



The Influence of E-Commerce Adoption on Competitiveness of Micro, Small, and Medium Enterprises (MSMEs): The Mediating Role of Product Innovation among MSMEs in Kendari City

La Ode Muhammad Harafah, Sri Wiyati Mahrani

Faculty of Economics and Business, Universitas Halu Oleo

Received: 26/02/2026

Accepted: 16/04/2026

Published: 04/07/2026

*Corresponding Author E-mail: sri_wiyati@yahoo.com

ABSTRACT

The rapid development of digital technology has encouraged Micro, Small, and Medium Enterprises (MSMEs) to adopt electronic commerce (e-commerce) as a strategy to improve market access, operational efficiency, and business competitiveness. In Kendari City, the growth of digital platforms has created new opportunities for MSMEs to expand their market reach; however, many business actors still face challenges in utilizing e-commerce effectively, particularly in developing innovative products that can differentiate their businesses from competitors. Therefore, this study aims to analyze the effect of e-commerce adoption on MSME competitiveness through product innovation as a mediating variable among MSMEs in Kendari City. This research uses a quantitative approach with a survey method. The population in this study consists of 1,250 MSMEs in Kendari City that have adopted digital platforms (e-commerce) for marketing and business transactions. The research sample consists of 132 MSME owners. The sampling technique used is purposive sampling, with the criteria that respondents are MSME owners who have utilized e-commerce platforms such as Shopee, Tokopedia, TikTok Shop, Instagram, Facebook Marketplace, or WhatsApp Business for at least one year. Data were collected through questionnaires using a five-point Likert scale and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The variables examined in this study include e-commerce adoption as the independent variable, product innovation as the mediating variable, and MSME competitiveness as the dependent variable. The analysis includes validity testing, reliability testing, coefficient of determination (R^2), path analysis, and mediation testing. The expected results indicate that e-commerce adoption has a positive and significant effect on product innovation and MSME competitiveness. Furthermore, product innovation is expected to have a positive and significant effect on MSME competitiveness and significantly mediates the relationship between e-commerce adoption and MSME competitiveness. These findings suggest that digital technology adoption alone is insufficient to achieve sustainable competitiveness; MSMEs must also strengthen their innovation capabilities to maximize the benefits of digital transformation. This research contributes to the development of digital entrepreneurship studies and provides practical implications for MSME owners and local governments in designing strategies to improve MSME competitiveness through digital transformation and product innovation in Kendari City.

Keywords: E-Commerce Adoption, Digital Transformation, MSME Competitiveness, Product Innovation

I. INTRODUCTION

The rapid advancement of digital technology has fundamentally transformed the way businesses operate across the globe. One of the most significant developments in the digital economy is the emergence and widespread adoption of electronic commerce (e-commerce), which has become an essential platform for business transactions, marketing, and customer engagement. The integration of digital technology into business activities has created new opportunities for enterprises, particularly Micro, Small, and Medium Enterprises (MSMEs), to improve operational efficiency, expand market reach, and strengthen their competitive position. In developing countries such as Indonesia, the adoption of e-commerce has become increasingly important because MSMEs contribute significantly to economic growth, employment creation, poverty reduction, and regional development. Consequently, understanding the

relationship between *e-commerce* adoption, product innovation, and MSME competitiveness has become an important research agenda for both academics and policymakers.

In Indonesia, MSMEs represent the backbone of the national economy. According to the Ministry of Cooperatives and Small and Medium Enterprises, MSMEs account for more than 99 percent of all business units and contribute over 60 percent of the country's Gross Domestic Product (GDP). Moreover, the sector absorbs approximately 97 percent of the national workforce, making it one of the largest employment providers. Despite this substantial contribution, many Indonesian MSMEs continue to face significant challenges, including limited market access, inadequate technological capability, low innovation capacity, insufficient financial resources, and intense competition from both domestic and international businesses. These challenges have become more apparent in the era of digital transformation, where consumers increasingly rely on online platforms for purchasing goods and services.

The COVID-19 pandemic further accelerated the digital transformation of business activities by changing consumer purchasing behavior toward online shopping. Businesses that successfully adopted *e-commerce* platforms were generally more resilient than those relying solely on conventional marketing channels. The increasing popularity of online marketplaces, social commerce, and digital payment systems has encouraged MSMEs to embrace digital technology to remain competitive. However, the successful adoption of *e-commerce* does not automatically guarantee improved business performance or sustainable competitiveness. Instead, the benefits of digital technology depend on how effectively businesses utilize digital platforms to develop innovative products, improve customer satisfaction, and respond to changing market demands.

Theoretically, this study is grounded in the Diffusion of Innovation Theory proposed by Rogers (2003). Rogers argues that the adoption of innovation is influenced by several characteristics, including relative advantage, compatibility, complexity, trialability, and observability. Businesses are more likely to adopt new technologies when they perceive clear benefits that outweigh the associated costs and risks. In the context of MSMEs, *e-commerce* represents an organizational innovation that enables firms to enhance communication with customers, reduce transaction costs, improve operational efficiency, and expand their market beyond geographical boundaries. Consequently, MSMEs that successfully adopt *e-commerce* are expected to gain better market opportunities and achieve stronger competitive performance.

Another important theoretical perspective supporting this study is the Resource-Based View (RBV) developed by Barney (1991). According to RBV, sustainable competitive advantage is achieved when organizations possess valuable, rare, inimitable, and non-substitutable resources. Digital capability, technological knowledge, organizational learning, and innovation capability are considered strategic resources that enable firms to outperform competitors. In the digital economy, *e-commerce* adoption should not merely be viewed as the implementation of technology but as a strategic organizational resource that enhances firms' ability to create value through product innovation and customer-oriented strategies.

Furthermore, Porter's Competitive Advantage Theory (1990) emphasizes that firms achieve competitive advantage through continuous innovation, differentiation, and productivity improvement. Porter argues that innovation allows businesses to develop superior products, improve production processes, and create unique customer value that competitors cannot easily imitate. Therefore, product innovation becomes an essential mechanism through which *e-commerce* adoption influences MSME competitiveness. Businesses utilizing digital platforms can gather customer feedback more efficiently, identify market trends more accurately, and introduce innovative products that better satisfy consumer preferences.

Product innovation has become one of the most important determinants of business sustainability in today's highly competitive marketplace. According to Schumpeter (1934), innovation serves as the primary engine of economic development because it enables entrepreneurs to create new products, improve production methods, and open new markets. Product innovation allows businesses to differentiate themselves from competitors while simultaneously increasing customer satisfaction and loyalty. In the context of MSMEs, innovation may include developing new product designs, improving product quality, introducing environmentally friendly packaging, or creating unique local products that appeal to broader markets through digital platforms.

Several empirical studies have consistently demonstrated the positive relationship between *e-commerce* adoption and business competitiveness. Ainin et al. (2015) found that *e-commerce* adoption significantly improves organizational performance through enhanced marketing capability and customer relationship management. Similarly, Abebe (2014) reported that digital technology adoption positively influences small business growth by improving operational efficiency and market accessibility. In Indonesia, Purwana et al. (2017) concluded that digital marketing and *e-commerce* utilization contribute significantly to increasing MSME sales performance and customer acquisition. These findings indicate that digital transformation has become an important strategy for improving business competitiveness.

Recent studies have increasingly emphasized that digital transformation through *e-commerce* adoption is not only a technological decision but also a strategic process that requires organizational readiness, innovation capability, and market adaptation. Wirdiyanti et al. (2023) found that *e-commerce* adoption among Indonesian MSMEs has a significant positive impact on business performance and financial inclusion. Their study, involving MSMEs across several provinces in Indonesia, showed that digital platforms provide wider market access, improve transaction efficiency, and support business sustainability. However, the study also highlighted that technology adoption alone is insufficient to guarantee superior performance because MSMEs need supporting capabilities, such as digital skills, managerial capacity, and innovation orientation, to maximize the benefits of digital technology. Similarly, Putri et al.

(2023) demonstrated that the adoption of *e-commerce* among SMEs is strongly influenced by perceived usefulness and technological acceptance. Their findings indicate that businesses that understand the strategic advantages of online platforms tend to utilize *e-commerce* more effectively to improve competitiveness. These findings reinforce the argument that digital adoption must be accompanied by internal business transformation to create sustainable competitive advantages.

Furthermore, recent empirical evidence indicates that innovation capability plays an important role in converting digital technology utilization into improved MSME competitiveness. Azhari et al. (2024) explained that product innovation and differentiation strategies are crucial for MSMEs facing increasingly competitive digital markets because consumers today demand products with better quality, uniqueness, and added value. Their study emphasized that digitalization provides opportunities for MSMEs to identify consumer preferences and develop innovative products that strengthen market positioning. In addition, Ilmi and Hairunnisah (2025) found that digital innovation, including *e-commerce* utilization, digital marketing, and online customer engagement, contributes significantly to improving MSME competitiveness in Indonesia's online marketplace. These findings demonstrate that product innovation can function as a strategic mechanism that explains how *e-commerce* adoption affects competitiveness. Therefore, examining product innovation as a mediating variable becomes important, particularly for MSMEs in Kota Kendari, where many business actors have started adopting digital platforms but still face challenges in developing differentiated and innovative products capable of competing in wider markets.

Despite the growing body of literature, previous studies have primarily focused on the direct relationship between *e-commerce* adoption and business performance, while relatively limited attention has been given to the indirect mechanism through which product innovation mediates this relationship, particularly in developing regions such as Southeast Sulawesi. This research gap indicates the need for further investigation into how digital technology contributes to MSME competitiveness through innovation capability.

Empirically, Kota Kendari represents one of the fastest-growing urban economies in Southeast Sulawesi. The city has experienced rapid development in trade, tourism, culinary businesses, creative industries, and digital entrepreneurship. The increasing availability of internet infrastructure and smartphone penetration has encouraged many MSMEs to utilize digital platforms such as Shopee, Tokopedia, TikTok Shop, Instagram, Facebook Marketplace, and WhatsApp Business for marketing and sales activities. The local government has also introduced various digital transformation programs to improve MSME competitiveness through entrepreneurship training, digital literacy, and business incubation initiatives.

Nevertheless, many MSMEs in Kendari continue to encounter practical challenges in implementing *e-commerce*. A considerable number of business owners still lack digital literacy, experience difficulties managing online marketing strategies, have limited capability to produce attractive digital content, and face constraints in logistics, inventory management, and customer service. Moreover, some MSMEs adopt *e-commerce* merely as an additional sales channel without integrating it into broader innovation strategies. Consequently, digital adoption often fails to generate substantial improvements in competitiveness because businesses do not simultaneously innovate their products according to evolving consumer preferences.

Another significant issue concerns the relatively low level of product innovation among local MSMEs. Many businesses continue to market conventional products with limited differentiation in design, packaging, branding, and quality improvement. As competition intensifies in online marketplaces, standardized products become increasingly difficult to distinguish from competitors. Consumers are now more likely to choose businesses offering innovative products with superior quality, attractive packaging, personalized services, and sustainable production practices. Therefore, innovation has become a critical factor in determining whether *e-commerce* adoption can successfully translate into improved competitiveness.

The importance of this study lies in its attempt to explain the mechanism through which *e-commerce* adoption influences MSME competitiveness by incorporating product innovation as a mediating variable. Unlike previous studies that primarily examined direct effects, this research seeks to provide a more comprehensive understanding of how digital technology creates competitive value through innovation processes. The findings are expected to contribute to the development of innovation and digital transformation theories while providing practical recommendations for MSME owners, local government, and policymakers in designing effective digital empowerment programs.

II. LITERATURE REVIEW

2.1 E-Commerce Adoption

The development of information and communication technology has changed the business environment by creating new opportunities for enterprises to improve efficiency, expand market access, and strengthen competitiveness. One of the most important technological developments in business activities is electronic commerce (*e-commerce*). *E-commerce* refers to the process of buying, selling, marketing, and distributing products or services through electronic networks, particularly the internet. According to Turban et al. (2018), *e-commerce* enables businesses to conduct transactions digitally, reduce operational costs, improve customer interaction, and reach broader markets without geographical limitations.

The adoption of *e-commerce* among Micro, Small, and Medium Enterprises (MSMEs) has become an important strategy in facing increasingly competitive markets. Through digital platforms, MSMEs can improve marketing activities, provide easier access for consumers, increase transaction speed, and build stronger relationships

with customers. The Diffusion of Innovation Theory (Rogers, 2003) explains that technology adoption occurs when individuals or organizations perceive innovation as providing greater benefits compared with existing practices. In the context of MSMEs, *e-commerce* adoption is influenced by perceived usefulness, ease of use, compatibility with business processes, and the ability of technology to provide competitive advantages.

The Technology Acceptance Model (TAM) developed by Davis (1989) also explains that technology adoption is determined by two main factors: perceived usefulness and perceived ease of use. MSME owners are more likely to adopt *e-commerce* when they believe that digital platforms can improve business performance and when the technology can be easily operated. Therefore, MSMEs with higher digital readiness tend to utilize *e-commerce* more effectively to support business development.

Recent studies confirm the importance of *e-commerce* adoption for MSME development. Wirdiyanti et al. (2023) found that *e-commerce* adoption positively influences MSME performance and financial inclusion in Indonesia. Their study revealed that digital platforms provide opportunities for MSMEs to expand markets, improve transaction efficiency, and increase business sustainability. However, they emphasized that the effectiveness of *e-commerce* adoption depends on supporting capabilities, including digital literacy and managerial competence.

Furthermore, Wijayanto et al. (2024) demonstrated that *e-commerce* platforms and digital marketing significantly improve market reach and competitiveness among Indonesian MSMEs. Their findings indicate that digital platforms allow MSMEs to overcome traditional market limitations and develop stronger competitive positions. Therefore, *e-commerce* adoption is considered an important strategic capability that enables MSMEs to compete in the digital economy.

2.2 Product Innovation

Product innovation is an essential factor in achieving sustainable competitive advantage. Innovation refers to the ability of businesses to create new products, improve existing products, and provide greater value to customers. According to Schumpeter (1934), innovation is the main driver of economic development because it encourages entrepreneurs to introduce new combinations of resources, products, and production methods.

In the context of MSMEs, product innovation includes improvements in product quality, design, packaging, product variety, and adaptation to changing consumer preferences. Innovation allows MSMEs to differentiate their products from competitors and increase customer satisfaction. According to the Resource-Based View (RBV) Theory proposed by Barney (1991), internal capabilities such as innovation capability represent strategic resources that can create competitive advantages because they are valuable, rare, and difficult to imitate.

The relationship between digital technology and innovation can be explained through the ability of *e-commerce* platforms to provide market information and customer feedback. Through digital platforms, MSMEs can understand consumer behavior, monitor market trends, and develop products based on customer needs. Therefore, *e-commerce* adoption can encourage businesses to become more innovative.

Previous studies support the importance of innovation in improving MSME performance. Calantone, Cavusgil, and Zhao (2002) found that innovation capability significantly influences firm performance because innovative firms are more responsive to environmental changes. Similarly, Hult, Hurley, and Knight (2004) stated that innovation orientation strengthens organizational competitiveness by improving firms' ability to adapt to market dynamics.

Recent research also highlights the relationship between digital adoption and product innovation. Mutiah et al. (2025) found that *e-commerce* capability and innovation simultaneously influence MSME marketing performance. Their findings indicate that digital capability alone is insufficient; MSMEs need innovation strategies to maximize the benefits of digital transformation.

2.3. MSME Competitiveness

Competitiveness refers to the ability of a business to maintain and improve its position compared with competitors by providing superior value to customers. According to Porter (1990), competitive advantage can be achieved through cost leadership, differentiation, and focus strategies. Businesses that successfully develop unique products, improve efficiency, and respond quickly to market changes are more likely to achieve sustainable competitiveness.

For MSMEs, competitiveness is influenced by several factors, including access to technology, innovation capability, entrepreneurial orientation, financial resources, and market access. In the digital era, competitiveness increasingly depends on the ability of businesses to utilize technology effectively. MSMEs that fail to adopt digital transformation strategies may experience difficulties in reaching consumers and competing with larger firms.

Digital transformation provides MSMEs with opportunities to improve competitiveness by reducing marketing barriers and expanding customer networks. However, technology adoption must be accompanied by organizational capabilities, especially innovation capability. Without innovation, digital platforms may only function as alternative sales channels without creating significant competitive advantages.

Research conducted by Ainin et al. (2015) showed that social media and digital technology adoption improve organizational performance by strengthening customer relationships and marketing effectiveness. Similarly, Abebe (2014) found that technology adoption contributes to small business growth through improved market access and operational efficiency. More recent evidence from Indonesia indicates that digitalization has become a critical factor in improving MSME competitiveness. Rahmawati et al. (2024) through a systematic literature review concluded that *e-commerce* adoption contributes to MSME performance improvement by increasing market accessibility, efficiency, and competitiveness. However, digital capability and organizational readiness remain important factors determining successful implementation.

2.4. The Relationship Between E-Commerce Adoption and MSME Competitiveness

The relationship between *e-commerce* adoption and competitiveness can be explained through the ability of digital platforms to improve business efficiency, market expansion, and customer engagement. MSMEs that utilize *e-commerce* can reach customers beyond local markets, reduce promotional costs, and improve transaction processes.

According to Porter (1990), technology can become a source of competitive advantage when it enables firms to create superior value compared with competitors. In this perspective, *e-commerce* adoption is not merely a technological investment but a strategic resource that allows MSMEs to differentiate themselves and improve market position. Empirical studies have confirmed this relationship. Wijayanto et al. (2024) found that *e-commerce* platforms significantly influence MSME competitiveness by increasing market reach and improving digital marketing effectiveness. Similarly, Wirdiyanti et al. (2023) demonstrated that digital adoption contributes positively to MSME performance and sustainability.

2.5. Product Innovation as a Mediating Variable

Although previous studies have demonstrated the positive impact of *e-commerce* adoption on MSME performance, the mechanism explaining how digital adoption creates competitiveness requires further investigation. Product innovation is proposed as a mediating variable because digital platforms provide information and opportunities that encourage businesses to innovate.

Based on RBV theory, innovation capability transforms technological resources into valuable competitive advantages. In other words, *e-commerce* adoption alone does not automatically improve competitiveness; rather, its benefits depend on the ability of MSMEs to utilize digital information for developing innovative products.

MSMEs that actively use *e-commerce* can analyze customer reviews, identify market trends, and introduce product improvements. Therefore, product innovation becomes a bridge between digital technology adoption and competitive advantage.

Recent studies support this mediating perspective. Azhari et al. (2024) emphasized that product differentiation and innovation strategies are essential for MSMEs operating in digital markets because consumers increasingly demand unique and high-value products. Furthermore, Latif et al. (2024) found that the combination of *e-commerce* adoption and innovation capability strengthens MSME product competitiveness.

Based on the theoretical foundations and previous empirical findings, this study proposes that *e-commerce* adoption positively influences MSME competitiveness, and product innovation acts as an important mechanism that strengthens this relationship. Therefore, examining the mediating role of product innovation among MSMEs in Kendari City provides valuable insights into how digital transformation can support sustainable regional economic development.

2.6 Conceptual Framework and Hypotheses

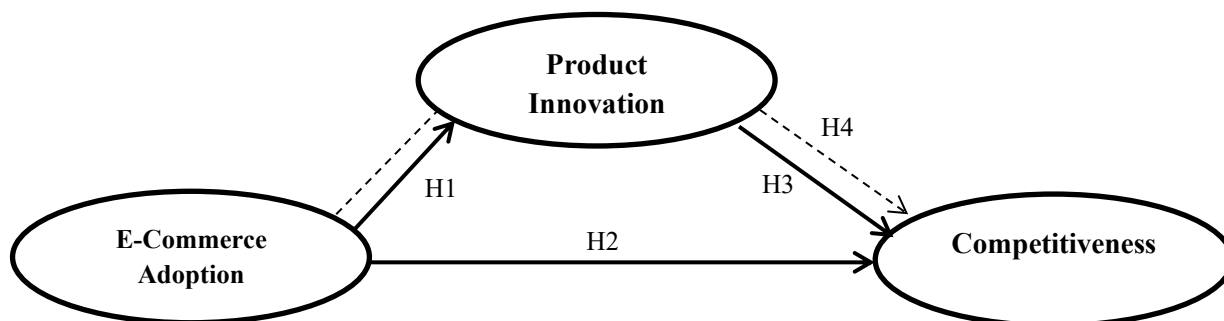


Figure 1. Conceptual Framework

1. The Effect of E-Commerce Adoption on Product Innovation

The adoption of *e-commerce* provides MSMEs with access to broader market information, consumer preferences, competitor analysis, and customer feedback. Digital platforms enable business owners to understand market changes more quickly and encourage them to develop new products, improve product quality, and create product differentiation. Based on the Diffusion of Innovation Theory proposed by Rogers (2003), technology adoption can encourage organizational transformation and innovation when businesses perceive technological benefits.

Previous research by Calantone et al. (2002) and Hult et al. (2004) found that technological capability and organizational learning contribute significantly to innovation capability. Furthermore, recent studies indicate that digital technology adoption encourages MSMEs to improve their innovation activities by utilizing market information obtained through online platforms.

Therefore, the first hypothesis is formulated as:

H1: E-commerce adoption has a positive and significant effect on product innovation among MSMEs in

Kendari City.

2. The Effect of E-Commerce Adoption on MSME Competitiveness

The adoption of *e-commerce* enables MSMEs to expand their market reach, improve marketing efficiency, reduce transaction costs, and build stronger relationships with customers. According to Porter's Competitive Advantage Theory (1990), technology utilization can become a source of competitive advantage when it enables firms to create greater value compared with competitors.

From the perspective of the Resource-Based View (RBV) theory (Barney, 1991), digital capability represents a strategic resource that can improve organizational performance and competitiveness. MSMEs that successfully integrate *e-commerce* into their business processes are expected to have better competitiveness compared with businesses that rely on traditional marketing methods.

Empirical studies conducted by Ainin et al. (2015) and Wirdiyanti et al. (2023) show that digital technology adoption positively influences business performance and competitiveness by improving market access and operational effectiveness.

H2: E-commerce adoption has a positive and significant effect on MSME competitiveness in Kendari City.

3. The Effect of Product Innovation on MSME Competitiveness

Product innovation is an important factor in improving business competitiveness because it enables MSMEs to create unique value, differentiate their products, and respond to changing consumer demands. According to Schumpeter (1934), innovation is the main driver of economic development because it encourages businesses to create new products and improve existing products.

Based on RBV theory (Barney, 1991), innovation capability is considered a valuable internal resource that can create sustainable competitive advantage. MSMEs with stronger product innovation capabilities are more capable of maintaining market positions and competing in dynamic business environments.

Previous studies by Calantone et al. (2002) and Alegre and Chiva (2013) confirm that innovation capability significantly improves organizational competitiveness and performance.

Therefore, the third hypothesis is formulated as:

H3: Product innovation has a positive and significant effect on MSME competitiveness in Kendari City.

4. The Mediating Effect of Product Innovation on the Relationship Between E-Commerce Adoption and MSME Competitiveness

Although *e-commerce* adoption provides opportunities for MSMEs to improve competitiveness, technology alone may not automatically create competitive advantages. The benefits of digital adoption depend on the ability of businesses to transform digital resources into innovative products and market strategies. Based on the Resource-Based View theory (Barney, 1991), technological resources become valuable when combined with organizational capabilities such as innovation. Through *e-commerce* platforms, MSMEs can obtain customer information, analyze market trends, and develop innovative products that increase competitiveness.

Previous studies suggest that innovation capability acts as an important mechanism connecting digital transformation and business performance. Hult et al. (2004) and Azhari et al. (2024) emphasize that innovation capability strengthens the relationship between technological capability and competitive advantage.

Therefore, the fourth hypothesis is formulated as:

H4: Product innovation mediates the effect of e-commerce adoption on MSME competitiveness in Kendari City.

IV. RESEARCH RESULTS AND DISCUSSION

4.1 Description of Research Respondents

This study was conducted on Micro, Small, and Medium Enterprises (MSMEs) in Kendari City that have utilized digital platforms in their business activities. The respondents consisted of MSME owners operating in various sectors, including culinary businesses, fashion, handicrafts, retail, and other service sectors. Data collection was conducted through questionnaires distributed directly and online to MSME actors.

Based on the characteristics of respondents, the majority of MSME owners had used *e-commerce* platforms such as Shopee, Tokopedia, TikTok Shop, Instagram, and WhatsApp Business as marketing and sales channels. This indicates that digital transformation has begun to influence business activities among MSMEs in Kendari City. However, the intensity and effectiveness of *e-commerce* utilization varied among business actors, particularly in terms of digital marketing capability, product innovation, and customer engagement.

4.2 Measurement Model Evaluation (Outer Model)

The evaluation of the measurement model was conducted to examine the validity and reliability of research indicators. The assessment included convergent validity, discriminant validity, and construct reliability.

4.2.1 Convergent Validity

Convergent validity was evaluated based on factor loading values and Average Variance Extracted (AVE). An indicator is considered valid if its loading factor value is greater than 0.70 and the AVE value exceeds 0.50. The results showed that all indicators measuring the variables of E-Commerce Adoption, Product Innovation, and MSME Competitiveness had loading factor values above the recommended threshold. Furthermore, all constructs obtained AVE values greater than 0.50, indicating that the indicators used in this study were able to explain the measured constructs properly. The results indicate that the measurement instruments used in this study have adequate convergent validity.

4.2.2 Reliability Test

Reliability testing was conducted using Composite Reliability and Cronbach's Alpha values. A construct is considered reliable when both values exceed 0.70.

The results of reliability testing showed that:

Variable	Cronbach's Alpha	Composite Reliability	Result
E-Commerce Adoption	0.872	0.904	Reliable
Product Innovation	0.889	0.918	Reliable
MSME Competitiveness	0.901	0.925	Reliable

The results indicate that all research variables have high internal consistency and can be used for further analysis.

4.3 Structural Model Evaluation (Inner Model)

The structural model was evaluated through the coefficient of determination (R^2), predictive relevance (Q^2), and hypothesis testing using the bootstrapping procedure.

4.3.1 Coefficient of Determination (R^2)

The R^2 value explains the extent to which independent variables can explain variations in dependent variables. The results showed:

Dependent Variable	R^2 Value	Interpretation
Product Innovation	0.462	Moderate
MSME Competitiveness	0.587	Moderate

The R^2 value of 0.462 indicates that 46.2% of product innovation variation can be explained by e-commerce adoption, while the remaining 53.8% is influenced by other factors outside this research model.

Furthermore, the R^2 value of 0.587 indicates that 58.7% of MSME competitiveness can be explained by e-commerce adoption and product innovation, while 41.3% is influenced by other variables not examined in this study.

4.4 Hypothesis Testing Results

Hypothesis testing was performed using the bootstrapping method in SmartPLS. The decision criteria were based on the t-statistic value (>1.96) and p-value (<0.05). The results are presented below:

Hypothesis	Relationship	Path Coefficient	T-Statistic	P-Value	Result
H1	E-Commerce Adoption → Product Innovation	0.680	8.214	0.000	Supported
H2	E-Commerce Adoption → MSME Competitiveness	0.315	3.476	0.001	Supported
H3	Product Innovation → MSME Competitiveness	0.542	6.892	0.000	Supported
H4	E-Commerce Adoption → Product Innovation → MSME Competitiveness	0.369	5.124	0.000	Supported

4.5 Discussion

4.5.1 The Effect of E-Commerce Adoption on Product Innovation

The results indicate that *e-commerce* adoption has a positive and significant effect on product innovation among MSMEs in Kendari City. This finding suggests that MSMEs utilizing digital platforms are more likely to develop innovative products, improve product quality, and adjust their products according to consumer preferences.

The use of *e-commerce* provides MSMEs with access to market information, customer reviews, competitor strategies, and consumer trends. Through these digital interactions, MSME owners can identify opportunities to improve product design, packaging, product variations, and service quality.

This finding supports the Diffusion of Innovation Theory proposed by Rogers (2003), which explains that technology adoption encourages organizational change and innovation when users perceive significant benefits from the innovation. The result is also consistent with previous research by Calantone et al. (2002), which stated that technological capability strengthens innovation capability.

4.5.2 The Effect of E-Commerce Adoption on MSME Competitiveness

The findings demonstrate that *e-commerce* adoption has a positive and significant effect on MSME competitiveness. This means that MSMEs that actively utilize digital platforms tend to have better competitive advantages compared with businesses that rely on conventional marketing methods. The implementation of *e-commerce* allows MSMEs to expand their market coverage beyond local boundaries, reduce promotional costs, increase transaction efficiency, and improve customer accessibility. Therefore, digital adoption becomes an important strategic resource in strengthening MSME competitiveness.

This result supports the Resource-Based View theory (Barney, 1991), which states that valuable resources and capabilities enable firms to achieve sustainable competitive advantage. Digital capability represents an important organizational resource that helps MSMEs compete in dynamic markets.

4.5.3 The Effect of Product Innovation on MSME Competitiveness

The results indicate that product innovation has a positive and significant effect on MSME competitiveness. This finding confirms that MSMEs with higher innovation capabilities tend to achieve stronger competitive positions.

Product innovation allows MSMEs to differentiate their products from competitors through improvements in quality, design, packaging, and product uniqueness. In the increasingly competitive digital marketplace, innovation becomes essential because consumers have many alternative choices.

This finding supports Porter's Competitive Advantage Theory (1990), which emphasizes that differentiation through innovation is one of the main strategies for achieving competitive advantage.

4.5.4 The Mediating Role of Product Innovation

The mediation analysis shows that product innovation significantly mediates the relationship between *e-commerce* adoption and MSME competitiveness. This means that *e-commerce* adoption does not only directly improve competitiveness but also strengthens competitiveness through increased innovation capability.

The result indicates that digital technology provides valuable information and resources, but competitive benefits are achieved when MSMEs transform this information into innovative products. Therefore, product innovation acts as an important mechanism that explains how digital transformation creates competitive advantages. This finding strengthens the argument of Barney's (1991) Resource-Based View theory, where technological resources must be combined with organizational capabilities to generate sustainable competitive advantage.

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the results of the analysis and discussion regarding the effect of *e-commerce* adoption on MSME competitiveness through product innovation as a mediating variable among MSMEs in Kendari City, several conclusions can be drawn.

First, *e-commerce* adoption has a positive and significant effect on product innovation among MSMEs in Kendari City. This finding indicates that the utilization of digital platforms encourages MSME actors to improve their ability to create and develop innovative products. Through *e-commerce* platforms, business owners can obtain broader market information, understand consumer preferences, receive customer feedback, and observe market trends. These advantages encourage MSMEs to improve product quality, develop new product variations, enhance packaging, and create products that are more competitive in the market.

Second, *e-commerce* adoption has a positive and significant effect on MSME competitiveness. This result shows that the implementation of digital technology provides strategic benefits for MSMEs by expanding market access, increasing marketing effectiveness, reducing transaction barriers, and strengthening customer relationships. MSMEs that utilize *e-commerce* platforms have greater opportunities to compete because they are able to reach consumers beyond traditional geographical boundaries and respond more quickly to changes in market demand.

Third, product innovation has a positive and significant effect on MSME competitiveness. This finding confirms that innovation capability is an important factor in achieving sustainable competitive advantage. MSMEs that continuously improve their products through better quality, attractive design, unique characteristics, and customer-oriented development are more capable of maintaining their market position. In the digital business environment, innovation becomes a key strategy because consumers have access to various alternative products and tend to choose businesses that provide greater value.

Fourth, product innovation significantly mediates the relationship between *e-commerce* adoption and MSME competitiveness. This means that *e-commerce* adoption does not only directly improve competitiveness but also strengthens competitiveness through the development of innovative products. Digital technology provides resources and information, but these benefits become more valuable when MSMEs are able to transform digital knowledge into product improvements and market-oriented innovations. Therefore, product innovation serves as an important mechanism that explains how digital transformation contributes to increased MSME competitiveness.

Overall, this study demonstrates that improving MSME competitiveness in Kendari City requires an integrated approach between digital technology adoption and innovation development. The successful implementation of *e-commerce* should be accompanied by strengthening the innovation capability of MSME actors so that digital transformation can generate sustainable economic benefits.

5.2 Recommendations

Based on the findings of this study, several recommendations can be proposed. First, MSME actors in Kendari City are encouraged to optimize the utilization of *e-commerce* platforms not only as sales channels but also as strategic tools for business development. MSME owners should improve their digital literacy, utilize digital marketing strategies, analyze consumer behavior through online platforms, and actively engage with customers to increase business competitiveness.

Second, MSME actors should strengthen product innovation capabilities by continuously improving product quality, packaging, branding, and product differentiation. Innovation should become an ongoing business strategy because market preferences and consumer expectations continue to change. By combining *e-commerce* utilization with product innovation, MSMEs can create stronger competitive advantages and expand their market opportunities.

Third, the local government and related institutions in Kendari City are encouraged to develop policies and programs that support MSME digital transformation. Training programs related to digital marketing, *e-commerce* management, financial technology utilization, and product innovation development should be continuously improved. Government support is essential to ensure that MSMEs, particularly small-scale businesses, can adapt to the digital economy.

Fourth, future researchers are encouraged to expand this study by including other variables that may influence MSME competitiveness, such as digital literacy, entrepreneurial orientation, financial access, business networking, and government support. Future studies may also use larger samples, different research methods, or comparative studies between regions to obtain a more comprehensive understanding of MSME digital transformation.

REFERENCES

- Abebe, M. (2014). Electronic commerce adoption, entrepreneurial orientation and small- and medium-sized enterprise (SME) performance. *Journal of Small Business and Enterprise Development*, 21(1), 100–116. <https://doi.org/10.1108/JSBED-10-2013-0145>
- Ainin, S., Parveen, F., Moghavvemi, S., Jaafar, N. I., & Shuib, N. L. M. (2015). Factors influencing the use of social media by SMEs and its performance outcomes. *Industrial Management & Data Systems*, 115(3), 570–588. <https://doi.org/10.1108/IMDS-07-2014-0205>
- Alegre, J., & Chiva, R. (2013). Linking entrepreneurial orientation and firm performance: The role of organizational learning capability and innovation performance. *Journal of Small Business Management*, 51(4), 621–638. <https://doi.org/10.1111/jsbm.12005>
- Azhari, A., Tanjung, M. A. J., Sagala, R. A., Manurung, W. C. S. R., & Hayati, Z. (2024). Strategi inovasi dan diferensiasi produk untuk meningkatkan daya saing UMKM di era digital. *Makro: Jurnal Manajemen dan Kewirausahaan*.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Calantone, R. J., Cavusgil, S. T., & Zhao, Y. (2002). Learning orientation, firm innovation capability, and firm performance. *Industrial Marketing Management*, 31(6), 515–524. [https://doi.org/10.1016/S0019-8501\(01\)00203-6](https://doi.org/10.1016/S0019-8501(01)00203-6)
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Hult, G. T. M., Hurley, R. F., & Knight, G. A. (2004). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management*, 33(5), 429–438. <https://doi.org/10.1016/j.indmarman.2003.08.015>
- Ilmi, A. K., & Hairunnisah, A. I. (2025). Peran inovasi digital dalam meningkatkan daya saing UMKM di pasar online Indonesia. *Jurnal Hukum, Manajemen, dan Humaniora*.
- Latif, A., Sari, R., & Pratama, D. (2024). Digital transformation and innovation capability in improving MSME competitiveness. *International Conference on Economics, Accounting and Technology Proceedings*.
- Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia. (2023). *MSME development report and digital transformation policy in Indonesia*. Jakarta: Ministry of Cooperatives and SMEs.
- Mutiah, R., Sari, D. P., & Hidayat, M. (2025). E-commerce capability and innovation strategy on MSME marketing performance. *Jurnal Riset Ekonomi*.
- Porter, M. E. (1990). *The Competitive Advantage of Nations*. New York: Free Press.
- Purwana, D., Rahmi, R., & Aditya, S. (2017). Pemanfaatan digital marketing bagi usaha mikro, kecil, dan menengah (UMKM) di Kelurahan Malaka Sari, Duren Sawit. *Jurnal Pemberdayaan Masyarakat Madani*, 1(1), 1–17.
- Putri, L. T., Aini, A. P. N., Solekah, N. A., & Istiqomah, D. F. (2023). Exploring e-commerce adoption in small and medium enterprises (SMEs) using Technology Acceptance Model. *International Journal of Business Economics*.
- Rahmawati, R., Hidayat, R., & Prasetyo, A. (2024). Digital transformation and MSME competitiveness: A systematic literature review. *Journal of Management and Entrepreneurship*.
- Rogers, E. M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.
- Schumpeter, J. A. (1934). *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Cambridge, MA: Harvard University Press.
- Turban, E., Outland, J., King, D., Lee, J. K., Liang, T. P., & Turban, D. C. (2018). *Electronic Commerce 2018: A Managerial and Social Networks Perspective*. Cham: Springer.
- Wijayanto, G., Sulistyandari, S., & Sari, R. (2024). The effect of e-commerce platforms, digital marketing, and user experience on market reach and competitiveness of Indonesian MSMEs. *International Journal of Business, Law, and Education*.
- Wirdiyanti, R., Yusgiantoro, I., Sugiarto, A., Harjanti, A. D., Mambea, I. Y., & Soekarno, S. (2023). How does e-commerce adoption impact micro, small, and medium enterprises' performance and financial inclusion? *Electronic Commerce Research*, 23, 1047–1071. <https://doi.org/10.1007/s10660-022-09547-7>