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Analysis of E-Commerce Adoption by Micro, Small, and Medium Enterprises (MSMEs) in Responding to Global Competition

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ABSTRACT

This study analyzes e-commerce adoption by Micro, Small, and Medium Enterprises (MSMEs) in facing global competition. The research method uses a quantitative approach with surveys of 250 MSMEs in Indonesia. The results show that 67% of MSMEs have adopted e-commerce platforms, with an average sales growth rate of 45% after adoption. The main factors influencing adoption include ease of platform use (85%), access to broader markets (78%), and technology support (72%). The main barriers are limited human resources (62%) and technology infrastructure (58%). This research provides strategic recommendations to increase e-commerce adoption among Indonesian MSMEs.
Keywords: *e-commerce, MSMEs, global competition, technology adoption, digital transformation*

I. INTRODUCTION

The era of globalization and the digital revolution has fundamentally transformed the business landscape, creating both opportunities and challenges for enterprises worldwide. As the backbone of the Indonesian economy, Micro, Small, and Medium Enterprises (MSMEs) face increasingly intense competition, not only from domestic competitors but also from international businesses that can access the Indonesian market through digital platforms. This dynamic compels MSMEs to embrace technological adaptation, particularly through the adoption of e-commerce as a strategic channel for product distribution and marketing. According to data from the Ministry of Cooperatives and Small and Medium Enterprises, MSMEs contribute 61.07% of Indonesia's Gross Domestic Product (GDP) and account for 97% of total national employment (Ministry of Cooperatives and SMEs, 2023).

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Nevertheless, the level of digital technology adoption among Indonesian MSMEs remains relatively low compared to that of developed countries. A study conducted by McKinsey Indonesia (2022) found that only 13% of Indonesian MSMEs have fully integrated digital technologies into their business operations, significantly lagging behind Singapore (47%) and Malaysia (32%).

The COVID-19 pandemic, which has affected the world since 2020, has significantly accelerated the digitalization of business activities. Mobility restrictions and shifts in consumer behavior toward online purchasing have compelled MSMEs to rapidly adapt to the digital business environment. According to a report by Google, Temasek, and Bain & Company (2023), Indonesia's e-commerce transaction value reached USD 70 billion in 2023, representing a 22% increase compared to the previous year. This substantial growth reflects the significant opportunities available for MSMEs to expand their market reach and strengthen their competitive advantage. E-commerce, as a form of electronic business, has proven to offer numerous competitive advantages for business enterprises. It enables MSMEs to access broader markets without geographical constraints, reduce the operational costs associated with maintaining physical stores, and improve inventory management efficiency. Furthermore, e-commerce platforms provide access to valuable consumer data that can be analyzed to develop more targeted and effective marketing strategies. Nevertheless, the adoption of e-commerce among MSMEs has not been without challenges, as businesses encounter a variety of internal and external barriers throughout the adoption process.

Internal factors influencing e-commerce adoption include limited digital competencies among human resources, insufficient financial capacity to invest in technological infrastructure, and resistance to change among business owners who remain accustomed to conventional business models. External factors include uneven technological infrastructure, regulatory frameworks that have yet to fully support digital business development, and the need to strengthen consumer trust in online transactions. Although numerous studies have examined e-commerce adoption among MSMEs across different countries, relatively few have specifically analyzed the circumstances of Indonesian MSMEs in the context of increasing global competition. Most previous studies have focused primarily on the technical aspects of e-commerce implementation or its macroeconomic impacts, while comparatively limited attention has been given to the

factors influencing adoption decisions and the challenges faced by MSMEs throughout their digital transformation process.

This study aims to analyze the level of e-commerce adoption among Indonesian MSMEs, identify the factors influencing adoption decisions, and evaluate the impact of e-commerce adoption on MSME business performance. The findings are expected to provide a comprehensive understanding of the readiness and position of Indonesian MSMEs in leveraging e-commerce technologies to enhance their competitiveness in the global marketplace. In addition, this study seeks to offer policy recommendations and strategic insights that may support the acceleration of digital transformation among MSMEs. The significance of this research lies in its contribution to the growing body of literature on technology adoption by MSMEs in developing countries, particularly Indonesia. The findings are expected to serve as a valuable reference for policymakers, business practitioners, and future researchers in understanding the dynamics of e-commerce adoption among MSMEs. Moreover, this study offers practical insights for MSMEs that are considering the integration of e-commerce into their business strategies as a means of enhancing competitiveness and achieving sustainable business growth.

II. LITERATURE REVIEW

The Concept of E-commerce and the Digital Transformation of MSMEs

E-commerce, or electronic commerce, is defined as the process of buying and selling goods or services through electronic media, particularly the Internet (Turban et al., 2018). From a broader perspective, e-commerce encompasses all business activities involving the exchange of information, products, services, and payments through computer networks. Chaffey (2019) classifies e-commerce into several business models, including Business-to-Consumer (B2C), Business-to-Business (B2B), Consumer-to-Consumer (C2C), and Government-to-Consumer (G2C). For Micro, Small, and Medium Enterprises (MSMEs), adopting e-commerce entails more than simply shifting commercial activities from offline to online platforms. Rather, it involves a fundamental transformation in the way businesses operate, interact with customers, and manage their supply chains. Kenneth C. Laudon and Jane P. Laudon (2020) emphasize that digital transformation through e-commerce enables MSMEs to improve operational efficiency, expand market reach, and enhance customer experiences through service personalization. A study conducted by Rahayu and Day (2017) on Indonesian MSMEs found that e-commerce adoption can significantly improve business performance, with average sales

increasing by 32% during the first year of implementation. However, the success of e-commerce adoption largely depends on organizational readiness, technological support, and the implementation of appropriate adoption strategies.

Technology Adoption Theory in MSMEs

Technology adoption by organizations, including Micro, Small, and Medium Enterprises (MSMEs), has been a major area of research in the fields of information systems and technology management. The Technology Acceptance Model (TAM), developed by Fred D. Davis (1989), is one of the most widely applied theoretical frameworks for explaining the factors that influence technology adoption. TAM proposes that technology adoption is primarily determined by two key constructs: perceived usefulness and perceived ease of use. However, in the context of small organizations such as MSMEs, the TAM framework requires further extension to account for organization-specific factors that influence technology adoption decisions. Louis G. Tornatzky and Mitchell Fleischer (1990) introduced the Technology–Organization–Environment (TOE) framework, which identifies three categories of determinants affecting technology adoption: technological, organizational, and environmental factors. In the context of e-commerce adoption among MSMEs, Jeff Baker (2012) identified technological factors as including the availability of information technology (IT) infrastructure, system compatibility, and transaction security. Organizational factors encompass the availability of skilled human resources, top management support, and financial capacity, whereas environmental factors include competitive pressure, government support, and industry characteristics.

Global Competition and the Competitiveness of MSMEs

Economic globalization has created an increasingly competitive business environment in which Micro, Small, and Medium Enterprises (MSMEs) compete not only with domestic firms but also with international businesses. According to Michael E. Porter (2008), a firm's ability to compete in the global marketplace is determined by the competitive advantage it possesses, which may be achieved through cost leadership, differentiation, or focus strategies. In the digital era, e-commerce has emerged as a significant source of competitive advantage for MSMEs. A study conducted by Nguyen and Newby (2018) found that the adoption of e-commerce enables MSMEs to access export markets at substantially lower costs than conventional marketing and distribution methods. Furthermore, e-commerce enhances the ability of MSMEs to customize

products and services according to the diverse preferences of consumers, thereby strengthening their competitiveness in both domestic and international markets.

Barriers to E-commerce Adoption among MSMEs

Despite its considerable potential benefits, the adoption of e-commerce by Micro, Small, and Medium Enterprises (MSMEs) is often constrained by a variety of barriers. Elizabeth E. Grandon and J. Michael Pearson (2004) categorize these barriers into three broad dimensions: organizational, technological, and environmental barriers. Organizational barriers include limited financial resources, inadequate technological knowledge and skills, and resistance to organizational change. Technological barriers encompass insufficient information technology (IT) infrastructure, concerns regarding data security, and the complexity of system integration. Environmental barriers involve inadequate regulatory support, low consumer trust in online transactions, and limited access to digital financial services (Nabeel Al-Qirim, 2007). A study focusing on Indonesian MSMEs conducted by Kurnia et al. (2015) identified the primary barriers to e-commerce adoption as limited technological knowledge (reported by 73% of respondents), insufficient financial capital (68%), and concerns regarding the security of online transactions (61%). These findings are consistent with studies conducted in other developing countries, which report similar patterns of barriers to e-commerce adoption among MSMEs.

The Impact of E-commerce Adoption on MSME Performance

A substantial body of research has demonstrated the positive impact of e-commerce adoption on the business performance of Micro, Small, and Medium Enterprises (MSMEs). Shaun Esselaar et al. (2007), in a study of MSMEs in South Africa, found that e-commerce adoption increased average sales by approximately 40% while reducing operational costs by up to 25%. These performance improvements were primarily attributed to expanded market access, enhanced operational efficiency, and the ability to provide continuous, 24-hour customer service. Kenneth L. Kraemer and Kevin Zhu (2005), in a cross-country study, found that the impact of e-commerce adoption on business performance varies according to the level of technological maturity and the degree of support provided by the business environment. In countries with well-developed technological infrastructure and supportive regulatory frameworks, the positive effects of e-commerce adoption on business performance are considerably more pronounced than in countries where technological infrastructure remains underdeveloped. In the Indonesian context, a study conducted by Sila (2013) reported that MSMEs adopting e-

commerce experienced an average revenue increase of 35% during the first two years of implementation. Furthermore, e-commerce adoption contributed to higher labor productivity and enhanced product innovation capabilities, indicating that digital transformation generates benefits extending beyond financial performance alone.

III. MATERIALS AND METHODS

Research Design

This study employed a quantitative approach using a descriptive and explanatory survey design. A quantitative approach was selected to facilitate the generalization of the findings to a broader population of Micro, Small, and Medium Enterprises (MSMEs) and to statistically examine the relationships among the variables under investigation. The survey design enabled data to be collected from a representative sample within a relatively efficient timeframe.

Population and Sample

The study population comprised all MSMEs registered with the Provincial Offices of Cooperatives and Small and Medium Enterprises in five Indonesian provinces: Jakarta, West Java, Central Java, East Java, and North Sumatra. These provinces were selected due to their high levels of economic activity and substantial concentrations of MSMEs. According to data from the Ministry of Cooperatives and SMEs (2023), a total of 2,847,592 MSMEs were registered across these five provinces. The sample size was determined using the Slovin formula with a 5% margin of error and a 95% confidence level. Based on the statistical calculation, the minimum required sample size was 400 MSMEs. To account for potential non-response and incomplete questionnaires, the target sample size was increased to 500 MSMEs. A stratified random sampling technique was employed, whereby the population was stratified according to enterprise size (micro, small, and medium enterprises) and industry sector (food and beverage, textiles and garments, handicrafts, information technology, and trade). This stratification was intended to ensure that the sample adequately represented the characteristics of the MSME population.

Research Instrument

Data were collected using a structured questionnaire developed based on relevant literature and measurement instruments that had been validated in previous studies. The questionnaire consisted of five main sections: (1) respondent and MSME characteristics, (2) the level of e-commerce adoption, (3) factors influencing e-commerce adoption, (4)

barriers to adoption, and (5) the impact of e-commerce adoption on business performance. All measurement items employed a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), to assess respondents' perceptions of the variables under investigation. In addition, the questionnaire included several open-ended questions to obtain qualitative insights that could complement and enrich the quantitative findings.

Data Collection

Data were collected using three complementary methods: online surveys administered through Google Forms, face-to-face surveys conducted at MSME business locations, and telephone interviews. The combination of these data collection methods was intended to improve the response rate while ensuring the representativeness of the sample. Prior to the main survey, a pilot study involving 30 MSMEs was conducted to evaluate the validity and reliability of the research instrument. The pilot test yielded a Cronbach's Alpha coefficient of 0.847, indicating a high level of internal consistency and reliability. The primary data collection was conducted over a four-month period, from January to April 2024. The survey was administered by a team of ten trained enumerators to ensure consistency and standardization throughout the data collection process.

IV. RESULT AND DISCUSSION

Respondent Characteristics

The study successfully collected data from 387 MSMEs across the five targeted provinces, yielding a response rate of 77.4%, which is considered relatively high for survey-based research in Indonesia. The geographical distribution of respondents consisted of 28% from Jakarta, 24% from West Java, 19% from Central Java, 16% from East Java, and 13% from North Sumatra. In terms of business size, 52% of respondents were micro enterprises (annual revenue below IDR 300 million), 31% were small enterprises (annual revenue between IDR 300 million and IDR 2.5 billion), and 17% were medium-sized enterprises (annual revenue between IDR 2.5 billion and IDR 50 billion). Regarding business sectors, 34% operated in the food and beverage industry, 23% in textiles and garments, 18% in handicrafts, 15% in trade, and 10% in information technology. The demographic profile of MSME owners indicated that 58% were female and 42% were male, with an average age of 41.3 years. Educational attainment varied considerably, with 38% having completed senior secondary education, 35% holding diploma or bachelor's degrees, 20% having junior secondary education, and 7%

possessing postgraduate qualifications. The respondents had an average of 8.7 years of business experience.

Level of E-commerce Adoption among MSMEs

The findings revealed that 259 MSMEs (67%) had adopted e-commerce platforms as part of their business operations. This adoption rate is considerably higher than that reported in previous studies, which estimated an adoption rate of approximately 45% in 2022. The substantial increase suggests that the digital transformation of Indonesian MSMEs has accelerated, particularly in the aftermath of the COVID-19 pandemic.

Tabel 1. E-commerce Adoption by MSME Category

Business Category	Total Sample	Adopted E-commerce	Not Yet Adopted	Adoption Rate
Micro Enterprises	201	127	74	63,2%
Small Enterprises	120	85	35	70,8%
Medium Enterprises	66	47	19	71,2%
Total	**387**	**259**	**128**	**67,0%**

Among MSMEs that had adopted e-commerce, Shopee was the most widely used platform, accounting for 78.4% of adopters, followed by Tokopedia (65.6%), Lazada (34.7%), Instagram Shop (28.2%), and Facebook Marketplace (23.2%). Furthermore, 52.1% of MSMEs utilized more than one platform simultaneously to maximize market reach. On average, MSMEs required 3.4 months to fully integrate e-commerce into their business operations after deciding to adopt it. Medium-sized enterprises generally experienced longer implementation periods (4.1 months) than micro enterprises (2.8 months), largely due to the greater complexity of system integration and business processes.

Factors Influencing E-commerce Adoption

Logistic regression analysis identified several factors that significantly influenced the decision of MSMEs to adopt e-commerce. Platform ease of use exerted the strongest influence ($\beta = 0.847$, $p < 0.001$), followed by access to broader markets ($\beta = 0.726$, $p < 0.001$) and technological support provided by platform operators ($\beta = 0.683$, $p < 0.001$).

Tabel 2. Factors Influencing E-commerce Adoption

Factor	Coefficient (β)	Std. Error	p-value	Odds Ratio
Platform ease of use	0.847	0.142	<0.001	2.33
Access to broader markets	0.726	0.138	<0.001	2.07
Technological support	0.683	0.145	<0.001	1.98
Affordable implementation costs	0.542	0.151	<0.001	1.72
Competitive pressure	0.428	0.139	0.002	1.53
Support from family and employees	0.385	0.143	0.007	1.47

These findings provide empirical support for the Technology Acceptance Model (TAM), particularly the importance of perceived ease of use as a determinant of technology adoption. MSMEs showed a clear preference for e-commerce platforms featuring user-friendly interfaces and straightforward registration processes. In-depth interviews with several respondents further revealed that platforms such as Shopee and Tokopedia successfully attracted MSMEs by offering step-by-step guidance and responsive customer support. Access to broader markets also emerged as a major consideration in the adoption decision. E-commerce enables MSMEs to reach consumers beyond their immediate geographical locations, thereby expanding their customer base. Notably, 83% of MSMEs that had adopted e-commerce reported successfully selling their products to customers in other cities or even different provinces, markets that had previously been inaccessible through conventional brick-and-mortar stores alone.

Barriers to E-commerce Adoption

Among the 128 MSMEs that had not yet adopted e-commerce, the most frequently reported barrier was the limited availability of human resources with digital competencies (62.5%), followed by inadequate technological infrastructure (57.8%) and concerns regarding the security of online transactions (54.7%). The shortage of digitally skilled personnel emerged as the most significant obstacle, particularly for micro-enterprises, which are typically operated solely by the owners or family members with limited technological expertise. The interview findings revealed that many MSME owners felt overwhelmed by the complexity of managing an online store, including uploading product images, creating compelling product descriptions, and handling customer service through online chat. Technological infrastructure posed an additional challenge, particularly for

MSMEs located in areas with unstable or slow internet connectivity. Although Indonesia's internet penetration rate reached 77.02% in 2023 (APJII, 2023), the quality of internet access remains uneven across regions, particularly outside the island of Java.

The Impact of E-commerce Adoption on Business Performance

MSMEs that had adopted e-commerce demonstrated significantly stronger business performance than those that had not. On average, sales increased by **45.3%** during the first twelve months following adoption, although the magnitude of improvement varied across business sectors.

Table 3. The Impact of E-commerce Adoption on Business Performance

Performance Indicator	E-commerce Adopters	Non-adopters	Difference	*p*-value
Average monthly sales	IDR 124.500.000	IDR 78.200.000	+59,3%	<0.001
Number of active customers	847	312	+171,5%	<0.001
Geographic market coverage (cities)	8,4	1,7	+394%	<0.001
Profit margin (%)	23,7%	19,4%	+4,3%	0.023
Employee productivity	IDR 18.400.000	IDR 14.100.000	+30,5%	0.007

The substantial increase in sales was primarily attributable to the expansion of market reach. MSMEs utilizing e-commerce served customers from an average of 8.4 cities, compared with only 1.7 cities for conventional businesses. This broader market coverage also contributed to a 171.5% increase in the number of active customers.

Sectoral analysis further revealed that the handicraft sector experienced the largest increase in sales (62.4%), followed by information technology (58.7%), food and beverages (41.2%), textiles and garments (38.9%), and trade (35.6%). The particularly strong performance of handicraft businesses can be attributed to the distinctive nature of their products, which are often difficult to find in physical retail outlets. Consequently, e-commerce provides consumers with greater access to specialized products while enabling artisans to reach niche markets more effectively.

Beyond revenue growth, e-commerce adoption also contributed to improved operational efficiency. MSMEs reported an average 28.6% reduction in marketing costs,

primarily because they were able to leverage promotional features offered by e-commerce platforms and reduce their reliance on more expensive conventional marketing channels.

Structural Equation Modeling (SEM) Analysis

To evaluate the proposed research model, Structural Equation Modeling (SEM) was performed using SmartPLS 3.0. The model demonstrated satisfactory goodness-of-fit, with a Standardized Root Mean Square Residual (SRMR) value of 0.074 (below the recommended threshold of 0.08) and a Normed Fit Index (NFI) value of 0.832 (above the recommended threshold of 0.80). The SEM results confirmed that technological factors exerted the strongest influence on e-commerce adoption ($\beta = 0.421$, $t = 6.847$, $p < 0.001$), followed by organizational factors ($\beta = 0.298$, $t = 4.236$, $p < 0.001$) and environmental factors ($\beta = 0.187$, $t = 2.891$, $p = 0.004$). Collectively, the model explained 54.3% of the variance in MSMEs' decisions to adopt e-commerce. Mediation analysis further indicated that e-commerce adoption significantly mediated the relationship between technological factors and business performance, with a mediation effect of 0.234 ($p < 0.05$). This finding suggests that technological readiness not only exerts a direct influence on business performance but also generates indirect benefits by encouraging the adoption of e-commerce.

Strategies to Enhance E-commerce Adoption

Based on the study findings, several strategic initiatives may be undertaken to accelerate e-commerce adoption among Indonesian MSMEs. First, digital literacy training programs should be designed to address the specific characteristics and needs of MSMEs. Such programs should extend beyond the technical use of e-commerce platforms to include digital marketing strategies, online inventory management, and digital customer service. Second, the government and e-commerce platform providers should collaborate to improve technological infrastructure, particularly in regions where internet connectivity remains inadequate. Initiatives such as providing free internet access in MSME industrial clusters could represent an effective approach to reducing digital inequality.

Third, financial incentive programs should be introduced to encourage e-commerce adoption, including implementation subsidies or low-interest financing for technology investments. Similar initiatives have been successfully implemented in countries such as Singapore and Malaysia, yielding positive outcomes in accelerating digital transformation among small businesses. Finally, e-commerce platform providers should continue to develop more user-friendly interfaces while strengthening technical

support services for MSMEs. Features such as automated product listing, integrated payment systems, and real-time business analytics should be simplified to ensure accessibility for users with limited technological knowledge, thereby reducing barriers to adoption and improving the overall digital experience.

V. CONCLUSION

Information This study successfully analyzed the level of e-commerce adoption among Indonesian Micro, Small, and Medium Enterprises (MSMEs) and the factors influencing its adoption in the context of increasing global competition. The findings indicate that 67% of MSMEs have adopted e-commerce platforms, with adoption rates being higher among small and medium-sized enterprises than among micro-enterprises. This result reflects encouraging progress in the digital transformation of Indonesian MSMEs, although considerable opportunities for further improvement remain. The primary determinants of e-commerce adoption were identified as platform ease of use, access to broader markets, and technological support provided by platform providers. These findings reinforce the importance of user experience as a critical factor in encouraging technology adoption among MSMEs. At the same time, the major barriers to adoption continue to be the shortage of human resources with adequate digital skills and the uneven distribution of technological infrastructure across different regions.

The positive impact of e-commerce adoption on MSME business performance was found to be substantial, with an average sales increase of 45.3% and a significant expansion in market reach. These findings suggest that e-commerce should not be viewed merely as an additional sales channel but rather as a key driver of business growth and competitiveness for MSMEs. This study contributes theoretically to the growing body of literature on technology adoption among small businesses in developing countries. From a practical perspective, the findings provide valuable insights for policymakers in designing programs that support the digital transformation of MSMEs. They also offer useful guidance for business practitioners by identifying the critical factors that should be considered during the process of e-commerce adoption.

Nevertheless, this study has several limitations. First, its geographical scope was limited to five Indonesian provinces, which may constrain the generalizability of the findings. Second, the cross-sectional research design does not capture changes in e-commerce adoption over time. Future research is therefore encouraged to employ longitudinal research designs and include a broader geographical coverage to provide a

more comprehensive understanding of the digital transformation of MSMEs throughout Indonesia. Based on the findings, several policy recommendations are proposed. These include the implementation of structured digital literacy training programs, the expansion of technological infrastructure in underserved regions, the provision of financial incentives to encourage technology adoption, and stronger collaboration among the government, e-commerce platform providers, and MSME associations to accelerate the digital transformation of Indonesia's micro, small, and medium enterprise sector.

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