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Cross-Border Shopping Service Adoption: The Role of Technological, Organizational, and Environmental Factors

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ABSTRACT

Cross-border shopping services support overseas purchasing by Indonesian MSMEs, but the mediating role of organizational context in their adoption remains insufficiently studied. This study analyzed the influence of technological and environmental factors on the adoption of cross-border shopping services, with organizational context as a mediating variable. This study employed a quantitative approach using purposive sampling. Data were collected through an online questionnaire completed by 120 MSME owners in Indonesia who use cross-border shopping services to purchase goods for their businesses. MSMEs were the unit of analysis, while business owners served as respondents. The data were analyzed using SPSS 31 and SmartPLS 4.0 with the PLS-SEM method. The results indicate that technological and environmental factors did not show significant direct relationships with the adoption of cross-border shopping services. In contrast, organizational context showed a positive and significant relationship with adoption. Environmental factors were also positively associated with organizational context, and their indirect relationship with adoption through organizational context was significant. These findings highlight the importance of organizational context, particularly business owners' willingness to take risks, the strategic importance of cross-border shopping services, and the availability of technological resources in MSMEs.

Keywords: Cross-border shopping services, MSMEs, Technological factors, Organizational context, Environmental factors, TOE framework.

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INTRODUCTION

The rapidly growing digital innovations of the past few decades have played a major role in the growth of the digital economy and have become a crucial foundation for significant changes in the global trading system. With these developments, cross-border e-commerce (CBEC) has emerged as a form of online cross-border trade that facilitates international transactions between consumers and entrepreneurs (Chen et al., 2024). With access to the internet and smartphones, buyers and sellers from different countries

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can connect with each other and purchase products, services, and information known as CBEC (C. Q. Nguyen et al., 2024).

The growth of e-commerce, including CBEC, has provided opportunities for MSMEs in Indonesia to participate in broader digital markets (Bening et al., 2023; Muchtar et al., 2023). In this study, cross-border shopping services refer to intermediary shopping services used by Indonesian MSMEs to purchase goods from overseas e-commerce platforms for their businesses. Abdulkarem and Hou (2022) examined the mediating role of organizational context in CBEC adoption among SMEs in China. Meanwhile, C. Q. Nguyen et al. (2024) and Purwianti et al. (2025) studied factors related to CBEC adoption intention among SMEs in Vietnam and Indonesia. However, the use of cross-border shopping services by Indonesian MSMEs to purchase goods for their businesses has received less attention, especially the role of organizational context in the relationship between environmental factors and adoption.

The Technology–Organization–Environment (TOE) framework explains technology adoption through technological, organizational, and environmental contexts (Giang et al., 2025; Tornatzky & Fleischer, 1990). Technological factors relate to the characteristics and suitability of technology, while environmental factors include government support, infrastructure, market demand, and competitive pressure (Abdulkarem & Hou, 2022; Bening et al., 2023). Organizational context refers to an organization's internal readiness and capabilities in using digital technologies (Asmawati et al., 2024). In this study, technological and environmental factors are examined in relation to the adoption of cross-border shopping services. Organizational context is also examined in relation to adoption and as a mediator between environmental factors and adoption.

This study aims to analyze the relationships between technological factors, environmental factors, organizational context, and the adoption of cross-border shopping services by MSMEs. Specifically, this study examines the mediating role of organizational context in the relationship between environmental factors and adoption. By applying the TOE framework to cross-border shopping services as a form of CBEC, this study provides insight into how external environmental conditions are associated with adoption through internal organizational conditions.

LITERATURE REVIEW

The technology factor within the TOE framework refers to technologies currently possessed by an organization or new technologies that have the potential to be adopted to support operational activities and business processes, thereby influencing the organization’s decision to adopt a technological innovation (T. H. Nguyen et al., 2022; Tornatzky & Fleischer, 1990). Technological characteristics can influence an organization’s level of readiness and its decision to adopt digital innovations because they shape perceptions of a technology’s benefits, suitability, and complexity (T. H. Nguyen et al., 2022; Tornatzky & Fleischer, 1990). In the context of CBEC, technological factors include perceived benefits, suitability, security, complexity, and perceived costs, which will influence MSMEs’ decisions to adopt CBEC services (C. Q. Nguyen et al., 2024). Technology that provides an integrated, secure, and reliable system will boost operational efficiency, streamline international transaction processes, and help convince

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SMEs to utilize digital services to reach global markets (C. Q. Nguyen et al., 2024; Tornatzky & Fleischer, 1990). Thus, the better the technological characteristics of a platform, the greater the likelihood that organizations or SMEs will adopt cross-border shopping services as a strategy to expand their market reach and competitiveness in this digital era (C. Q. Nguyen et al., 2024; T. H. Nguyen et al., 2022).

The organizational context within the TOE framework refers to the resources, capabilities, and internal characteristics of an organization that influence its readiness to adopt a technological innovation (T. H. Nguyen et al., 2022; Tornatzky & Fleischer, 1990). Organizational characteristics, such as top management support, entrepreneurial orientation, and technology orientation, are internal factors that play a crucial role in enhancing an organization's ability to effectively implement digital technologies (T. H. Nguyen et al., 2022). The organizational context is related to an organization's capabilities and resources that can support the implementation of technological innovations; this context consists of organizational readiness, organizational innovation, and knowledge of e-commerce, all of which will influence the propensity of MSMEs to adopt CBEC services (C. Q. Nguyen et al., 2024). In addition, the digital readiness of MSMEs is influenced by five main dimensions, namely, people, process, strategy, technology, and integration, which reflect an organization's readiness to undertake digital transformation (Rafiah et al., 2022). In this study, organizational context specifically refers to business owners' willingness to take risks, the strategic importance of cross-border shopping services for their businesses, and the availability of technological resources to support business activities.

Environmental factors in the TOE framework refer to conditions external to the organization that can influence the decision to adopt technology, such as pressure from competitors, relationships among business partners, industry characteristics, and regulatory support from the government (T. H. Nguyen et al., 2022; Tornatzky & Fleischer, 1990). In the context of adopting CBEC, environmental factors consist of government support, pressure from customers, and pressure from competitors, all of which will influence MSMEs' intention to adopt CBEC services (C. Q. Nguyen et al., 2024). Furthermore, supportive government policies, regulations that facilitate digital transactions, and a conducive business environment can promote the implementation of CBEC and encourage MSMEs to adopt the technology (Abdulkarem & Hou, 2022). External supports, whether through government policies or the development of the digital ecosystem, present opportunities for SMEs seeking to expand their market access to international markets, enhance competitiveness, and accelerate digital transformation in their business operations (Rafiah et al., 2022). Therefore, as the external environment faced by organizations becomes increasingly conducive, the greater the opportunity for organizations or SMEs to adopt cross-border shopping services as a strategy for business development and to capitalize on global market opportunities (Abdulkarem & Hou, 2022; C. Q. Nguyen et al., 2024).

In this study, cross-border shopping services are considered a form of CBEC that allows MSMEs to purchase goods from overseas e-commerce platforms through shopping intermediaries. These services help MSMEs obtain products from foreign sellers to support their business activities. Cross-border shopping services are closely related to CBEC because they involve digital platforms, electronic payment systems, and international logistics services that support cross-border transactions (C. Q. Nguyen et

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al., 2024; Madhavan et al., 2025). Previous studies have shown that technological, organizational, and environmental factors are important considerations in CBEC adoption among SMEs (Abdulkarem & Hou, 2022; C. Q. Nguyen et al., 2024). Giang et al. (2025) also highlighted the relevance of the TOE framework in explaining e-commerce adoption among SMEs. In the context of cross-border shopping services, MSMEs need to consider not only technological characteristics and external environmental conditions but also their internal readiness to manage overseas purchasing activities. Therefore, the TOE framework is considered relevant for examining how technological factors, environmental factors, and organizational context are related to the adoption of cross-border shopping services by MSMEs.

Previous studies have shown that technological factors play an important role in the adoption of digital technologies among MSMEs. C. Q. Nguyen et al. (2024) explained that technological characteristics, such as perceived benefits, compatibility, and security, are important considerations in CBEC adoption intention among SMEs. Similarly, Purwianti et al. (2025), who examined factors influencing CBEC adoption intention among MSMEs in Batam, found that perceived security positively influences attitudes toward CBEC adoption. These findings indicate that technological security is an important consideration for MSMEs when evaluating cross-border digital services. Furthermore, Cuandra and Candy (2024) found that technological capability has a significant influence on the sustainable performance of SMEs in Batam. Although their study focused on business performance rather than CBEC adoption, the findings highlight the importance of technological capabilities in supporting business activities. Bening et al. (2023) also explained that technological considerations play a role in selecting e-commerce adoption strategies among Indonesian SMEs. In addition, Matlakala (2025) examined technological characteristics, including perceived costs, benefits, and compatibility, in relation to mobile commerce adoption among SMEs. Based on these previous studies, technological characteristics can be considered relevant to MSMEs' decisions to use digital services. In the context of cross-border shopping services, technological factors such as security, compatibility, and the ability to support international transactions are expected to encourage MSMEs to adopt these services. Therefore, the first hypothesis (H1) can be formulated as follows:

H1: Technological factors have a positive and significant effect on the adoption of cross-border shopping services.

Previous studies have shown that organizational context plays an important role in influencing the adoption of digital technologies among MSMEs. Al Khazim et al. (2024) examined the role of organizational readiness in e-commerce adoption among MSMEs in Indonesia. C. Q. Nguyen et al. (2024) also identified organizational readiness and organizational innovation as important internal factors related to CBEC adoption intention among SMEs. According to Wahyuni and Prihardianto (2025), organizational readiness and an innovation culture are important factors in supporting MSMEs' ability to use digital platforms and adapt to digital transformation. Asmawati et al. (2024) explained that organizational characteristics and human resource capabilities can support MSMEs in implementing digital technologies. In addition, Yudiani and Muizu (2025) highlighted the importance of leadership and organizational culture in strengthening organizational readiness during digital transformation. These findings

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indicate that MSMEs with adequate internal resources, knowledge, and management support may be better prepared to adopt digital services. In the context of cross-border shopping services, organizational readiness can help MSMEs understand international purchasing processes, manage business activities, and utilize these services more effectively. Based on these previous studies, the second hypothesis (H2) can be formulated as follows:

H2: Organizational context has a positive and significant effect on the adoption of cross-border shopping services.

Environmental factors, such as government support, customer demand, and competitive pressure, can influence MSMEs' decisions to adopt digital services. Abdulkarem and Hou (2022) found that environmental factors were positively related to several levels of CBEC adoption among SMEs in China. C. Q. Nguyen et al. (2024) also explained that government support, customer pressure, and competitive pressure were related to subjective norms concerning CBEC adoption intention among Vietnamese SMEs. Similarly, Purwianti et al. (2025) found that government support positively influenced attitudes toward CBEC adoption among SMEs in Indonesia. Natalia and Christian (2024) and Pangesti and Adyaksana (2021) also examined environmental factors in relation to e-commerce adoption among Indonesian SMEs. Furthermore, Chen et al. (2024) examined the relationship between CBEC development and enterprise digital technology innovation. These studies indicate that external environmental conditions can play an important role in encouraging businesses to consider digital technologies and cross-border activities. In the context of cross-border shopping services, support from the external environment and increasing market competition may encourage MSMEs to use overseas purchasing services for their business needs. Therefore, the third hypothesis (H3) can be formulated as follows:

H3: Environmental factors have a positive and significant direct effect on the adoption of cross-border shopping services.

Environmental factors can also influence organizational context by encouraging MSMEs to strengthen their internal readiness and capabilities. According to Abdulkarem and Hou (2022), environmental factors have a positive and significant relationship with organizational context among SMEs adopting CBEC in China. This indicates that external conditions may encourage organizations to improve their internal capabilities to respond to changes in the business environment. Tenggono et al. (2024) also examined the relationship between institutional pressure and digital readiness in organizational transformation. Furthermore, Mady et al. (2022) discussed the role of institutional pressure and internal organizational capabilities in business innovation. Bening et al. (2023) also highlighted the importance of technological, organizational, and environmental factors in e-commerce adoption strategies among Indonesian SMEs. These findings suggest that external pressures and support can encourage MSMEs to develop their knowledge, resources, and organizational readiness. In the context of cross-border shopping services, competitive pressure, market demand, and government support may encourage MSMEs to improve their internal capabilities before using digital services for overseas purchasing activities. Based on these previous studies, the fourth hypothesis (H4) can be formulated as follows:

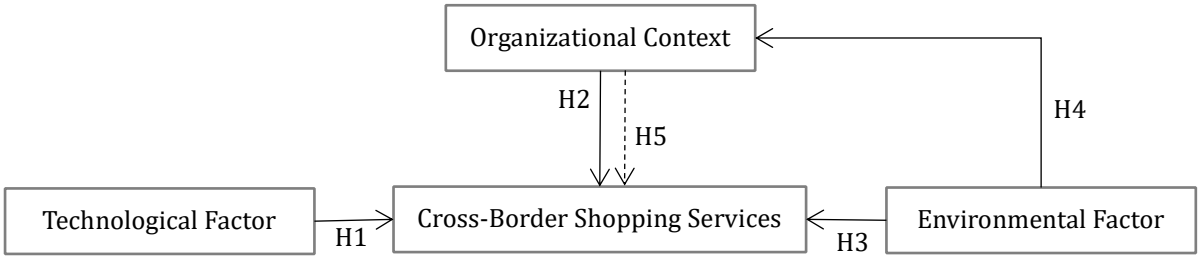
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H4: Environmental factors have a positive and significant effect on organizational context.

Within the TOE framework, organizational context can act as a mediator between environmental factors and the adoption of cross-border shopping services. Abdulkarem and Hou (2022) found that organizational context mediates the relationship between environmental factors and different levels of CBEC adoption among SMEs in China. This indicates that external environmental conditions may influence adoption through the internal characteristics and readiness of an organization. Tenggono et al. (2024) also examined the intermediary role of digital readiness in organizational transformation, while Jewapatarakul and Ueasangkomsate (2024) examined organizational readiness and knowledge acquisition in relation to digital transformation among SMEs. Similarly, Vladimirov and Harizanova (2026) investigated the mediating role of organizational factors between environmental changes and SMEs' digital transformation. Azzahra et al. (2025) also examined digital readiness as a mediating variable between organizational culture and innovative work behavior among SMEs. Furthermore, Höyng and Lau (2023) emphasized the importance of individual digital readiness in supporting organizational digital transformation. These studies indicate that internal readiness can play an important role in explaining how external conditions are related to organizational decisions and digital activities. In the context of cross-border shopping services, environmental factors such as government support, market pressure, and customer demand may encourage MSMEs to strengthen their internal resources and capabilities. Better organizational readiness may then support MSMEs in adopting cross-border shopping services for their business activities. Therefore, the fifth hypothesis (H5) can be formulated as follows:

H5: Environmental factors have a positive and significant indirect effect on the adoption of cross-border shopping services through organizational context.

Figure 1. The Conceptual Framework of Variables Relationship



METHODS

This study employed a quantitative approach with a cross-sectional design to analyze the relationships between technological factors, organizational context, environmental factors and the adoption of cross-border shopping services by MSMEs. Research data were collected using purposive sampling, specifically by distributing a structured online questionnaire (via Google Forms) through social media. The questionnaire was distributed from early December 2025 through April 2026 to MSME owners in Indonesia who had previously procured goods through e-commerce platforms

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using cross-border shopping services to support their business activities. The questionnaire was reviewed by the academic supervisor before distribution, and the questions remained unchanged throughout the data collection period. No separate pilot test was conducted. To check for duplicate responses, respondent names were filtered in Google Sheets, and entries with the same name were further checked using the email addresses provided by the respondents. The unit of analysis in this study was MSMEs as business entities, while MSME owners served as respondents who provided information about their businesses' use of cross-border shopping services. Respondents were screened based on their business ownership, previous experience using cross-border shopping services, procurement of goods through these services, and the use of e-commerce platforms for purchasing goods. After the screening process, 120 valid responses were retained for analysis. The collected data were analyzed using Structural Equation Modeling (SEM) with the assistance of SmartPLS software.

The variables analyzed in this study included environmental factors measured using five items adapted from Abdulkarem and Hou (2022), technological factors measured using five items adapted from Abed (2020), adoption of cross-border shopping services measured using five items adapted from Mou et al. (2020), and organizational context measured using five items adapted from Abed (2020). All 20 items were initially measured using a five-point Likert scale. The measurement items were adapted from previous studies, with minor wording adjustments to fit the context of cross-border shopping services without substantially changing their original meaning. The items were translated into Indonesian with the assistance of translation tools. The initial sample target was set at 100 respondents using a practical respondent-to-item ratio of 5:1 (Lim, 2025). With 20 measurement items, the target was calculated as 20 × 5 = 100 respondents.

Data analysis was conducted using SPSS 31 and SmartPLS 4.0. The analysis began with descriptive statistics and a collinearity assessment using variance inflation factor (VIF) values, with values below 5 indicating no critical collinearity issues. The measurement model was evaluated using outer loadings, reliability, convergent validity, and discriminant validity. Outer loadings above 0.70, reliability values of at least 0.70, AVE values above 0.50, and HTMT values below 0.90 were used as the main assessment criteria (Sarstedt et al., 2022). The structural model was then evaluated using path coefficients, t-statistics, p-values, R-square values, and effect sizes (f^2). Statistical significance was assessed at the 0.05 level, while mediation was evaluated using the significance of the indirect effect and its 95 percent bootstrap confidence interval. Predictive performance was assessed using PLSpredict by examining Q^2_predict values and comparing prediction errors between PLS-SEM and the linear model. Model fit was also assessed using SRMR, with values below 0.08 generally indicating acceptable model fit (Guenther et al., 2023).

Common method bias was considered because all variables were measured using the same self-reported questionnaire. As a procedural consideration, the questionnaire was reviewed before distribution, and the questions remained unchanged throughout the data collection period. However, these procedures could not eliminate the possibility of common method bias. Therefore, Harman's single-factor test was conducted in SPSS 31 as a statistical assessment. The analysis included the 14 indicators retained in the final measurement model. Principal component analysis was performed without rotation to

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examine the variance explained by a single component. A value below the commonly used 50 percent threshold was considered an indication that no single component dominated the variance. However, Harman's single-factor test has limitations and cannot completely rule out common method bias (Podsakoff et al., 2024).

RESULTS

Data were collected from December to April over five months, with a total of 161 respondents. After data collection, the responses were manually reviewed using Google Sheets to ensure data quality. The screening process included checking respondent eligibility and reviewing response patterns, such as identical answers across all 20 measurement items and unusually inconsistent answers within the same construct. Following this manual screening process, 41 responses were excluded, leaving 120 valid responses for further analysis. The respondents' characteristics, including age, gender, education level, domicile, and annual revenue, are presented in Table 1.

Table 1. Respondents' Personal Data

Characteristics	Category	Frequency	Percentage (%)
Age	< 20 years	4	3.3
	20–29 years	54	45.0
	30–39 years	36	30.0
	40–49 years	22	18.3
	50–59 years	4	3.3
	Total	120	100
Gender	Female	80	66.7
	Male	40	33.3
	Total	120	100
Education	Elementary School/Equivalent	2	1.7
	Junior High School/Equivalent	5	4.2
	High School/Vocational School/Equivalent	55	45.8
	Diploma	20	16.7
	Bachelor's Degree	30	25
	Master's Degree	7	5.8
Characteristics	**Category**	**Frequency**	**Percentage (%)**
Education	Doctorate	1	0.8
	Total	120	100
Domicile	Batam	76	63.3

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	Outside Batam	44	36.7
	Total	120	100
Annual Revenue	< IDR 300 million	74	61.7
	IDR 300 million – IDR 2.5 billion	37	30.8
	IDR 2.5 billion – IDR 50 billion	9	7.5
	Total	120	100

Table 1 shows that the majority of respondents in this study reside in Batam, accounting for 63.3 percent. Therefore, the research findings must be interpreted with caution, as the sample characteristics largely reflect the conditions of MSMEs in Batam, which do not yet fully represent MSMEs throughout Indonesia.

Following the descriptive analysis, the research model was evaluated using the PLS-SEM method. The reported VIF values were below 5, indicating no critical collinearity issues in the model (Sarstedt et al., 2022). Harman's single-factor test showed that the first component explained 35.969 percent of the total variance, which was below the commonly used 50 percent threshold. This result suggests that no single component dominated the variance. However, this test alone cannot completely rule out common method bias (Podsakoff et al., 2024). The initial measurement model consisted of 20 indicators. During the measurement model evaluation, six indicators with relatively low outer loadings were removed, namely CBSS_02 (0.660), EF_05 (0.634), OC_03 (0.633), OC_04 (0.563), TF_04 (0.545), and TF_05 (0.623). Following indicator removal, the measurement model was re-evaluated, and the AVE values of all constructs exceeded the recommended threshold of 0.50 (Sarstedt et al., 2022). The final measurement model retained 14 indicators. Although several retained indicators had outer loadings below 0.70, they were not removed further because the AVE values had met the recommended criterion. The six indicators were removed mainly based on statistical considerations, particularly their relatively low outer loadings and the need to achieve AVE values above 0.50, rather than a separate theoretical assessment. These indicators represented specific aspects of the constructs, including customer expectations, transaction security, and organizational processes. Therefore, although the final model met the AVE criterion, removing these indicators may have reduced the coverage of the original constructs and should be considered when interpreting the findings. According to Sarstedt et al. (2022), AVE values above 0.50 indicate adequate convergent validity, while composite reliability (ρC) values between 0.70 and 0.90 indicate satisfactory internal consistency reliability. The ρC values of the final measurement model ranged from 0.788 to 0.829. However, the Cronbach's alpha and Dijkstra–Henseler's rho (ρA) values for organizational context and technological factors remained below 0.70. Although values between 0.60 and 0.70 may be considered in exploratory research, these results should be interpreted with caution (Sarstedt et al., 2022). Table 2 presents the outer loading, Cronbach's alpha, ρA, ρC, and AVE results.

Table 2. Outer Model Measurement

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Item	Outer Loading	Cronbach's alpha	ρA	ρC	AVE
CBSS_01	0.773	0.726	0.728	0.829	0.549
CBSS_03	0.733				
CBSS_04	0.726				
CBSS_05	0.730				
EF_01	0.788	0.710	0.739	0.819	0.533
EF_02	0.641				
EF_03	0.800				
EF_04	0.676				
OC_01	0.825	0.625	0.646	0.799	0.570
OC_02	0.738				
OC_05	0.697				
TF_01	0.712	0.610	0.636	0.788	0.555
TF_02	0.811				
TF_03	0.706				

The cross-loading results in Table 3 show that each indicator has a higher loading on its own variable than on the other variables. According to Yew et al. (2023), this pattern supports discriminant validity based on the cross-loading criterion. However, Sarstedt et al. (2022) explained that cross-loadings alone may not be sufficient to identify discriminant validity problems. Although EF_02, EF_04, and OC_05 have outer loadings below 0.70, the AVE values of their respective variables remain above 0.50, supporting convergent validity (Sarstedt et al., 2022). These indicators were retained in the final model, but their lower outer loadings should be considered when interpreting the measurement results.

Table 3. Results of the Cross-Loading Discriminant Validity Test

Item	CBSS	EF	OC	TF
CBSS_01	0.773	0.420	0.500	0.361
CBSS_03	0.733	0.318	0.440	0.400
CBSS_04	0.726	0.188	0.493	0.283
CBSS_05	0.730	0.352	0.443	0.343
EF_01	0.454	0.788	0.397	0.485
EF_02	0.226	0.641	0.300	0.442
EF_03	0.328	0.800	0.541	0.488
EF_04	0.212	0.676	0.383	0.443

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OC_01	0.536	0.537	0.825	0.557
OC_02	0.466	0.380	0.738	0.461
OC_05	0.426	0.344	0.697	0.397
TF_01	0.290	0.454	0.403	0.712
TF_02	0.434	0.502	0.491	0.811
TF_03	0.291	0.461	0.526	0.706

Based on the Fornell-Larcker test results presented in Table 4, the square root of AVE for each variable was higher than its correlations with the other variables (Yew et al., 2023). The square root of AVE values ranged from 0.730 to 0.755, while the highest correlation between variables was 0.634. These results support discriminant validity based on the Fornell-Larcker criterion. However, this criterion should be evaluated together with other discriminant validity assessments because it may not identify all discriminant validity problems (Sarstedt et al., 2022).

Table 4. Results of the Discriminant Validity Test - Fornell-Larcker

	CBSS	EF	OC	TF
CBSS	0.741			
EF	0.434	0.730		
OC	0.634	0.568	0.755	
TF	0.468	0.633	0.632	0.745

Table 5. Heterotrait-Monotrait Ratio (HTMT)

	CBSS	EF	OC	TF
CBSS				
EF	0.578			
OC	0.933	0.815		
TF	0.679	0.960	1.010	

The HTMT test results in Table 5 show that five of the six relationships between variables have values below 1.00. Henseler et al. (2015) and Ringle et al. (2023) explain that a value of 1.00 can be used as a benchmark in testing discriminant validity through the HTMT inference approach. In this study, only the relationship between the technological factors and the organizational context showed a value of 1.010 , which slightly exceeded the benchmark by 0.010. These results indicate that most HTMT values are below 1.00, while the closeness between the technology factor and the organizational

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context factor warrants attention in interpreting the findings. Overall, the cross-loading and Fornell–Larcker results also support discriminant validity, although some HTMT values still exceed the recommended threshold of 0.90.

According to the R-square test results, environmental factors, technological factors, and organizational context explained 41.3 percent of the variance in cross-border shopping service adoption, while the remaining 58.7 percent was not explained by the research model. Furthermore, environmental factors explained 32.2 percent of the variance in organizational context, with the remaining 67.8 percent not explained by the model (Sarstedt et al., 2022).

Table 6. R-Square Test Results

Variable	R^2	R^2 Adjusted
Cross-Border Shopping Services	0.413	0.397
Organizational Context	0.322	0.317

In addition to the R-square values, f^2 was examined to evaluate the contribution of each predictor variable to the structural model (Sarstedt et al., 2022). The results showed that environmental factors had an f^2 value of 0.476 on organizational context, indicating a large effect size. Organizational context had an f^2 value of 0.276 on the adoption of cross-border shopping services, indicating a medium effect size. In contrast, environmental factors and technological factors had f^2 values of 0.006 and 0.005 on adoption, respectively, indicating negligible effect sizes. These findings suggest that environmental factors made a substantial contribution to explaining organizational context, while organizational context contributed more to explaining adoption than the direct effects of technological and environmental factors.

In addition to the R-square and effect size results, PLSpredict was conducted to evaluate the predictive performance of the research model (Guenther et al., 2023). The Q^2_predict values were 0.177 for cross-border shopping services and 0.298 for organizational context. Both values were positive, indicating that the model performed better than the simple prediction benchmark. At the indicator level, all seven endogenous indicators had positive Q^2_predict values. However, the comparison of RMSE values showed that the PLS-SEM model had lower prediction errors than the linear model for three of the four cross-border shopping service indicators and one of the three organizational context indicators. These findings suggest that the model has some predictive relevance, although its predictive performance compared with the linear model was mixed and should be interpreted with caution.

The model fit assessment showed SRMR values of 0.090 for the saturated model and 0.103 for the estimated model. Both values exceeded the recommended threshold of 0.08, indicating that the overall model fit was not fully established. Therefore, the results should be interpreted cautiously and evaluated together with the measurement and structural model assessment (Sarstedt et al., 2022).

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Table 7. SRMR Test Results

Variable	SRMR
Saturated model	0.090
Estimated model	0.103

Table 8. Results of the Hypothesis Test

	Hypothesis	β	T statistics (|O/STDEV|)	P values	Decision
H1	Technological Factor -> Cross-Border Shopping Services	0.076	0.716	0.474	Not Significant
H2	Organizational Context -> Cross-Border Shopping Services	0.541	5.606	< 0.001	Significant
H3	Environmental Factors -> Cross-Border Shopping Services	0.078	0.818	0.413	Not Significant
H4	Environmental Factors -> Organizational Context	0.568	11.539	< 0.001	Significant
H5	Environmental Factors -> Organizational Context -> Cross-Border Shopping Services	0.307	4.858	< 0.001	Significant

Based on the hypothesis testing results presented in Table 8, technological factors did not have a significant effect on the adoption of cross-border shopping services, with a β value of 0.076, a t-statistic of 0.716, and a p-value of 0.474. Therefore, H1 was not supported. In contrast, organizational context had a positive and significant effect on the adoption of cross-border shopping services, with a β value of 0.541, a t-statistic of 5.606, and a p-value of less than 0.001, supporting H2. Environmental factors did not have a significant direct effect on adoption, with a β value of 0.078, a t-statistic of 0.818, and a p-value of 0.413. Therefore, H3 was not supported. However, environmental factors had a

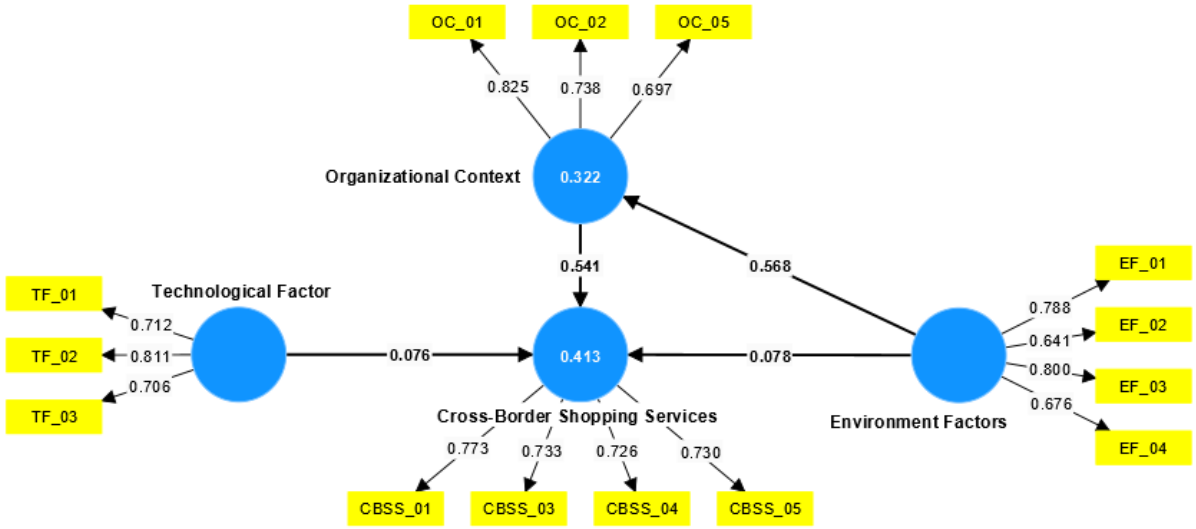
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positive and significant effect on organizational context, with a β value of 0.568, a t-statistic of 11.539, and a p-value of less than 0.001, supporting H4. These results indicate that organizational context has an important relationship with the adoption of cross-border shopping services, while technological and environmental factors do not show significant direct effects.

The test results show that environmental factors have a significant indirect effect on the adoption of cross-border shopping services through organizational context, with a β value of 0.307, a t-statistic of 4.858, and a p-value of less than 0.001. The 95 percent bootstrap confidence interval ranged from 0.195 to 0.442 and did not include zero, further supporting the significance of the indirect effect. However, environmental factors did not have a significant direct effect on the adoption of cross-border shopping services, with a β value of 0.078, a t-statistic of 0.818, and a p-value of 0.413. These results indicate that organizational context acts as a mediator linking environmental factors to the adoption of cross-border shopping services. Thus, the mediation is classified as indirect-only mediation because the indirect effect is significant, while the direct effect is not significant.

Based on the testing of the research model, a final structural model was obtained that showed the relationship between the research variables. The final research model is shown in the following figure.

Figure 2. Research Model



DISCUSSION

This study aims to analyze the influence of technological and environmental factors on the adoption of cross-border shopping services by MSMEs, as well as to examine the organizational context that mediates the relationship between environmental factors and the adoption of cross-border shopping services. Based on the research findings, not all factors within the TOE framework have a direct influence on the

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adoption of cross-border shopping services. Technological and environmental factors did not show a significant direct influence, whereas organizational context had a significant influence on the adoption of cross-border shopping services. Furthermore, environmental factors had a significant influence on organizational context, and organizational context was found to act as a mediator between environmental factors and the adoption of cross-border shopping services. These findings will be discussed further based on each hypothesis and compared with the results of previous studies.

The results of this study show that technological factors do not have a significant effect on the adoption of cross-border shopping services, with a β value of 0.076 and a p-value of 0.474. The f^2 of 0.005 also indicates that technological factors make a very limited direct contribution to explaining adoption in the research model. One possible explanation is that technology may have become a basic requirement rather than a major factor distinguishing the use of cross-border shopping services among MSMEs. Since the respondents in this study were MSME owners who had already used e-commerce platforms and cross-border shopping services, they may already be familiar with digital transactions. As a result, the perceived benefits and usefulness of technology may not be sufficient to explain differences in their responses regarding the use of these services. This explanation is consistent with Purwantini et al. (2024), Setiyani and Rostiani (2021), and Religia et al. (2023), who reported non-significant relationships involving technological factors in e-commerce adoption among MSMEs. However, C. Q. Nguyen et al. (2024) highlighted the importance of technological characteristics in CBEC adoption intention, while Purwianti et al. (2025) found that perceived security positively influenced attitudes toward CBEC adoption. These differences may be related to the research context and the outcomes being examined, as previous studies focused on adoption intention or attitudes, whereas this study involved MSMEs with previous experience using cross-border shopping services. Therefore, the findings suggest that technological factors may not independently explain the use of these services in the present sample. However, this interpretation remains a possible explanation rather than a mechanism directly tested in this study.

The results of Hypothesis 2 show that organizational context has a positive and significant relationship with the adoption of cross-border shopping services, with a β value of 0.541 and a p-value of less than 0.001. The f^2 of 0.276 also indicates a medium effect, suggesting that organizational context makes an important contribution to explaining adoption in the research model. This finding highlights the importance of internal organizational conditions within the TOE framework. In the context of MSMEs using cross-border shopping services, organizational context reflects business owners' willingness to take risks, their recognition of the strategic importance of these services, and the availability of technological resources within their businesses. These conditions may help explain differences in the use of cross-border shopping services among MSMEs, even when the services are already accessible. The findings are consistent with Abdulkarem and Hou (2022), Purwantini et al. (2024), Al Khazim et al. (2024), and Chia and Agustin (2026), who highlighted the importance of organizational conditions in e-commerce or CBEC adoption. Similarly, C. Q. Nguyen et al. (2024) found that organizational readiness and innovativeness were positively associated with perceived behavioral control in the context of CBEC adoption intention. Although these studies examined different aspects of adoption, they support the relevance of internal

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organizational conditions in understanding MSMEs' use of digital services. Therefore, the findings suggest that organizational context is an important factor associated with the adoption of cross-border shopping services in the present sample, supporting H2.

The results of Hypothesis 3 show that environmental factors do not have a significant direct relationship with the adoption of cross-border shopping services, with a β value of 0.078 and a p-value of 0.413. The f^2 of 0.006 also indicates that environmental factors make a very limited direct contribution to explaining adoption in the research model. These findings suggest that external pressures from competitors, suppliers, and customers may not be sufficient to explain differences in the use of cross-border shopping services among MSMEs. One possible explanation is that external environmental conditions may be associated with adoption through internal organizational readiness and capabilities rather than through a direct relationship. This interpretation is consistent with the results of H4 and H5, which show a significant relationship between environmental factors and organizational context, as well as a significant indirect effect through organizational context. The findings are consistent with Ausat and Peirisal (2021) and Alharthi et al. (2025), who reported non-significant relationships involving environmental factors or external pressures in e-commerce adoption. However, Abdulkarem and Hou (2022) found positive relationships between environmental factors and CBEC adoption levels among SMEs in China. Similarly, Purwianti et al. (2025) found that government support positively influenced attitudes toward CBEC adoption in Indonesia. These differences may be related to the research context and the outcomes examined, as previous studies focused on broader CBEC adoption or adoption attitudes. Therefore, the findings suggest that environmental factors may be more closely associated with adoption through organizational context than through a direct relationship in the present sample. However, this explanation remains an interpretation of the observed relationships rather than a causal mechanism established by the study. Thus, H3 was not supported.

The results of Hypothesis 4 show that environmental factors have a positive and significant relationship with organizational context, with a β value of 0.568 and a p-value of less than 0.001. The f^2 of 0.476 also indicates a large effect, suggesting that environmental factors make a substantial contribution to explaining organizational context in the research model. These findings suggest that external pressures from competitors, suppliers, and customers are closely related to the internal organizational conditions of MSMEs. One possible explanation is that MSME owners facing these pressures may pay greater attention to the strategic importance of cross-border shopping services, their willingness to take risks, and the technological resources available within their businesses. This finding is consistent with Abdulkarem and Hou (2022), who reported a positive relationship between environmental factors and organizational context in CBEC adoption among SMEs in China. Similarly, Mady et al. (2022) and Tenggono et al. (2024) highlighted the relevance of external pressures and internal organizational capabilities in other business and digital transformation contexts. Although these studies examined different research settings, they support the importance of considering the relationship between external conditions and internal organizational factors. Within the TOE framework, these findings suggest that environmental factors may be more closely associated with adoption through organizational context rather than through a direct relationship. This interpretation is

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also consistent with the non-significant direct relationship found in H3 and provides further support for examining the mediating role of organizational context in H5. However, these relationships should not be interpreted as evidence of causality because the study used a cross-sectional design. Therefore, H4 was supported.

The results of Hypothesis 5 show that organizational context significantly mediates the relationship between environmental factors and the adoption of cross-border shopping services, with a β value of 0.307 and a p-value of less than 0.001. Since the direct relationship between environmental factors and adoption was not significant, while the indirect effect through organizational context was significant, the mediation is classified as indirect-only mediation. These findings suggest that environmental conditions may be associated with the adoption of cross-border shopping services through the internal organizational conditions of MSMEs rather than through a direct relationship. One possible explanation is that pressures from competitors, suppliers, and customers may encourage MSME owners to consider the strategic importance of cross-border shopping services, their willingness to take risks, and the technological resources available within their businesses. These internal conditions may then be related to how MSMEs use cross-border shopping services for their business activities. This finding is consistent with Abdulkarem and Hou (2022), who found that organizational context mediates the relationship between environmental factors and CBEC adoption levels among SMEs in China. Similarly, Jewapatarakul and Ueasangkomsate (2024) and Vladimirov and Harizanova (2026) highlighted the importance of organizational factors in explaining relationships involving external conditions and digital transformation among SMEs. Although these studies examined different research contexts, they support the relevance of internal organizational conditions in understanding digital adoption. Within the TOE framework, the findings suggest that environmental factors may be related to adoption through organizational context instead of independently influencing adoption. This provides a more detailed understanding of how the environmental and organizational dimensions of the TOE framework are related in the context of cross-border shopping services. However, this interpretation does not establish a causal process because the study used a cross-sectional design. Therefore, H5 was supported.

Overall, these findings suggest that external environmental conditions alone may not be sufficient to explain the adoption of cross-border shopping services by MSMEs. Within the TOE framework, organizational context plays an important role in explaining how environmental factors are related to adoption. Organizational context showed a positive and significant relationship with adoption (β = 0.541), while environmental factors were positively associated with organizational context (β = 0.568). In contrast, the direct relationships of technological factors (β = 0.076) and environmental factors (β = 0.078) with adoption were not significant. The significant indirect relationship between environmental factors and adoption through organizational context (β = 0.307) suggests that external environmental conditions may be associated with adoption through internal organizational conditions rather than directly. These findings provide a more detailed understanding of the TOE framework by highlighting the mediating role of organizational context in the adoption of cross-border shopping services among MSMEs. However, these relationships should not be interpreted as evidence of causality because the study used a cross-sectional design.

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From a managerial perspective, the findings of this study suggest that MSMEs should not focus only on technological availability or external support when using cross-border shopping services. Instead, they should also pay attention to their internal organizational conditions, including their willingness to manage risks, understanding of the strategic importance of these services, and availability of technological resources. Since environmental factors showed a significant indirect relationship with adoption through organizational context, external pressures and support may be more useful when MSMEs have adequate internal capabilities to respond to them. Therefore, cross-border shopping service providers and the government could support MSMEs by offering practical guidance, training, and information related to overseas purchasing procedures, international transactions, and potential risks. Such support may help MSMEs strengthen their organizational readiness and make better use of cross-border shopping services in their business activities.

CONCLUSION

Overall, this study shows that organizational context plays an important role in the relationship between environmental factors and the adoption of cross-border shopping services among MSMEs. Although environmental factors did not have a significant direct relationship with adoption, their indirect relationship through organizational context was significant. Technological factors also did not show a significant direct relationship with adoption. These findings suggest that external environmental conditions may be associated with adoption through internal organizational conditions rather than independently. Within the TOE framework, this study highlights the mediating role of organizational context in understanding the adoption of cross-border shopping services among Indonesian MSMEs.

The findings of this study suggest that MSMEs should pay attention to their internal organizational conditions when using cross-border shopping services. Business owners can consider their willingness to manage risks, the strategic importance of these services, and the technological resources available within their businesses. These conditions may help MSMEs respond to external pressures and use cross-border shopping services more effectively. In addition, cross-border shopping service providers and the government could support MSMEs by providing practical guidance, information about overseas purchasing procedures, and education about potential risks in cross-border transactions. Such support may help MSMEs strengthen their organizational readiness and improve their ability to use these services for business activities.

This study has several limitations. First, the study used purposive sampling with 120 valid respondents, of whom 63.3 percent were from Batam. Therefore, the findings cannot be generalized to all MSMEs in Indonesia. Second, the cross-sectional design cannot establish causal relationships or examine changes over time. The use of self-reported questionnaire data may also introduce response bias and common method bias. Third, several measurement results require careful interpretation. Some Cronbach's alpha and ρA values were below 0.70, while several HTMT values exceeded the recommended threshold of 0.90. The SRMR values of 0.090 and 0.103 also exceeded the commonly used threshold of 0.08. Furthermore, the removal of six indicators may affect construct content validity. The research model explained 41.3 percent of the variance in

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adoption, indicating that other factors may also be relevant. Future research could examine specific organizational mechanisms that explain the relationship between environmental factors and adoption. Studies involving MSMEs from different regions, business sectors, and levels of digital maturity could provide a broader understanding of these relationships. Longitudinal studies could also be conducted to examine changes over time.

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