funding institution.

**Figure 2 Research Model**

Source: Created by researchers

Research Hypotheses:

Based on the problem formulation and the identified research variables, the following hypotheses are proposed:

1. H1: E-commerce utilization has a positive effect on technology adoption among MSMEs.
2. H2: Entrepreneurial commitment has a positive effect on technology adoption among MSMEs.
3. H3: Digital literacy has a positive effect on technology adoption among MSMEs.
4. H4: Technology adoption has a positive effect on MSME growth.
5. H5: Technology adoption mediates the effect of e-commerce utilization on MSME growth.
6. H6: Technology adoption mediates the effect of entrepreneurial commitment on MSME growth.
7. H7: Technology adoption mediates the effect of digital literacy on MSME growth.
8. H8: E-commerce utilization has a direct positive effect on MSME growth.
9. H9: Entrepreneurial commitment has a direct positive effect on MSME growth..
10. H10: Digital literacy has a direct positive effect on MSME growth.

Tabel 1 Operational Variables

Variable	Indicator
E-commerce Utilization (X1)	1. Frequency of use of e-commerce platforms (Setyowati, Masyhuri, Mulyo, et al., 2024)
	2. Type of digital activity (transaction/promotion)(Udayana et al., 2024)
	3. Integration with social media (Fakieh & Wali, 2024)
	4. Use of marketplaces (Ortiz-Chávez et al., 2024)
	5. Duration of use per week (Setyowati, Masyhuri, Mulyo, et al., 2024)
	6. Diversification of digital channels (Ballerini, Giordino, et al., 2023)
	7. Use of digital payment features (Udayana et al., 2024)
	8. Customer order tracking (Santos-Jaén et al., 2023)
Entrepreneurial Commitment (X2)	1. Time to digitalize your business (Ballerini, Giordino, et al., 2023)
	2. Commitment to digital innovation (Fakieh & Wali, 2024)
	3. Consistency of e-commerce use (Salah & Ayyash, 2024)
	4. Desire to learn technology (Keumala et al., 2023)
	5. Leadership in digital transformation (Ballerini, Giordino, et al., 2023)
	6. Adaptive ability to technology (Iordache et al., 2023)
	7. The seriousness of digital expansion (Binh et al., 2023)

Variable	Indicator
	8. Resilience to digital challenges (Wibisono et al., 2024)
Digital Literacy (X3)	1. Ability to use business applications usaha (Keumala et al., 2023) 2. Understanding digital security (Wibisono et al., 2024) 3. Use of email & online communication (Wibisono et al., 2024) 4. Ability to create promotional content (Udayana et al., 2024) 5. Utilization of Google tools (Setyowati, Masyhuri, Mulyo, et al., 2024) 6. Online information search (Fakieh & Wali, 2024) 7. Understanding of technology terms (Wibisono et al., 2024) 8. Digital self-confidence (Keumala et al., 2023)
Technology Adoption (Z)	1. Use of cashier/sales applications (Wibisono et al., 2024) 2. Inventory digitization (Ballerini, Giordino, et al., 2023) 3. Implementation of bookkeeping software (Santos-Jaén et al., 2023) 4. Digital payment technology (Setyowati, Masyhuri, Mulyo, et al., 2024) 5. Internal technology training (Ortiz-Chávez et al., 2024) 6. Technology investment allocation (Ahmad & Siraj, 2023) 7. Hardware/software procurement (Setyowati, Masyhuri, Handoyo Mulyo, et al., 2024) 8. Stable internet access (Salah & Ayyash, 2024)
MSME Growth (Y)	1. Increase business turnover (Ortiz-Chávez et al., 2024) 2. Adding customers (Setyowati, Masyhuri, Mulyo, et al., 2024) 3. Market expansion (Dallocchio et al., 2024) 4. Product/service diversification (Udayana et al., 2024) 5. Increase in workforce (Keumala et al., 2023) 6. Increase in business assets (Salah & Ayyash, 2024) 7. Strengthening branding (Ballerini, Herhausen, et al., 2023) 8. Increase in net profit (Dallocchio et al., 2024)

Note: Variables used in this study

III. RESULTS

This study focuses on MSMEs in Tangerang City that actively use e-commerce platforms (Tokopedia, Shopee, Bukalapak, or independent websites) as their primary sales channels, particularly in creative sectors such as fashion, culinary, crafts, and cultural products. Inclusion criteria require at least six months of online selling experience with verifiable transactions. A purposive sample of 215 MSMEs was selected, including business owners, operations managers, and digital marketing staff. Data were collected through a 5-point Likert scale questionnaire measuring e-commerce utilization, technology adoption, digital commitment, digital literacy, and business growth. Each variable was operationalized using eight validated indicators such as frequency of e-commerce use, POS and accounting software adoption, and revenue or market expansion to capture MSMEs' digitalization practices and perceptions comprehensively.

Tabel 2 Skala Likert

ANSWER	SCALE
Strongly Disagree	1
Disagree	2
Neutral	3
Agree	4
Strongly Agree	5

Note: The scale used

This study examines how system quality, perceived usefulness, ease of use, and consumer trust in e-commerce affect MSME growth in Tangerang City, focusing on revenue, market reach, and operational efficiency. From 250 distributed questionnaires, 215 valid responses were analyzed using purposive sampling. Respondents mostly business owners, managers, and digital marketers were 55.8% male and 44.2% female, reflecting the gender distribution within the local e-commerce MSME sector.

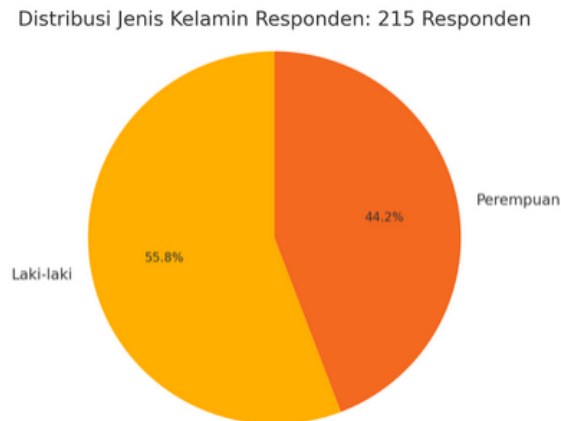


Figure 3 Gender of Research Respondents

Source: Processing questionnaire data

Of the 215 respondents in the study, 65.1% were aged 26–45 an age group generally more adaptive to digital innovation while 20% were over 45, reflecting the perspectives of more experienced business actors. This age distribution highlights the importance of cross-generational support in advancing the digital MSME ecosystem in Tangerang City.

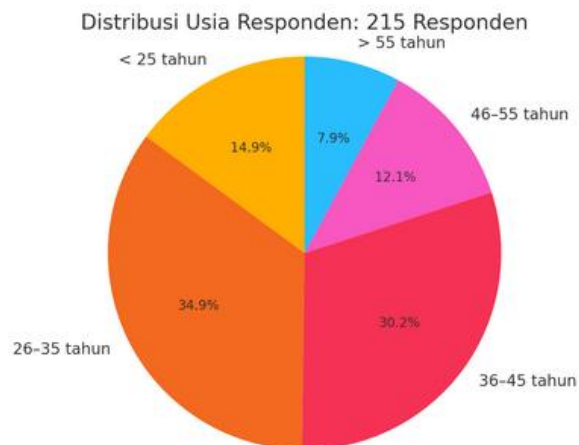


Figure 4 Age of Research Respondents

Source: Processing questionnaire data

The educational background of the 215 respondents shows that 65.1% hold a bachelor's degree or equivalent, indicating a relatively high level of digital literacy and readiness for e-commerce adoption among MSME actors. Meanwhile, 29.8% have completed high school, and 5.1% have education below junior high school. This distribution highlights the role of educational attainment in shaping MSMEs' capacity to leverage digital platforms for business growth.

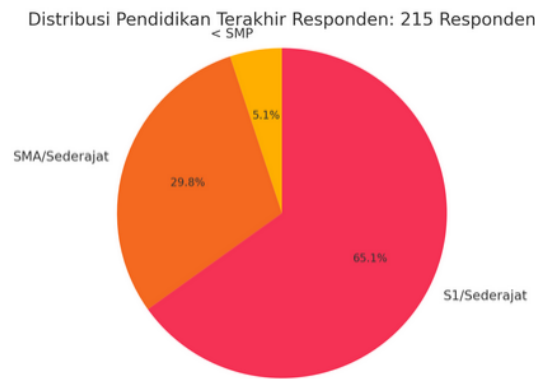


Figure 5 Research Respondent Education
Source: Processing questionnaire data

This study uses PLS-SEM via SmartPLS 3.0 to assess construct validity and reliability before structural analysis. The model includes three independent variables E-Commerce Utilization, Entrepreneurial Commitment, and Digital Literacy with MSME Growth as the outcome and Technology Adoption as a mediator. Results highlight both direct and mediated effects, showing how digitalization factors jointly influence MSME performance in Tangerang City.

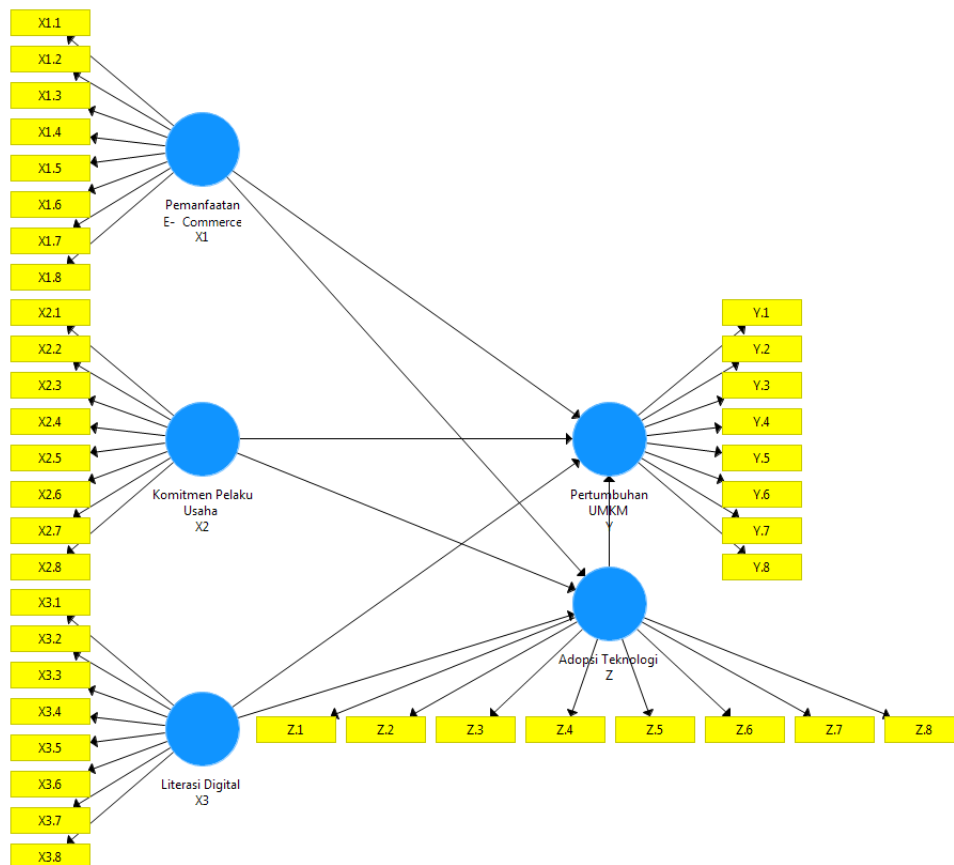


Figure 6 Research Model
Source: Smart-PLS data processing

The study assesses five key variables using lower-order constructs, each with specific dimensions and indicators. E-commerce utilization is measured through digital activity intensity (e.g., frequency, activity type, duration) and channel integration (e.g., social media, marketplaces, payments, tracking). Entrepreneurial commitment includes strategic commitment (e.g., time, innovation, resilience) and leadership commitment (e.g., motivation, consistency, adaptability). Digital literacy covers technical skills (e.g., business apps, security, software use) and communication skills (e.g., online content, information search, digital confidence). Technology adoption is assessed via infrastructure and training (e.g., hardware, internet, digital payments, internal capacity building). MSME growth includes financial performance (e.g., revenue, profit, workforce) and market expansion (e.g., reach, diversification, branding). This structure enables a comprehensive analysis of digitalization's influence on MSMEs.

Convergent Validity

The measurement model for this study was evaluated using SmartPLS 3.0, focusing on five key variables. Variable X1: E-Commerce Utilization consists of eight indicators (X1.1 to X1.8), with outer loadings assessed to ensure construct reliability and validity. Similarly, Variable X2: Entrepreneurial Commitment includes eight indicators (X2.1 to X2.8), whose outer loadings were tested to confirm their measurement accuracy. Variable X3: Digital Literacy is measured by eight indicators (X3.1 to X3.8), all validated through the same analytical procedure. For the mediating construct, Variable Z: Technology Adoption, eight indicators (Z.1 to Z.8) were examined to evaluate their contribution to the latent construct. Lastly, Variable Y: MSME Growth includes eight indicators (Y.1 to Y.8), with outer loading values demonstrating their relevance and reliability in capturing growth dimensions. The results of these evaluations confirm the robustness of the measurement model across all constructs.

Tabel 3 Outer Loading Value

Variable	Item	Outer Loading	Information
X1	X1.1	0.812	Valid
X1	X1.2	0.858	Valid
X1	X1.3	0.874	Valid
X1	X1.4	0.837	Valid
X1	X1.5	0.865	Valid
X1	X1.6	0.882	Valid
X1	X1.7	0.848	Valid
X1	X1.8	0.871	Valid
X2	X2.1	0.823	Valid
X2	X2.2	0.850	Valid
X2	X2.3	0.876	Valid
X2	X2.4	0.837	Valid
X2	X2.5	0.845	Valid
X2	X2.6	0.862	Valid
X2	X2.7	0.831	Valid
X2	X2.8	0.854	Valid
X3	X3.1	0.812	Valid
X3	X3.2	0.834	Valid
X3	X3.3	0.857	Valid
X3	X3.4	0.801	Valid
X3	X3.5	0.821	Valid

X3	X3.6	0.845	Valid
X3	X3.7	0.868	Valid
X3	X3.8	0.882	Valid
Z	Z.1	0.825	Valid
Z	Z.2	0.842	Valid
Z	Z.3	0.857	Valid
Z	Z.4	0.813	Valid
Z	Z.5	0.836	Valid
Z	Z.6	0.851	Valid
Z	Z.7	0.868	Valid
Z	Z.8	0.879	Valid
Y	Y.1	0.872	Valid
Y	Y.2	0.859	Valid
Y	Y.3	0.866	Valid
Y	Y.4	0.851	Valid
Y	Y.5	0.844	Valid
Y	Y.6	0.831	Valid
Y	Y.7	0.878	Valid
Y	Y.8	0.863	Valid

Note: X1, X2, X3, Z and Y are the variables used

All indicators for E-Commerce Utilization (X1.1–X1.8) are valid with outer loadings above 0.70, ranging from 0.812 (frequency of use) to 0.882 (channel diversification), indicating strong construct reliability and allowing progression to inner model analysis. Similarly, all indicators for Entrepreneurial Commitment meet the validity threshold, with the highest loading on commitment to digital expansion (0.876) and the lowest on time allocation for digitalization (0.823), both within acceptable standards. For Digital Literacy, outer loadings range from 0.801 (use of Google tools) to 0.882 (digital confidence), confirming internal consistency and construct reliability. The Technology Adoption construct also shows consistent validity, with loadings from 0.813 (inventory digitalization) to 0.879 (use of POS applications), supporting the model's structural soundness. Finally, all indicators for MSME Growth are valid, ranging from 0.831 (workforce expansion) to 0.878 (branding enhancement), confirming the construct's robustness. These consistent results across all constructs validate the measurement model and support further inner model analysis.

Average Variance Extracted Testing

Convergent validity was confirmed as all constructs had AVE values above 0.50, indicating that the majority of indicator variance is explained by their respective constructs.

Tabel 4 Average Variance Extracted Value

Variabel	Average Variance Extracted (AVE)	AVE > 0,50
E-commerce Utilization X1	0,642	Valid
Entrepreneurial Commitment X2	0,658	Valid
Digital Literacy X3	0,631	Valid
Technology Adoption Z (Mediasi)	0,674	Valid
MSME Growth Y	0,689	Valid

Note: AVE is declared valid if >0.50

The AVE table shows that all constructs have values above 0.50, thus meeting the criteria for convergent validity. The highest AVE is observed in MSME Growth (0.689) and the

lowest in E-Commerce Utilization (0.642), indicating that the indicators consistently reflect their respective constructs.

Composite Reliability

Construct reliability was assessed using Cronbach's Alpha and Composite Reliability, with both criteria requiring values above 0.70. All constructs met these thresholds, indicating strong internal consistency and readiness for further analysis. The detailed results are presented in the following table.

Tabel 5 Value Cronbach's Alpha and Composite Reliability

Variable	Composite Reliability	Cronbach's Alpha
X1	0.912	0.895
X2	0.926	0.902
X3	0.908	0.887
Z	0.920	0.901
Y	0.932	0.915

Note: Utilization of E-Commerce X1, Business Actor Commitment X2, Digital Literacy X3, Technology Adoption Z, MSME Growth Y

The table indicates that all constructs have Composite Reliability and Cronbach's Alpha values exceeding 0.70, signifying high internal consistency. The highest values are observed in MSME Growth (0.932; 0.915), followed by Technology Adoption, Entrepreneurial Commitment, Digital Literacy, and E-Commerce Utilization. These results confirm that the measurement instruments are reliable and suitable for further analysis.

Coefficient of Determination (R-square)

Tabel 6 R-Square values for variables Z and Y

Variabel	R-Square	R-Square Adjusted
Z	0.689	0.678
Y	0.743	0.735

Note: Adoption of Technology Z, Growth of MSMEs Y

An R-square value of 0.689 indicates that 68.9% of the variance in Technology Adoption is explained by e-commerce utilization, entrepreneurial commitment, and digital literacy. For MSME Growth, an R-square of 0.743 shows that 74.3% of its variance is explained by these variables along with the mediating effect of technology adoption. These results confirm the strong predictive power of the model.

Hypothesis Testing

Before presenting the path coefficients and t-values, structural hypothesis testing was conducted to assess the strength and significance of direct and indirect effects, including mediation by Technology Adoption. Path coefficients show relationship strength and direction, while t-values (threshold ≥ 1.96 , $\alpha = 0.05$) indicate statistical significance. Results are summarized in the following table.

Tabel 7 Path Coefficient and T-test

Hypothesis	Testing	Original Sample (O)	T Statistics (O/STDEV)	P Values	Information
H1	E-commerce Utilization X1 → Technology Adoption Z	0.317	5.123	0.003	Accepted
H2	Entrepreneurial Commitment X2 → Technology Adoption Z	0.276	4.321	0.002	Accepted

H3	Digital Literacy X3 → Technology Adoption Z	0.254	3.876	0.001	Accepted
H4	Technology Adoption Z → MSME Growth Y	0.312	4.789	0.000	Accepted
H5	E-commerce Utilization X1 → Technology Adoption Z → MSME Growth Y	0.099	2.910	0.004	Accepted
H6	Entrepreneurial Commitment X2 → Technology Adoption Z → MSME Growth Y	0.086	2.450	0.014	Accepted
H7	Digital Literacy X3 → Technology Adoption Z → MSME Growth Y	0.065	2.310	0.021	Accepted
H8	E-commerce Utilization X1 → MSME Growth Y	0.225	3.563	0.001	Accepted
H9	Entrepreneurial Commitment X2 → MSME Growth Y	0.210	2.765	0.006	Accepted
H10	Digital Literacy X3 → MSME Growth Y	0.187	2.989	0.003	Accepted

Note: H1-H10= Hypothesis in this study

Table 7 presents the results of structural hypothesis testing, indicating that all path relationships in the model are statistically significant ($p < 0.05$). Hypotheses H1 to H3 confirm that E-Commerce Utilization ($O = 0.317$; $t = 5.123$), Entrepreneurial Commitment ($O = 0.276$; $t = 4.321$), and Digital Literacy ($O = 0.254$; $t = 3.876$) significantly influence Technology Adoption. H4 further shows that Technology Adoption has a direct effect on MSME Growth ($O = 0.312$; $t = 4.789$).

Hypotheses H5 to H7 test the mediating effect of Technology Adoption, revealing significant indirect effects of E-Commerce Utilization ($O = 0.099$; $t = 2.910$), Entrepreneurial Commitment ($O = 0.086$; $t = 2.450$), and Digital Literacy ($O = 0.065$; $t = 2.310$) on MSME Growth. Additionally, H8 to H10 confirm significant direct effects of all three independent variables on MSME Growth: E-Commerce Utilization ($O = 0.225$; $t = 3.563$), Entrepreneurial Commitment ($O = 0.210$; $t = 2.765$), and Digital Literacy ($O = 0.187$; $t = 2.989$).

Interpretation of Research Results

The Relationship Between E-Commerce Utilization and Technology Adoption

Based on the findings of this study, E-Commerce Utilization has a significant positive effect on Technology Adoption among MSMEs. This result aligns with the Technology-Organization-Environment (TOE) framework, which posits that frequent engagement with digital platforms compels organizations particularly MSMEs to accelerate the adoption of new technologies for greater efficiency and competitiveness (Setyowati, Masyhuri, Handoyo Mulyo, et al., 2024). Supporting this, (Ortiz-Chávez et al., 2024) found that the frequency and variety of e-commerce activities enhance technological readiness and infrastructure acceptance among SMEs in Southeast Asia, thereby fostering digital solution uptake (Salah & Ayyash, 2024).

Furthermore, the integration of channels such as marketplaces and social media exposes MSMEs to advanced features such as sales analytics and automated payment systems

which, in turn, drives them to invest time and resources in technology training and the development of IT-based operational systems (Ortiz-Chávez et al., 2024). In the context of Tangerang City, increased digital interaction with customers through e-commerce has encouraged MSMEs to adopt inventory management applications and digital accounting software to support the growing volume of transactions.

The Relationship Between Business Actor Commitment and Technology Adoption

Based on the findings of this study, Entrepreneurial Commitment has a significant positive effect on Technology Adoption among MSMEs. This result aligns with the Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasizes that managerial support and organizational commitment are key determinants in accelerating the acceptance and utilization of new technologies (Keumala et al., 2023). For instance, a study by (Ortiz-Chávez et al., 2024) indicate that MSMEs with proactive leadership and dedicated time allocation for digital transformation are more likely to implement cloud-based inventory management systems and point-of-sale (POS) applications more rapidly (Binh et al., 2023).

Moreover, a study by (Ballerini, Giordino, et al., 2023) revealed that consistent use of e-commerce platforms and a strong willingness to learn technology are key components of entrepreneurial commitment that drive investment in internal training and the acquisition of analytical software. This, in turn, enhances the rate of digital solution adoption among MSMEs (Salah & Ayyash, 2024). In the context of Tangerang City, MSME actors with high levels of commitment demonstrate greater levels of technology adoption, indicating that strategic decisions to allocate resources toward business digitalization directly enhance technological capabilities and operational performance.

The Relationship Between Digital Literacy and Technology Adoption

Based on the findings of this study, Digital Literacy has a significant positive effect on Technology Adoption among MSMEs. This result is consistent with the Technology Acceptance Model (TAM), which emphasizes the crucial role of self-efficacy and perceived ease of use in fostering technology acceptance (Iordache et al., 2023). For instance, a study by (Setyowati, Masyhuri, Mulyo, et al., 2024) found that digital literacy training particularly in the use of business applications and online content creation significantly enhances MSME actors' confidence in adopting inventory management software and digital point-of-sale (POS) systems (Ballerini, Giordino, et al., 2023).

Moreover, a study by (Ballerini, Herhausen, et al., 2023) indicate that a strong understanding of digital security and proficient online information-seeking skills facilitate the integration of new technologies into business operations, thereby reducing adoption barriers (Ortiz-Chávez et al., 2024). In the context of Tangerang City, MSMEs with high digital literacy are quicker to implement digital payment platforms and sales analytics modules, thereby enabling more data-driven strategic decision-making.

The Relationship between Technology Adoption and MSME Growth

Based on the findings of this study, Technology Adoption has a significant positive effect on MSME Growth. This aligns with the Diffusion of Innovations Theory, which asserts that the accelerated adoption of new technologies by organizations drives competitive advantage and market expansion (Himawan et al., 2024). (Iordache et al., 2023). For instance, a study by (Santos-Jaén et al., 2023) indicate that MSMEs adopting digital inventory systems and automated payment applications experienced revenue increases of up to 25% within the first six months of implementation (Ahmad & Siraj, 2023).

Moreover, a study by (Fakieh & Wali, 2024) reveal that the implementation of sales analytics software facilitates data-driven strategic decision-making, thereby enhancing operational efficiency and expanding customer reach. (Ortiz-Chávez et al., 2024). In the context of Tangerang City, MSMEs that rapidly integrate digital technologies report higher revenue growth and increased employment compared to those still reliant on manual processes.

The Relationship Between E-Commerce Utilization and MSME Growth Through Technology Adoption

Based on the mediation analysis, Technology Adoption is proven to significantly mediate the effect of E-Commerce Utilization on MSME Growth. This finding is consistent with the Technology–Organization–Environment (TOE) Framework, which emphasizes the interplay between technological capabilities and organizational context in shaping successful digital transformation outcomes (Ballerini, Giordino, et al., 2023), which explains that the effectiveness of new digital channels, such as e-commerce platforms, depends on an organization’s capacity to adopt and integrate relevant technologies. For example, a study by (Ballerini, Herhausen, et al., 2023) show that intensive use of marketplaces encourages MSMEs to implement automated payment systems and inventory management modules, which subsequently increase transaction volumes and revenue. (Keumala et al., 2023).

Moreover, a study by Wibisono et al. (2024) found that MSMEs leveraging e-commerce sales data to implement analytics dashboards experienced improved operational efficiency and expanded market reach, thereby strengthening business growth (Ahmad & Siraj, 2023). Thus, Technology Adoption serves as a key mediator, channeling the positive impact of e-commerce utilization toward enhanced financial performance and market expansion of MSMEs.

The Relationship Between Business Actor Commitment and MSME Growth through Technology Adoption

Based on the mediation analysis, Technology Adoption is shown to significantly mediate the effect of Entrepreneurial Commitment on MSME Growth. This finding aligns with the Dynamic Capabilities Theory, which posits that an organization’s ability to integrate and apply new technologies depends on managerial commitment and adequate resource allocation (Ballerini, Giordino, et al., 2023). For instance, a study by (Binh et al., 2023) found that MSMEs with highly committed leadership toward digitalization actively invest in IT training and the development of ERP systems, which in turn drive revenue growth and market expansion. Similarly (Ballerini, Giordino, et al., 2023), observed that such strategic investments, grounded in strong managerial commitment, significantly enhance firms’ adaptive capacity and competitiveness in digitally evolving markets.

Furthermore, research by (Wibisono et al., 2024) shows that consistent e-commerce usage and a strong willingness to learn technology two key dimensions of entrepreneurial commitment stimulate the adoption of sales analytics applications and process automation, positively impacting operational efficiency and workforce growth (Binh et al., 2023). Thus, Technology Adoption functions as a primary mediator, channeling the positive effects of entrepreneurial commitment into enhanced financial performance and market expansion of MSMEs.

The Relationship between Digital Literacy and MSME Growth through Technology Adoption

Based on the mediation analysis, Entrepreneurial Commitment significantly enhances MSME Growth not only directly but also indirectly through increased Technology Adoption. This finding aligns with the Dynamic Capabilities Theory (Fakieh & Wali, 2024), which emphasizes that managerial commitment and resource allocation enable organizations to develop adaptive capabilities for integrating new technologies. For example, Binh et al. (2023) found that MSMEs with consistent leadership and strong dedication to digital transformation were quicker to implement cloud-based inventory management systems, thereby driving revenue growth and improving operational efficiency (Udayana et al., 2024).

Furthermore, the study by Binh et al. (2023) found that a motivation to learn technology and internal training two key dimensions of entrepreneurial commitment stimulate the use of digital point-of-sale (POS) applications and sales analytics modules, leading to positive outcomes in market expansion and revenue stability (Wibisono et al., 2024). Thus, Technology Adoption serves as a central mediator, channeling the positive effects of entrepreneurial commitment into financial growth and market expansion for MSMEs.

The Relationship Between E-Commerce Utilization and MSME Growth

Based on the findings of this study, E-Commerce Utilization has a direct positive effect on MSME Growth. This result aligns with the Technology Acceptance Model (TAM) (Santos-Jaén et al., 2023), which posits that perceived usefulness and ease of use of digital platforms encourage organizations to optimize online marketing channels to enhance business performance. For example Ortiz-Chávez et al. (2024), found that intensive use of marketplaces and integration with social media directly contributed to revenue increases of up to 20% and a significant expansion of customer base.

Furthermore, the study by Binh et al. (2023) found that diversifying e-commerce channels such as selling across multiple platforms and utilizing digital payment features significantly enhances operational efficiency and expands the market reach of MSMEs.

The Relationship Between Business Actor Commitment and MSME Growth

Based on the findings of this study, Entrepreneurial Commitment has a direct positive effect on MSME Growth. This aligns with the Resource-Based View (RBV) (Fakieh & Wali, 2024), which asserts that resource allocation and strong managerial support are strategic assets driving competitive advantage and business expansion. For instance (Ballerini, Herhausen, et al., 2023), found that MSMEs with consistent leadership in digital transformation reported higher revenue growth and greater workforce expansion compared to those with weaker commitment.

Furthermore, the study by Binh et al. (2023), found that business owners who actively establish internal policies to support the use of e-commerce and digital technologies experience faster market growth and greater income stability.

The Relationship Between Digital Literacy and MSME Growth

Based on the findings of this study, Entrepreneurial Commitment has a direct positive effect on MSME Growth. This is consistent with the Resource-Based View (RBV) (Fakieh & Wali, 2024), which emphasizes that strong managerial support and effective resource allocation constitute strategic assets for achieving competitive advantage and business expansion. For example, Ahmad & Siraj (2023) found that MSMEs with consistent leadership in digital transformation reported significantly higher revenue growth and workforce expansion compared to those with lower levels of commitment.

Furthermore, the study by Binh et al. (2023) found that business owners who actively establish internal policies to support the use of e-commerce and digital technologies experience faster market growth and greater income stability.

IV. CONCLUSIONS

E-commerce utilization, entrepreneurial commitment, and digital literacy have been found to exert a significant positive influence on both technology adoption and MSME growth in Tangerang City, through both direct and mediated pathways. The use of digital platforms facilitates the implementation of technologies such as POS applications and inventory systems, leading to increased revenue, operational efficiency, and market reach. Path coefficients indicate that e-commerce utilization contributes 31.7% to technology adoption and 22.5% to MSME growth, with an additional mediating effect of 9.9%. Entrepreneurial commitment and digital literacy contribute over 20% and 18% directly, along with mediated effects of 8.6% and 6.5%, respectively.

Theoretically, these findings reinforce the Technology–Organization–Environment (TOE) framework, the Diffusion of Innovations (DOI) theory, and the Dynamic Capabilities approach, underscoring the importance of internal and external readiness in driving MSME digital transformation. An R^2 value of 0.743 confirms the model's strong predictive power.

Practically, the study recommends an integrated strategy: intensifying e-commerce adoption, strengthening managerial commitment, enhancing digital literacy, and investing in technology. This approach supports sustainable and competitive MSME growth in the digital era.

Based on the findings and limitations of this study, the following recommendations are proposed for advancing both future research and e-commerce practices for MSMEs:

1. Design blended learning-based training tailored to MSME characteristics, combining online modules, mentoring, and case studies. Evaluate outcomes using transaction metrics and user satisfaction indicators to ensure practical impact and scalability.
2. Conduct long-term research to monitor shifts in digital behavior and MSME performance. Enrich quantitative data with in-depth interviews or focus group discussions (FGDs) to uncover non-quantifiable factors influencing technology adoption.
3. Apply agile product-market fit testing for e-commerce channels and features (e.g., chatbots, loyalty programs) using rapid iteration based on user feedback. This approach enhances customer retention and engagement through responsive, data-informed refinement.
4. Establish cross-sector policy forums involving MSMEs, government bodies, digital platforms, and training institutions. These forums should co-develop regulations, tiered digital literacy programs, and incentive structures, supported by regular policy impact evaluations using transaction data and structured surveys.

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