

Factors Influencing Decision Making to Adopt Cross-Border E-commerce

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Abstract

Purpose: This study aims to identify and analyze the factors that influence the decision of MSMEs in Indonesia to adopt cross-border E-commerce. The main focus is on six variables that refer to the TOE framework: perceived benefit, perceived security, perceived cost, government support, organizational readiness, and organizational innovativeness.

Methodology/approach: This study used a quantitative approach through an online questionnaire survey distributed to 440 MSME owners in Indonesia. Purposive sampling was applied with the criterion that respondents were familiar with or used digital platforms for learning. Data were analyzed using PLS-SEM through SMARTPLS to test variable relationships, supported by descriptive analysis via SPSS to outline the respondent characteristics.

Results: The results show that government support, organizational readiness, and organizational innovativeness significantly influence MSMEs' adoption of Cross-Border E-commerce, while perceived benefit, perceived security, and perceived cost do not. The study highlights that adoption is driven more by organizational and environmental factors than by technology-related perceptions.

Conclusions: Indonesian MSMEs' decision to adopt cross-border E-commerce is mainly determined by their organizational readiness, innovation capabilities, and government support. Strengthening internal capacity and improving government facilities and policies are key factors driving MSME digital transformation success.

Limitations: This study is limited to variables within the TOE framework and uses cross-sectional data; therefore, the findings cannot yet describe changes in MSME behavior comprehensively or be generalized to other countries.

Contributions: This study provides practical insights for the government, MSME players, and researchers to formulate strategies to accelerate the adoption of cross-border E-commerce in Indonesia.

Keywords: *Cross-Border E-commerce, Government Support, Organizational Innovativeness, Organizational Readiness, Technology Organization Environment*

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1. Introduction

According to data [Dewi and Mardika \(2026\)](#), the number of MSMEs in Indonesia is projected to reach 64 million by 2025. Only approximately 39.7% of these are registered in the digital ecosystem. Therefore, based on this data, it can be concluded that MSMEs in Indonesia experience positive growth each year. According to data, there are approximately 75,000 MSMEs in Batam ([Zaki, Métwalli, Aly, & Badawi, 2023](#)). Although these developments are considered positive for MSMEs in Indonesia, MSMEs still face challenges related to the failure to optimize digital technology, including limited

access to adequate digital literacy and marketing skills. This phenomenon demonstrates that the level of digital readiness and capabilities are important factors influencing decision-making, which will influence the success of market expansion.

The rapid advancement of digital information technology has transformed how business actors operate across various activities ([Soetiyani, Lukiyana, Ariandi, Kamaruddin, & Jundi, 2024](#)). Digital tools, such as E-commerce, enable micro, small, and medium enterprises to expand their market reach both locally and globally. The use of E-commerce has been shown to improve transaction efficiency and customer interaction for MSMEs ([Annisa & Murni, 2025](#)). Many MSME actors also utilize digital platforms to reduce operational costs and accelerate the sales process ([Soetiyani et al., 2024](#)). Therefore, E-commerce functions not only as a marketing medium but also as an enabler that enhances overall business performance ([Soetiyani et al., 2024](#)). E-commerce is a transactional system that allows sellers and buyers to interact virtually without face-to-face meetings, facilitating product selection, payment, and fast delivery processes, resulting in greater customer convenience. Additionally, E-commerce is considered a strategic channel for reaching wider markets compared with conventional trade ([Sudari, 2023](#)). However, adopting E-commerce is not free from challenges because internal factors, such as organizational readiness and technological literacy, remain significant obstacles for MSMEs. External factors, such as market pressure and consumer trust, also influence MSMEs' decisions to integrate digital technology into their operations ([Sudari, 2023](#)).

Empirical findings show that most E-commerce studies on MSMEs focus on domestic contexts and rarely examine cross-border dimensions. For example, consumer trust has been identified as a key factor in digital marketing strategies but remains underexplored in international expansion settings. Other studies indicate that perceptions of security and digital service quality strongly shape online purchasing decisions, which are essential when operating in global markets. Research on Indonesian MSMEs also reveals that technological modernization is uneven across regions, resulting in varied E-commerce experiences in different areas. These patterns indicate a research gap regarding how Technological, Organizational, and Environmental (TOE) factors shape Indonesian MSMEs' decisions to adopt cross-border E-commerce. This study offers a distinct contribution by applying the TOE framework to the context of cross-border E-commerce adoption among Indonesian MSMEs. Existing literature has predominantly employed the TOE model to examine general or domestic E-commerce adoption, whereas empirical studies focusing on cross-border adoption are limited and fragmented. Therefore, the application of the TOE framework in this research provides conceptual originality, as it allows for a more comprehensive understanding of how technological, organizational, and environmental factors interact when MSMEs operate beyond national boundaries. This emphasis on cross-border dynamics strengthens the theoretical scope of TOE and positions this study as a novel extension within the Indonesian MSME context.

This research was conducted because the adoption of E-commerce still creates uncertainties and challenges for MSME players in running their businesses across borders. E-commerce adoption requires a long process, and the technology employed must be sufficiently advanced. For MSME players, the level of competition is intense and highly competitive, so they must have a special strategy to compete with large-scale companies that have dominated the market ([C. Q. Nguyen, Nguyen, & Tran, 2024](#)). Factors influencing SMEs' decisions include perceived benefits, perceived security, perceived cost, organizational readiness, government support, and organizational innovativeness. These factors can be clarified in the TOE (Technology, Organization, Environment) theory, which supports this research ([Li, Liow, & Yuan, 2022](#)). In this study, the researchers focused on identifying factors that offer clearer empirical explanations for MSMEs' decisions. According to [Ocloo, Xuhua, Akaba, Shi, and Worwui-Brown \(2020\)](#), the decision of MSME actors to adopt E-commerce is influenced by TOE (Technology, Organization, Environment) factors. The factors used by researchers in this study aim to determine the effect of indicators that are determined to be significant or insignificant in this study based on the TOE principle. In addition, researchers want to see what indicators influence the E-commerce adoption process. The results of the tested indicators can be used as support for MSME actors in making decisions regarding E-commerce adoption.

2. Literature Review and Hypothesis Development

2.1 Main Theoretical Framework

The framework used in this study is the TOE framework. The TOE framework was proposed by Tornatzky and Fleischer to understand the factors that influence the adoption of information technology (Salah & Ayyash, 2024). In the context of E-commerce implementation, the TOE (Technology–Organization–Environment) framework is used as the basic theory because it is recognized as the appropriate framework for studying technology implementation in organizations. In addition to focusing on technological aspects, TOE also involves micro and macro variables, such as factors within an organization and its surrounding environment. Thus, this framework has good explanatory power and high relevance for research and managerial applications. However, this theory still has shortcomings, especially in terms of neglecting individual characteristics, such as managers or staff who play an important role in the technology adoption process (T. H. Nguyen, Le, & Vu, 2022).

The TOE framework consists of three main aspects: technology, organization, and environment. The technology aspect describes the extent to which new technological innovations align with the benefits and needs of MSMEs. Meanwhile, the organizational aspect reflects the readiness of MSMEs in terms of scope, size, management support for change, and adequate resources (T. H. Nguyen et al., 2022). The environmental aspect explains external factors such as competitors, suppliers, and government policies that influence MSME decisions to adopt information technology (Abdulkarem & Hou, 2022). These three aspects collectively explain why technological value perceptions, organizational capabilities, and external institutional pressures shape MSMEs' cross-border E-commerce decisions.

2.2 Perceived Benefit

Perceived benefits are defined as the extent to which users believe that the use of technology provides benefits, convenience, increased income, and broader market access. In research Khsroo, Burhanuddin, Ali, and Shihab Ahmed (2024) perceived benefits and E-commerce adoption produce significant positive relates. The utilization of E-commerce has many advantages over other trading methods. E-commerce has a wide range of markets, both national and international, which is very beneficial for MSME owners if they adopt E-commerce. The benefits obtained are not only profits but also increased efficiency of MSMEs. The benefits and efficiency become the decision process for MSMEs to adopt E-commerce. Isa and Alenezi (2022) found a significant positive relationship between perceived benefits and E-commerce adoption. Across studies, perceived benefit has consistently emerged as a primary driver of E-commerce adoption because it enhances expected performance and market reach. Perceived benefits motivate MSMEs to improve efficiency. Perceived Benefit is the most important factor in E-commerce adoption. This factor will be the key to the decision to adopt E-commerce (Almunawar, Auzzali, Oseli, & Ariff, 2022; Hossain, Al-Hanakta, Hervie, Md Nor, & Illes, 2022; Li et al., 2022; Shanmugam, Teoh, & Thurasamy, 2022).

H₁: Perceived Benefit is positively related to cross-border E-commerce adoption

2.3 Perceived Security

Security is one of the indicators taken into consideration in making decisions for adopted E-commerce because there are often obstacles in the adoption process (Hussein, Baharudin, Kiumarsi, & Hilmi, 2020). Challenges and obstacles in the adoption process are influenced by the fear of risks arising, such as failed transactions and fraud. Security must be based on a belief that exists in the E-commerce adoption process. Good security can increase MSME owners' trust because customers' privacy and data can be properly maintained. Security strengthens trust and reduces perceived risk, making it a key technological factor influencing cross-border adoption (Firsty & Dachyar, 2022; Sujatha & Karthikeyan, 2021). Perceived security is an important factor that influences users' perceived trust and value in E-commerce. Anshori, Karya, and Gita (2022) found that perceived security significantly affects perceived value and trust, both of which are key determinants in the sustainability of E-commerce use. In the context of adoption, Setiyani and Rostiani (2021) through the Technology–Organization–Environment (TOE) approach also confirmed that security aspects are technological factors that have a significant effect on E-commerce adoption intention, especially for small and medium enterprises. The protection of business information and transaction security are the main considerations in making decisions regarding the adoption of E-commerce systems by businesses.

H_2 : Perceived Security is positively related to cross-border E-commerce adoption

2.4 Perceived Cost

[Li et al. \(2022\)](#) perceived that the cost of E-commerce adoption results in a significant relationship. This study emphasizes that the costs required for E-commerce adoption are high, making MSMEs think first before making a decision. The costs include adoption and training costs. However, some MSMEs choose not to adopt E-commerce due to a lack of financial resources. This hypothesis is supported by research ([C. O. Nguyen et al., 2024](#); [Sujatha & Karthikeyan, 2021](#)). According to this research [Setyowati, Masyhuri, Mulyo, and Irham \(2024\)](#) perceived cost with E-commerce adoption results in an insignificant relationship. Cost is not a problem for E-commerce adoption in this study. The cost for medium MSMEs is not an obstacle in the decision to adopt E-commerce. The resources owned by medium MSMEs, such as technology and the Internet, were already owned before adopting E-commerce, and there were not many expenses for E-commerce adoption. This hypothesis is supported by [Sarfo and Song \(2021\)](#). Cost is an important factor in the acceptance of technology. This cost reflects the perception of business actors towards the balance between the benefits obtained and the financial sacrifices incurred when using an E-commerce system. In practice, high costs are often an obstacle to the continued use of E-commerce, especially if the perceived benefits are not worth the investment.

H_3 : Perceived Cost is negatively related to cross-border E-commerce adoption

2.5 Government Support

According to [Ocloo et al. \(2020\)](#), government support and E-commerce adoption are significantly related. Government support for E-commerce development is needed to encourage MSMEs to adopt E-commerce. The support that the government can provide starts with IT support and training. These factors can increase the motivation. This statement is in line with research [Aswar, Ermawati, Wirman, Wiguna, and Hariyani \(2021\)](#), who state that the government is the driving factor for E-commerce adoption and provides the capacity to protect business transactions. This study [Firsty and Dachyar \(2022\)](#) found that government support significantly affects E-commerce adoption. This is because policies and assistance are needed for the development of E-commerce. Policies that the government can create include making laws that protect E-commerce users from fraud ([Ahi, Sinkovics, & Sinkovics, 2023](#)). IT support can be provided for E-commerce. Therefore, the government can be a major factor in increasing E-commerce adoption. In addition, the government's role in providing facilities as a means of support and assistance in marketing products owned by MSMEs digitally also influences the adoption of E-commerce ([Harmawan, 2022](#)).

H_4 : Government Support positively relates to Cross Borders E-commerce adoption

2.6 Organizational Readiness

An organization is a place where a group of people work together to achieve the goals of the organization itself. Organizational readiness can be used as an assessment to align planned goals with actual achieved goals in various aspects of the process ([Li et al., 2022](#)). Factors that can affect organizational readiness for MSME actors include the readiness of infrastructure, finance, information technology, and human resources. From these various factors, organizational readiness can be shortened into two related areas, namely, financial and technological readiness for MSMEs. According to [Purwantini, Hidayati, and Aligarh \(2024\)](#), organizational readiness and E-commerce adoption have a significant and positive relationship. Organizational readiness is a factor in the adoption of E-commerce. Organizations with high levels of preparation make better decisions regarding E-commerce adoption. Especially, readiness in technology and employee training. This hypothesis is supported ([Isa & Alenezi, 2022](#); [Setyowati et al., 2024](#)). In contrast to previous research, [Effendi and Subroto \(2021\)](#) found that the relationship between organizational readiness and E-commerce is not significant. Although some studies report weak effects due to differences in resource availability, the dominant pattern supports readiness as a positive predictor.

H_5 : Organizational readiness is positively related to Cross Borders E-commerce adoption

2.7 Organizational Innovativeness

According to [Setyowati et al. \(2024\)](#), organizational innovativeness significantly affects E-commerce adoption. This creates new challenges that affect MSMEs' decisions to adopt E-commerce. The new

challenge encourages MSME owners to create ideas that are different from before. This idea will be used to compete with existing competitors. These challenges force MSME owners to continue innovating to increase profits. [Daoud and Kammoun \(2024\)](#) found that organizational innovation positively affects E-commerce adoption. Innovation is crucial for the present and future of MSMEs. The owners of innovation is carry out innovation, so they also play an important role in this innovation. Therefore, MSMEs with innovative and experienced owners can reduce the risk of E-commerce adoption ([Auliandari, Suriyanti, & Azmi, 2022](#)).

According to [Octavia, Indrawijaya, Sriayudha, and Hasbullah \(2020\)](#), entrepreneurial orientation that includes innovation has a significant effect on E-commerce adoption and MSME business performance. MSMEs with strong innovation capabilities can overcome various limitations, such as capital, market access, and technology mastery, and are encouraged to utilize digital platforms to improve their competitiveness and performance. In line with this, [Salah and Ayyash \(2024\)](#) emphasized that innovation culture significantly influences E-commerce adoption by MSMEs. Within the TOE framework, they explained that MSMEs that build an innovative environment tend to be more adaptive to digital transformation, thus being able to better integrate technology and improve their marketing performance.

H₆: Organizational innovativeness is positively related to Cross Borders E-commerce adoption.

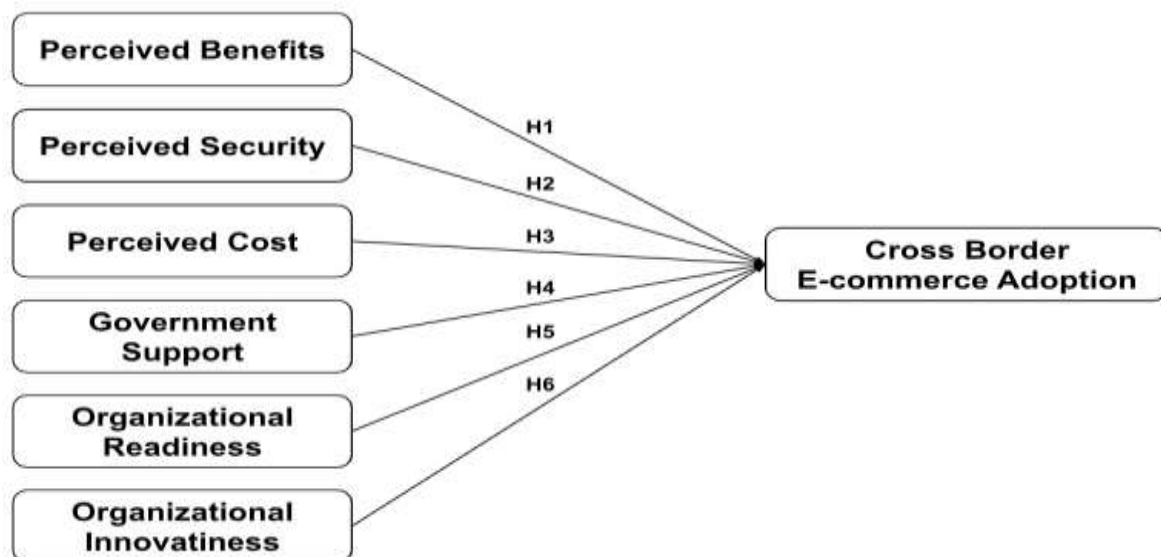


Figure 1. Research model

3. Research Methodology

This study used a quantitative approach. The quantitative approach focuses on the collection and analysis of numerical data, which allows researchers to investigate the relationship between variables in a structured manner ([Taherdoost, 2022](#)). Data were collected using Google Forms designed to measure the research variables. Through Google Forms created with questionnaires distributed online, it is easy for researchers to obtain respondents from anywhere and at any time. The results of the questionnaire will contain tabular displays, graphs, and other types of displays that will be analyzed to understand the phenomenon being studied. In addition, by using Google Forms, researchers can analyze the results obtained more easily because the data are structured and organized. Descriptive analytical research was used to investigate the elements that affect businesses' adoption of cross-border E-commerce. This study examines the factors that influence a company's decision to embrace cross-border E-commerce, including perceived advantages, perceived security, perceived cost, top management support, technology readiness, and competitive pressure. Quantitative data were processed using descriptive analytics to identify trends or correlations between variables. This model is a quantitative method that focuses on how organizations perceive the external and internal elements that propel digital transformation in the supply chain ([Febriani & Fikry, 2023](#)). It is anticipated that the study's findings will provide a clear picture of the potential and difficulties associated with digital adoption across

nations, as well as strategic considerations for companies looking to boost productivity and competitiveness internationally.

The population is defined as all units that are related to the objects in the research being conducted. The research population, which is the main focus of the research, is the owners of MSMEs in Indonesia. The level of MSMEs targeted by the study is divided into 3: micro enterprises (income less than IDR 300,000,000), small enterprises (income IDR 300,000,001- IDR 2,500,000,000), and medium enterprises (income IDR 2,500,000,001- IDR 50,000,000,000). The research population was selected based on the selected variables. The selected variables relate to the decision-making of MSME owners to adopt E-commerce to help increase efficiency and profit for MSMEs. The population that is the main focus must be known in advance to facilitate the distribution of questionnaires.

Sampling is an important aspect of the overall research process. Sampling techniques were used to select techniques suitable for sampling in the research. The sampling technique used in this study was purposive sampling. Purposive sampling is a strategy in which only certain populations are selected based on their suitability for research purposes. The selected population is MSME owners who have adopted E-commerce. The minimum sample size follows the rule of ten times the largest number of structural paths directed at any construct, making a sample of at least 60 respondents sufficient for the PLS-SEM analysis.

This study used a larger sample to increase statistical power and generalizability. The research instrument was validated through content validity testing involving expert judgment, followed by a pilot test to ensure reliability, clarity, and item suitability of the questionnaire. Construct validity and reliability were further assessed using convergent validity (loading factor, AVE) and internal consistency reliability (Cronbach’s Alpha, Composite Reliability). SmartPLS was used because it is suitable for predictive modeling, supports complex models with multiple constructs and indicators, and performs well with relatively small sample sizes. In addition, SmartPLS does not require multivariate normality, making it appropriate for MSME survey data, which commonly show non-normal distributions.

The data used in this study are primary data, and the method for collecting samples is through questionnaires distributed to MSME owners. The questions in the questionnaire were based on existing variables, namely, six independent variables and one dependent variable. These variables include perceived benefits, perceived costs, perceived security, government support, organizational readiness, and organizational innovativeness. The questions for each variable in the questionnaire were based on previous research. Where the assessment criteria consist of 5 points, namely Strongly Disagree

- (1) Disagree
- (2) Neutral / sufficient
- (3) Agree
- (4) Strongly agree

According [Hair, Ringle, and Sarstedt \(2011\)](#), there is a method to calculate the sample size needed. The sample size must be multiplied by the number of questions multiplied by 5 or 10. This study had six variables with a total of 26 questions; the sample size required was $(26 \times 10 = 260)$. Therefore, we know the number of respondents we have to get, namely 260 respondents with the criteria of MSME owners who adopt E-commerce as a business opportunity.

Table 1. Research Questionnaire Questions

| Variables | Indicator | | Source |
|--------------------|-----------|---|---|
| Perceived Benefits | PB1 | The implementation of cross-border E-commerce (such as TikTok Shop) has increased business opportunities. | (C. Q. Nguyen et al., 2024) |
| | PB2 | Cross-border E-commerce (such as TikTok Shop) provides me with a lot of useful information. | |

| | | | |
|----------------------------------|-------|---|-----------------------------|
| | PB3 | The implementation of cross-border E-commerce increases competitiveness. | |
| | PB4 | Cross-border E-commerce improves advertising and marketing. | |
| | PB5 | The implementation of cross-border E-commerce has made it easier for consumers to provide positive feedback to my business. | |
| Perceived Security | PS1 | Current regulations and laws are sufficient to protect cross-border E-commerce user. | (C. Q. Nguyen et al., 2024) |
| | PS2 | I am confident in the security of information in cross-border E-commerce transactions. | |
| | PS3 | I am confident in the payment systems used for cross-border E-commerce. | |
| Perceived Cost | PC1 | I feel that the cost of using cross-border E-commerce is quite high for companies. | (C. Q. Nguyen et al., 2024) |
| | PC2 | The time required to implement Cross-Border E-commerce (CBEC) is significant for companies. | |
| | PC3 | The maintenance and support costs for implementing cross-border E-commerce are quite high for the company. | |
| | PC4 | The infrastructure cost of implementing cross-border E-commerce is quite high for companies. | |
| Government Support | GS1 | Indonesia's current technological infrastructure is reliable and efficient enough to support cross-border E-commerce. | (C. Q. Nguyen et al., 2024) |
| | GS2 | Electronic payment facilities are safe and adequate for supporting cross-border E-commerce. | |
| | GS3 | Existing delivery services are reliable and efficient in supporting cross-border E-commerce. | |
| | GS4 | I received E-commerce-related information from the government. | |
| | GS5 | The government provides incentives and benefits to support E-commerce. | |
| Organisational Readiness | OR1 | My company already has a good telecommunications infrastructure. | (C. Q. Nguyen et al., 2024) |
| | OR2 | My company routinely uses database applications in its daily operations. | |
| | OR3 | My company has information system applications covering multiple functional areas, such as finance and marketing. | |
| Organisational Innovatiness | OI1 | Managers or employees are punished for failing to implement new ideas. | (C. Q. Nguyen et al., 2024) |
| | OI2 | Management welcomes and properly implements new ideas. | |
| | OI3 | Management rewards staff who provide new ideas and innovative work practices. | |
| | OI4 | Our company has a work plan for the use of Cross-Border E-commerce (CBEC) next year. | |
| Cross Border E-commerce Adoption | CBEC1 | Our company has a specific plan for implementing Cross-Border E-commerce (CBEC) within the next three years. | (C. Q. Nguyen et al., 2024) |
| | CBEC2 | Our company is strongly committed to adopting Cross-Border E-commerce (CBEC). | |

| | | | |
|--|-------|---|--|
| | CBEC3 | Our company has a strong, long-term commitment to implementing CBEC systems. | |
| | CBEC4 | The implementation of cross-border E-commerce (such as TikTok Shop) has increased business opportunities. | |

4. Results and Discussion

Table 1. Demographic profile

| | | Frequency | Percent (%) | Valid Percent (%) | Cumulative Percent (%) |
|---------------|---|-----------|-------------|-------------------|------------------------|
| Gender | Male | 187 | 42.5 | 42.5 | 42.5 |
| | Female | 253 | 57.5 | 57.5 | 100.0 |
| | Total | 440 | 100.0 | 100.0 | |
| Education | Elementary School | 5 | 1.1 | 1.1 | 1.1 |
| | Junior High School | 9 | 2.0 | 2.0 | 3.2 |
| | Senior High School / Vocational | 101 | 23.0 | 23.0 | 26.1 |
| | Diploma | 68 | 15.5 | 15.5 | 41.6 |
| | Bachelor's Degree | 171 | 38.9 | 38.9 | 80.5 |
| | Master's Degree | 70 | 15.9 | 15.9 | 96.4 |
| | Doctoral Degree | 16 | 3.6 | 3.6 | 100.0 |
| Total | 440 | 100.0 | 100.0 | | |
| Age | 44–59 Years Old | 66 | 15.0 | 15.0 | 15.0 |
| | 28–43 Years Old | 249 | 56.6 | 56.6 | 71.6 |
| | 12–27 Years Old | 125 | 28.4 | 28.4 | 100.0 |
| | Total | 440 | 100.0 | 100.0 | |
| Monthly Sales | Micro Enterprise (Less than IDR 25,000,000) | 169 | 38.4 | 38.4 | 38.4 |
| | Small Enterprise (IDR25,000,001–IDR208,000,000) | 181 | 41.1 | 41.1 | 79.5 |
| | Medium Enterprise (IDR208,000,001–IDR4,166,000,000) | 90 | 20.5 | 20.5 | 100.0 |
| MSMEs | Fashion | 99 | 22.5 | 22.5 | 22.5 |
| | Food and Beverage | 107 | 24.3 | 24.3 | 46.8 |
| | Furniture | 77 | 17.5 | 17.5 | 64.3 |
| | Toy Store | 56 | 12.7 | 12.7 | 77.0 |
| | Bookstore | 46 | 10.5 | 10.5 | 87.5 |
| | Beauty Products | 40 | 9.1 | 9.1 | 96.6 |
| | Fishing Equipment Store | 2 | 0,5 | 0,5 | 97.0 |
| | Design Services | 2 | 0,5 | 0,5 | 97,5 |
| | Mini Market | 6 | 1,4 | 1,4 | 98.9 |
| | Electronics | 1 | 0,2 | 0,2 | 99.1 |
| | Motorcycle Equipment | 2 | 0,5 | 0,5 | 99.5 |
| | Plants | 1 | 0,2 | 0,2 | 99.8 |
| | Sports Store | 1 | 0,2 | 0,2 | 100.0 |
| Total | 440 | 100.0 | 100.0 | | |

The demographic data show that women dominated the sample with 253 respondents (57.5%), while men accounted for 187 respondents (42.5%). Most respondents were bachelor's degree holders 171 (38.9%), and only five (1.1%) had elementary education, indicating generally strong human-capital readiness that supports digital adoption. The majority were aged 28–43 years, with 249 respondents (56.6%), suggesting a concentration of individuals in the productive age range who tend to be more adaptive to technology use. These characteristics reflect a group with sufficient cognitive, educational, and experiential resources to engage in cross-border E-commerce.

In terms of business characteristics, most respondents operated small enterprises, with 181 (41.1%) in this category, while medium-sized enterprises accounted for 90 (20.5%) of the total. The food and beverage sector were the most represented, with 107 respondents (24.3%), whereas electronics, plants, and sports shops each had only one respondent (0.2% each). These patterns illustrate that MSMEs facing fast-moving markets and higher competitive intensity tend to be more active in adopting digital marketing platforms. Such variations in scale and sector help explain why certain relationships in the model become significant or insignificant, as differences in resources, competitive pressure, and operational demands shape MSMEs' perception of the value and risk of cross-border E-commerce.

Table 2. VIF

| | VIF |
|-------------------------------|-------|
| Perceived benefits | 2.827 |
| Perceived security | 2.085 |
| Perceived cost | 1.053 |
| Government support | 2.253 |
| Organizational readiness | 2.524 |
| Organisational innovativeness | 3.046 |

Variance Inflation Factor (VIF) is a method used to determine whether there is multicollinearity, namely, the correlation between independent variables. According to [Zaki et al. \(2023\)](#), the value that must be produced by the VIF is a value that is <5 to be declared free from multicollinearity. In the tests carried out in this study, the VIF values in Table 2 met the criteria. The resulting average value of each variable was <5, indicating freedom from multicollinearity. Based on this result, testing for the next method can be performed.

Table 3. Outer loading, construct reliability and validity

| | | Outer Loadings | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracted (AVE) |
|--------------------|-----|----------------|------------------|-------|-----------------------|----------------------------------|
| Perceived benefits | PB1 | 0.757 | 0.825 | 0.825 | 0.877 | 0.588 |
| | PB2 | 0.781 | | | | |
| | PB3 | 0.745 | | | | |
| | PB4 | 0.782 | | | | |
| | PB5 | 0.768 | | | | |
| Perceived security | PS1 | 0.816 | 0.713 | 0.717 | 0.840 | 0.636 |
| | PS2 | 0.757 | | | | |
| | PS3 | 0.817 | | | | |
| Perceived cost | PC1 | 0.881 | 0.907 | 0.910 | 0.935 | 0.782 |
| | PC2 | 0.872 | | | | |
| | PC3 | 0.896 | | | | |
| | PC4 | 0.888 | | | | |
| Government support | GS1 | 0.792 | 0.813 | 0.816 | 0.870 | 0.572 |
| | GS2 | 0.753 | | | | |

| | | | | | | |
|----------------------------------|------|-------|-------|-------|-------|-------|
| | GS3 | 0.748 | | | | |
| | GS4 | 0.758 | | | | |
| | GS5 | 0.729 | | | | |
| Organizational readiness | OR1 | 0.794 | 0.735 | 0.738 | 0.850 | 0.653 |
| | OR2 | 0.810 | | | | |
| | OR3 | 0.820 | | | | |
| Organisational innovativeness | OI1 | 0.843 | 0.741 | 0.744 | 0.853 | 0.659 |
| | OI3 | 0.790 | | | | |
| | OI4 | 0.801 | | | | |
| Cross border E-commerce adoption | CBE1 | 0.753 | 0.760 | 0.760 | 0.847 | 0.581 |
| | CBE2 | 0.753 | | | | |
| | CBE3 | 0.789 | | | | |
| | CBE4 | 0.753 | | | | |

Outer loading is a measurement used to determine the strength of the relationship between the indicator and the variable being measured. In research [Radyawanto, Suhardi, Hartanto, Guyana, and Kiswara \(2022\)](#), the outer loading value must be > 0.7 in order to be said to meet the criteria in the assessment. A value of > 0.7 indicates that the indicator has a strong contribution to its construct, which will provide results that can be said to be valid. In the tests carried out in this study, the outer loading value in Table 3 explains that the results met the criteria. The resulting outer loading value was > 0.7 . Based on these results, testing for the next method can be performed.

The reliability test was divided into two stages: Cronbach's alpha and composite reliability. Cronbach's Alpha test is a reliability test that measures the internal consistency of questions in measuring one variable. According to [Munizu, Alam, Asdar, and Brasit \(2020\)](#), the Cronbach's alpha value must be > 0.6 to be considered valid and meet the criteria. In the tests carried out in this study, the Cronbach's alpha value in Table 3 shows results that have met the criteria. The resulting value was > 0.6 . Therefore, it can be concluded that the questionnaire is capable of measuring constructs.

Composite reliability is a reliability test that measures the consistency of questions in measuring the construct. This test is more flexible than Cronbach's alpha. In research [Purwanto and Sudargini \(2021\)](#), composite reliability must have a value of > 0.7 in order to be said to meet the research criteria. The higher the composite reliability, the more consistent it is in explaining the constructs. In the tests carried out in this study, the composite reliability value in Table 3 shows a value that meets the criteria. The resulting value was > 0.7 , so it was fulfilled. Based on these results, further testing methods can be performed.

The validity test was carried out using the Average Variance Extracted (AVE) where AVE is a test used to measure how much a construct can explain its indicators. In research [Shrestha \(2021\)](#), the resulting AVE value must be > 0.5 . The required AVE value must be above 0.5. The higher the AVE, the higher the construct can explain its indicator. The test results in Table 3 show that the AVE value met the requirements with a value of > 0.5 . Therefore, further method testing can be carried out.

Table 4. Discriminant validity (Fornell-Larcker)

| | CBE | GS | OI | OR | PB | PC | PS |
|----------------------------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Cross border E-commerce adoption | 0.762 | | | | | | |
| Government support | 0.626 | 0.756 | | | | | |
| Organisational innovativeness | 0.710 | 0.640 | 0.812 | | | | |
| Organizational readiness | 0.667 | 0.620 | 0.729 | 0.808 | | | |

| | | | | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|-------|
| Perceived benefits | 0.643 | 0.665 | 0.752 | 0.668 | 0.767 | | |
| Perceived cost | -0.159 | -0.205 | -0.182 | -0.140 | -0.143 | 0.884 | |
| Perceived security | 0.577 | 0.637 | 0.610 | 0.622 | 0.627 | -0.171 | 0.797 |

Fornell-Larcker is a discriminant validity test that measures the extent to which a construct is different from other constructs in the model. The function of this test is to ensure that the construct is more highly correlated with its indicators than with indicators from other constructs. According to research [Arshad, Qadir, Ahmad, and Rafique \(2024\)](#), this test is carried out by comparing the square root of the AVE of each construct with its correlation with other constructs. The test results in Table 4 show that the results of Fornell-Larcker are highly correlated with their indicators. Therefore, further method testing can be carried out.

Table 5. Path coefficient

| | Original Sample (O) | Sample Mean (M) | Standard Deviation (STDEV) | T Statistics (O/STDEV) | P Values | Result |
|---|---------------------|-----------------|----------------------------|--------------------------|----------|-----------------|
| Perceived Benefits -> Cross Border E-commerce Adoption | 0.090 | 0.096 | 0.068 | 1.329 | 0.184 | Not Significant |
| Perceived Security -> Cross Border E-commerce Adoption | 0.077 | 0.078 | 0.052 | 1.501 | 0.134 | Not Significant |
| Perceived Cost -> Cross Border E-commerce Adoption | -0.008 | -0.009 | 0.028 | 0.287 | 0.774 | Not Significant |
| Government support -> Cross Border E-commerce Adoption | 0.175 | 0.178 | 0.060 | 2.943 | 0.003 | Significant |
| Organisational Readiness -> Cross Border E-commerce Adoption | 0.209 | 0.208 | 0.059 | 3.525 | 0.000 | Significant |
| Organisational Innovativeness -> Cross Border E-commerce Adoption | 0.329 | 0.323 | 0.061 | 5.413 | 0.000 | Significant |

Table 6. Confidence intervals (R-Square)

| | R-Square | R-Square Adjusted |
|----------------------------------|----------|-------------------|
| Cross Border E-commerce Adoption | 0.586 | 0.581 |

The R-squared method is used to measure the extent to which independent variables can be explained by dependent variables ([Chicco, Warrens, & Jurman, 2021](#)). In the test results shown in Table 6, the R-squared value is 0.585. Thus, it can be said that only 58.5% of cross-border E-commerce adoption can

be explained by independent variables, while the remaining 41.5% is explained by other factors outside the model. The higher the R-squared, the better the model explains the variable in question.

4.1 Discussion

4.1.1 The Effect of Perceived Benefits on Cross-Border E-commerce Adoption (H_1)

The results of the first hypothesis test show a positive coefficient value of 0.090, but with a p-value of 0.184 ($p > 0.05$), it is not significant for Cross-Border E-commerce Adoption. Therefore, H_1 is rejected. This explains that even though MSME owners are aware of the benefits of using E-commerce, this perception is not enough to drive E-commerce adoption. This finding is in line with the research [Hendricks and Mwapwele \(2024\)](#) and [Lilya and Pasaribu \(2024\)](#), who explain that business actors may understand the potential benefits, but without the support of training, organizational readiness, and other support, these benefits cannot be achieved through E-commerce adoption. From a theoretical perspective, insignificant results may occur because perceived benefit belongs to the “technology context” in the TOE framework, which often requires strong organizational capabilities before it can influence adoption behavior. In many MSMEs, the perceived advantages are not immediately translated into action because adoption decisions depend more on internal readiness and managerial confidence than on the attractiveness of the benefits. This means that the perception of usefulness remains abstract until it is supported by concrete capacity, resulting in a non-significant influence on adoption.

4.1.2 Effect of Perceived Security on Cross-Border E-commerce Adoption (H_2)

The second hypothesis test shows a positive coefficient value of 0.077 with a p-value of 0.134 ($p > 0.05$), which is not significant for Cross-Border E-commerce Adoption. Thus, it can be explained that even though MSME players consider transaction security to be important, the level of perception of security is not yet a strong factor driving E-commerce adoption. This finding is in line with [Sujatha and Karthikeyan \(2021\)](#), who explained that perceived security has not yet become a key factor in driving E-commerce adoption. MSME players tend to focus more on the benefits and still have doubts about the security of payment transaction. Theoretically, this insignificance can be explained because security perceptions operate as a “baseline expectation” rather than a motivator for adoption. On digital platforms, users generally assume that basic protections already exist; therefore, variations in perceived security do not drastically alter adoption behavior. Within the TOE framework, this factor often loses influence when organizations prioritize opportunity-seeking behaviors over risk avoidance, leading MSMEs to adopt digital systems despite security concerns.

4.1.3 Effect of Perceived Cost on Cross-Border E-commerce Adoption (H_3)

The third hypothesis test shows a negative coefficient value of -0.008 with a p-value of 0.774 ($p > 0.05$), which is not significant for cross-border E-commerce adoption. Therefore, H_2 is rejected in this study. The negative coefficient indicates that an increase in perceived cost tends to reduce MSME owners' willingness to adopt E-commerce. However, because the resulting value was not significant, this relationship could not be proven empirically. This finding is in line with research [Sarfo and Song \(2021\)](#); [Setyowati et al. \(2024\)](#) which explains that perceived costs are not an obstacle for MSMEs in adopting E-commerce because of the ease of access to technology and the focus of MSMEs on long-term benefits.

Theoretically, costs lose their influence on adoption decisions when MSMEs consider digital integration a strategic investment rather than an operational burden. In the TOE framework, cost factors within the technological context are often overshadowed by organizational needs to compete digitally, causing cost concerns to become secondary considerations. This explains why, even though higher perceived costs may create hesitation, they do not significantly deter adoption because MSMEs increasingly see digital presence as a necessity.

4.1.4 The Effect of Government Support on Cross-Border E-commerce Adoption (H_4)

The fourth hypothesis test shows a positive coefficient of 0.175. With a p-value of 0.003 ($p < 0.05$), it is considered significantly positive for cross-border E-commerce adoption. Therefore, H_4 is accepted in this study. The results indicate that the greater the government support for MSMEs, the higher is the desire for E-commerce adoption by MSME. This finding is in line with [Ahi et al. \(2023\)](#) and [Ocloo et](#)

al. (2020), who explain that government support plays an important role in decision-making for E-commerce adoption. Government support, such as regulations, export facilities, and security, can increase the confidence of SME actors to expand their businesses into the international market through digital technology. In theory, environmental context factors, such as government intervention, are foundational drivers in the TOE framework because they reduce uncertainty, lower perceived risk, and create institutional pressure for digital participation. Support in the form of training, digital infrastructure, incentives, and regulatory clarity serves as an enabling environment that encourages MSMEs to adopt cross-border E-commerce. This makes government support a decisive catalyst for digital transformation, thereby explaining its significance.

4.1.5 Effect of Organizational Readiness on Cross-Border E-commerce Adoption (H₅)

The fifth hypothesis test shows a positive coefficient of 0.209 with a p-value of 0.000 ($p < 0.05$), which is considered significant and positive for cross-border E-commerce adoption. Therefore, H_5 was accepted. These results indicate that the higher the level of organizational readiness, the higher the likelihood of MSMEs adopting E-commerce. This finding is in line with [Purwantini et al. \(2024\)](#), who explain that organizational readiness is one of the internal factors that encourage MSME players to adopt E-commerce. MSMEs that are ready in terms of resources, good leadership, and strong information systems can adapt to international market needs and find opportunities in global digital trade. Theoretically, readiness is a central component of the TOE model's organizational context because it reflects an MSME's capability to absorb, adapt, and implement new technologies. When internal resources, skills, and infrastructure are aligned with digital requirements, adoption decisions become more achievable and less risky.

4.1.6 Effect of Organizational Innovativeness on Cross-Border E-commerce Adoption (H₆)

The sixth hypothesis test showed a positive coefficient value of 0.329 and a p-value of 0.000. Thus, it can be said to be significantly positive for cross-border E-commerce adoption. Therefore, H_6 is accepted. This finding is in line with the research [Daoud and Kammoun \(2024\)](#) and [Setyowati et al. \(2024\)](#), which explains that innovation is one of the keys to success in E-commerce adoption. MSMEs that can innovate, try new things, and collaborate digitally on digital opportunities can be said to have a strategy to increase opportunities in E-commerce adoption. From a theoretical standpoint, innovativeness is an organizational cultural driver that shapes openness to new technologies. In the TOE framework, innovation-oriented firms exhibit proactive exploration, quicker decision-making, and stronger adaptation to competitive pressures, making them more willing to adopt cross-border platforms. This explains why organizational innovativeness produces the strongest coefficient; MSMEs with creative and adaptive mindsets are better prepared to capitalize on the opportunities offered by global digital markets.

5. Conclusions

5.1 Conclusion

Based on the analysis, the adoption of cross-border E-commerce is not significantly influenced by perceived benefits, security, or costs. The findings show that government support, organizational readiness, and organizational innovativeness are significant drivers, indicating that both internal capability and supportive external conditions determine the likelihood of adoption. These results highlight that strengthening managerial capacity, technological readiness, and innovation culture is more critical than improving perceptions of technological advantage. From a theoretical standpoint, this study reinforces the Technology Organization Environment (TOE) framework by confirming that organizational and environmental dimensions play a more dominant role than technological perceptions for MSMEs in developing economies. This study provides new empirical evidence on digital adoption behavior in the context of cross-border E-commerce, particularly in emerging markets.

5.2 Research Limitations

This study had several limitations. First, the variables used only refer to the TOE framework; therefore, they do not include individual factors such as digital capabilities, business owner experience, or attitudes toward technology, which may also influence adoption decisions. Second, this study uses a cross-sectional design; therefore, it only describes conditions at a single point in time and cannot capture

changes in MSME behavior dynamically. Furthermore, this study focuses on MSMEs in Indonesia; therefore, the results cannot be generalized to other countries with different levels of digital readiness and government support. For further research, it is recommended to explore factors outside the TOE framework, such as individual factors, psychological aspects, and the business orientation of MSME owners. Research methods can also be expanded with qualitative or mixed-method approaches to delve deeper into the perceptions, obstacles, and experiences of MSMEs in adopting cross-border E-commerce. In addition, the scope of respondents needs to be expanded to include more regions and business sectors to obtain more comprehensive findings. Future studies may also consider the development of government regulations and digital security technologies that are constantly changing, as these factors have the potential to influence the readiness and perceptions of the adoption of cross-border E-commerce.

5.3 Suggestions and Directions for Future Research

Future research should examine MSMEs' understanding of digital security more deeply, using qualitative or mixed-method designs to capture perceptions that may not emerge through quantitative surveys. Expanding the demographic and sectoral coverage of respondents will also help to enhance generalizability. Considering the rapid evolution of digital regulations and cross-border trade systems, subsequent studies should integrate emerging variables, such as platform governance or data protection maturity, to better reflect the dynamic environment of cross-border E-commerce adoption.

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Author Contributions

AC contributed to the conceptualization, study design, data collection, data analysis, and manuscript drafting. INA contributed to the methodology validation, supervision, interpretation of the results, manuscript revision, and final approval of the manuscript. Both authors have read and agreed to the published version of this manuscript.

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