Factors Affecting Supplier Selection on Cross-border Electronic Commerce ——An Empirical Analysis Based on SEM Model

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Abstract. Cross-border electronic commerce is an important mode of foreign trade. However, the level of development of domestic export logistics is insufficient. Researching the optimization of Cross-border electronic commerce supply chains is necessary. In the supply chain, one of the fundamental issues is supplier selection, which plays a significant role in the overall performance, yet it has not received adequate attention. This study, based on a structural equation model, explores the role and mechanism of suppliers in the performance of Cross-border electronic commerce platforms. Empirical testing of the model was conducted using original data collected from 135 Chinese Cross-border electronic commerce professionals. The results indicate that supplier characteristics, compatibility in collaboration, experience in collaboration, and supplier reputation have a significant impact on the performance of Cross-border electronic commerce.

Keywords: Cross-border electronic commerce, Supplier selection, Structural equation model, Smart PLS.

1 Introduction

In recent years, Cross-border electronic commerce has continued to develop at a high pace and has become one of the primary methods of foreign trade. Cross-border electronic commerce platforms are responsible for quality assurance and after-sales service. Therefore, the choice of suppliers is crucial, as the supplier's level of supply and product quality directly affects the credibility of the e-commerce platform and the ease of guarantee services. Hence, the study of factors influencing supplier selection is essential. A structural equation model was used in this paper to investigate the factors affecting supplier selection on Cross-border electronic commerce platforms, aiming to identify and improve supplier selection strategies for Cross-border electronic commerce, providing a strategic advantage to enhance competitiveness in the market.

2 Literature Review

In the face of uncertain factors such as the global trade recovery and ongoing pandemic impacts, Cross-border electronic commerce continues to emerge as a major force in global trade. It has become an essential driver for supply chain stability[1]. Supplier selection is a fundamental

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issue within the supply chain, playing a significant role in the overall performance. Cross-border electronic commerce is currently a crucial form of foreign trade, where e-commerce platforms can act as transaction entities or intermediaries. However, the platform is responsible for quality assurance and after-sales service, making supplier selection critically important for e-commerce[2].

Various methods have been proposed and applied to evaluate and select suppliers. Many attempt to rank suppliers from best to worst and choose suitable suppliers. The process of evaluating and selecting suppliers is complex and requiring typical multi-criteria decision-making. The need for human judgment in various aspects of supplier selection, such as preferences for alternative solutions, preferences for supplier attributes, category numbers, and boundaries, makes supplier selection more challenging and risky[3]. To delve deeper into the factors influencing supplier selection in Cross-border electronic commerce and objectively conduct supplier evaluation and selection, this paper uses a structural equation model for research.

The structural equation model (SEM) has attracted significant attention since its inception, both from foreign and domestic researchers. Over the past few decades, SEM has made substantial progress in theoretical knowledge and practical applications. In terms of SEM theory, foreign scholars have done a lot of work and gained recognition from researchers worldwide[4]. In the early 20 years of the new century, research on SEM methods in China mainly involved five themes: model development, parameter estimation, model evaluation, measurement invariance, and special data processing, particularly model development (i.e., various variations of SEM) has achieved significant results[5]. SEM's application is widespread, but its application in supplier selection for Cross-border electronic commerce enterprises is relatively limited. Therefore, this paper builds upon previous research and conducts a study of the factors influencing supplier selection in Cross-border electronic commerce using the structural equation model.

3 Data and Method

3.1 Collection of data samples

The study conducted the survey in October 2023, targeting professionals in the Cross-border electronic commerce industry from 21 provinces in China, including Jiangsu, Shanghai, Beijing, Sichuan, and others. The research covered regions in North and South China, inland areas, and coastal areas. This study commissioned "Wen Juan Xing" (https://www.wjx.cn/) to conduct the official survey. "Wen Juan Xing" is recognized as China's most professional online survey platform[6], and there are more than 28.7 million people have registered to use[7]. A total of 135 valid responses was received after removing all of the invalid questionnaires.

3.2 Measures

The questionnaire divided the factors influencing Cross-border electronic commerce platform supplier selection into three dimensions: supplier company characteristics, compatibility in cooperation, and supplier reputation. The characteristics and reputation of a supplier significantly influence the level and depth of collaboration between both parties. Higher compatibility further advances the stability of the partnership, fostering a high-quality and stable

cooperation that, in turn, enhances the performance of cross-border e-commerce. Therefore, the cooperation stability acts as an intermediary factor between influencing elements and the performance of cross-border e-commerce.

The study uses a Likert five-point scale, ranging from 1 (very little impact) to 5 (very significant impact) to measure the respondents' assessments of the impact of each dimension on Cross-border electronic commerce performance. The items in the questionnaire are also not randomly listed, but have a scientific basis and are mostly adapted from previous experimental studies[2][8] and were modified to ensure validity. This study constructed a research framework as shown in Figure 1.

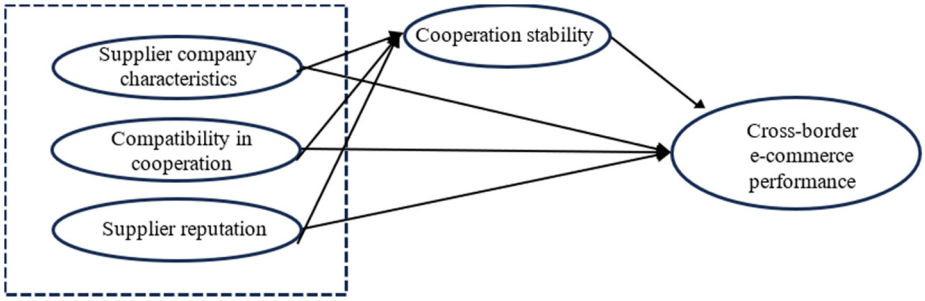

Figure 1. The research framework

3.3 Analytical Techniques

In this paper, the Structural Equation Model (SEM) is constructed to analysis and the Partial Least Squares (PLS) method is used to analysis the data collected. The choice of PLS-SEM was made not only because it is suitable for data that is non-normally distributed or of unknown distribution[9], but also because it is an iterative estimation that combines principal component analysis with multiple regression, making it a causal modeling method suitable for exploring the impact of this study. Therefore, PLS-SEM is the appropriate choice for our research model. This study used Smart PLS 3.0 to test the model.

4 Analysis of Data and Results

4.1 Common method variance

Considering that the same respondent answering the whole questionnaire may lead to common method variance (CMV) in the results, which in turn affects the validity of the scale. In this study, Harman's one-way test was used to test the CMV[10]. According to the results, CMV does not pose a significant threat to the data in this study.

Table 1. Results of the reliability and validity tests

Construct	Items no.	Standard loadings	Cronbach's α	CR	AVE
SCC	SCC1	0.862	0.909	0.932	0.733
	SCC2	0.858			
	SCC3	0.837			

	SCC4	0.870			
	SCC5	0.852			
	CC1	0.795	0.862	0.906	0.708
CC	CC2	0.882			
	CC3	0.842			
	CC4	0.843			
	CS1	0.735	0.847	0.897	0.687
CS	CS2	0.888			
	CS3	0.866			
	CS4	0.818			
	SR1	0.870	0.857	0.913	0.777
SR	SR2	0.907			
	SR3	0.874			
	CEP1	0.890	0.837	0.902	0.755
CEP	CEP2	0.842			
	CEP3	0.874			

Note: CR refers to Composite Reliability; AVE refers to Average Variance Extracted; The items of SCC1–CEP3 measured the constructs. SCC ¼ Supplier company characteristics; CC ¼ Compatibility in cooperation; CS ¼Cooperation stability; SR ¼ Supplier reputation; CEP ¼ Cross-border electronic commerce performance.

4.2 Models of measurements

The reliability and validity of the relevant data can be validated by the measurement model. As shown in Table 1, the results show the situation of reliability and validity. The external model loadings of all the items have greater than 0.70 and the average variance extracted (AVE) scores are all above the critical threshold of 0.5, indicating the convergent validity of the model is sufficient. In order to measure the internal consistency of the scale, this study utilized the use of Cronbach's alpha and composite reliability (CR) to test, and Table 1 demonstrates good reliability in the data (Nunnally)[11].

In order to test the case of discriminant validity of the data, two methods, Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio, were used in this study. Table 2 shows that the square root of AVE (values on the diagonal) is greater than the inter-structural correlation (other values in the matrix). Therefore, the table shows that the discriminant validity of the scale is good[12]. And all values that shown in Table 3 are below the threshold value (0.9). Therefore, discriminant validity has been established for all constructs.

Table 2. Square roots and correlation of AVEs (Fornell-Larcker criterion)

	SR	CC	SCC	CS	CEP
SR	0.881				
CC	0.632	0.841			
SCC	0.615	0.706	0.856		
CS	0.611	0.688	0.680	0.829	
CEP	0.702	0.752	0.742	0.757	0.869

Note: The square root of the AVE are the elements in bold, while the correlations are the off-diagonal elements. SCC ¼ Supplier company characteristics; CC ¼ Compatibility in cooperation; CS ¼Cooperation stability; SR ¼ Supplier reputation; CEP ¼ Cross-border electronic commerce performance.

Table 3. Heterotrait-Monotrait Ratio (HTMT)

	SR	CC	SCC	CS	CEP
SR					
CC	0.737				
SCC	0.694	0.794			
CS	0.711	0.805	0.772		
CEP	0.824	0.881	0.849	0.892	

Note: SCC ¼ Supplier company characteristics; CC ¼ Compatibility in cooperation; CS ¼Cooperation stability; SR ¼ Supplier reputation; CEP ¼ Cross-border electronic commerce performance.

4.3 Path factor analysis

In this study, Structural Equation Model (SEM) was evaluated using the PLS-SEM algorithm. In determining the significance of each coefficient, a bootstrapping method (500 resamples) was applied.

Hypothesis testing and structural relationships are outlined in Table 4. The results shows that supplier reputation (0.213, P<0.05), compatibility in cooperation (0.326, P<0.05) and supplier company characteristics (0.314, P<0.001) have significant and positive impact on cooperation stability. Additionally, supplier reputation (0.237, P<0.05), compatibility in cooperation (0.241, P<0.05), supplier company characteristics (0.225, P<0.05) have significant and positive impact on cross-border electronic commerce performance. Especially, the results indicate that cooperation stability (0.289, P<0.001) has a significant positive impact on supplier performance, supporting the expected hypotheses.

Table 4. Algorithm and bootstrapping tests.

	β	T-value	P-value
SR -> CS	0.204	2.233	0.026
SR -> CEP	0.226	2.594	0.010
CC -> CS	0.334	3.608	0.000
CC -> CEP	0.244	3.352	0.001
SCC -> CS	0.319	3.928	0.000
SCC -> CEP	0.231	3.015	0.003
CS -> CEP	0.294	4.559	0.000

Note: SCC ¼ Supplier company characteristics; CC ¼ Compatibility in cooperation; CS ¼Cooperation stability; SR ¼ Supplier reputation; CEP ¼ Cross-border electronic commerce performance.

4.4 Mediating effect analysis

In the analysis of the mediating effect, this paper employs bootstrapping to test the mediation and assesses the significance of the indirect effects using T-values and 97.5% confidence intervals. Specific indirect effects between influencing factors and cross-border e-commerce performance is presented in Table 5According to the data in Table 5, we observe that all 97.5% confidence intervals do not include zero, and T-values are greater than 1.96. Therefore, cooperation stability serves as a significant mediator between influencing factors and cross-border e-commerce performance, supporting the hypothesis.

Table 5. The results of mediating effect analysis.

Specific indirect effects			
Hypotheses and paths	β	T-value	Confidence intervals
SR -> CS-> CEP	0.027	2.235	[0.015,0.114]
CC -> CS-> CEP	0.037	2.644	[0.033,0.173]
SCC-> CS-> CEP	0.033	2.886	[0.036,0.158]

Note: SCC ¼ Supplier company characteristics; CC ¼ Compatibility in cooperation; CS ¼Cooperation stability; SR ¼ Supplier reputation; CEP ¼ Cross-border electronic commerce performance.

5 Conclusions

This study explores the impact of five major factors, namely supplier company characteristics, compatibility in cooperation, supplier's prior cooperation stability, and supplier reputation, on the performance of Cross-border electronic commerce. The results are shown in **Figure 2** and the main conclusions and discussions are as follows:

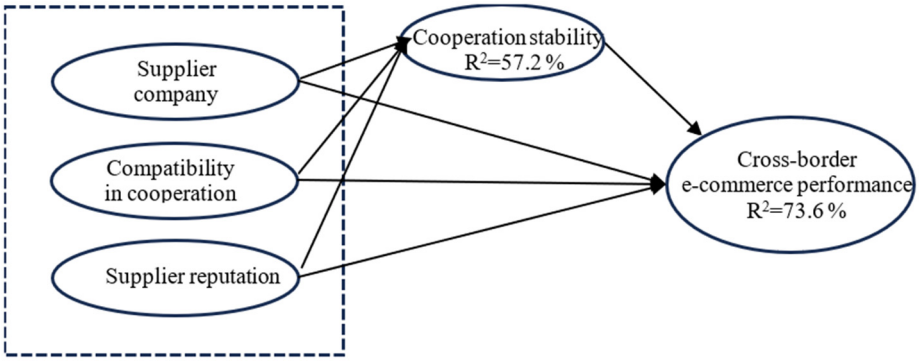

Figure 2. Results of the structural model.

Firstly, supplier company characteristics (stability of the company, financial condition, level of professionalism in Cross-border electronic commerce, brand recognition, and after-sales service) and reputation (reputation within the industry, integrity, and social evaluation) both have a positive impact on the performance of Cross-border electronic commerce. Cross-border electronic commerce companies should strategically partner with suppliers that are financially stable, mature, and professional. This can help establish a strategic supply model, enabling deeper industry collaboration and benefit sharing. Furthermore, supplier reputation is a prerequisite for initiating cooperation and a crucial factor influencing consumer trust in Cross-border electronic commerce companies, as well as repeat purchases. Thus, supplier reputation, integrity, and societal evaluation are key factors driving the establishment and maintenance of innovative cooperation models.

Secondly, the research indicates that compatibility in cooperation between Cross-border electronic commerce companies and suppliers (similarity in corporate culture, relevance of goals to the supplier, similarity in production operations and management forms, and compatibility in information system platforms) has a positive impact on the performance of Cross-border electronic commerce. The compatibility between the two companies directly

determines the breadth and depth of their cooperation. Similar corporate cultures and strategic goals significantly reduce cooperation friction, enhance communication efficiency, and reduce conflict costs. Cross-border electronic commerce companies often need to interact with companies with significant cultural differences, making mutual understanding, communication, and adjustment essential to achieving ideal cooperation results. Additionally, the prior cooperation stability of Cross-border electronic commerce companies and suppliers is crucial. Pleasant and mutually beneficial cooperation stability are more attractive than factors like price. Long-term cooperation stability, stability of the cooperation relationship, and mutual understanding create strong dependencies, leading to a preference for building long-term, friendly cooperative relationships and even deeper mutually beneficial sharing models.

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