The Model Causal Relationship of Logistics Service Quality Influencing Customer Satisfaction of Online Shopping e–commerce in Thailand

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Abstract

This research aimed to: 1) study the impact of logistics service quality on customer satisfaction in online shopping e–commerce in Thailand; and 2) develop a causal relationship model between logistics service quality and customer satisfaction in online shopping e–commerce in Thailand. 456 online shoppers were selected as the study samples by using a convenient sampling technique. The questionnaire was used for collecting data. Confirmatory factor analysis and structural equation modeling were analyzed in this study. The research framework consisted of five aspects of logistics service quality: 1) reliability quality; 2) responsiveness quality; 3) assurance quality; 4) empathy quality; and 5) timeliness quality of product delivery. The results of the confirmatory factor analysis revealed that the measurement model for logistics service quality that affected the customer's satisfaction with online shopping that was developed by the researchers aligned with the empirical data. The goodness–of–fit indices (GFI) met the required criteria. The relationships proposed in the structural model between logistics service quality and customer satisfaction in online shopping were analyzed. The results showed that logistics service quality had a positive influence on customer satisfaction.

Keywords: Logistics service quality; Customer satisfaction; e–commerce; online shopping

Introduction

The advanced communication technology has led to changes in customers' online purchasing behaviors (e–commerce) or online shopping. They have been rapidly growing and becoming more popular in Thailand, resulting in continuous expansion of the e–commerce market. It was estimated that the average annual growth will be up to 20% over the next five years. The current market value of 300 billion Baht is projected to increase to 750 billion Baht by the year 2025 (Techasiriprapa, 2022). The e–commerce market has been remarkably growing in the recent years, especially due to the impact of the COVID– 19 pandemic, which has resulted in customers increasingly preferring online shopping. The Ministry of Commerce has developed the National e–commerce Development Plan Phase 2, covering 2023–2027, as a key mechanism to develop e–commerce in Thailand. It aims to reach the projected domestic e–commerce value of 7.1 trillion Baht by 2027, or a 10% average growth rate from 2021. The survey by the Electronic Transaction Development Agency (ETDA) revealed that the domestic e–commerce value of Thailand was 4.01 trillion Baht, representing about 6.08% growth from the previous year (Ministry of Commerce, 2022). Moreover, data from the Electronic Transaction Development Agency (ETDA) in 2019 showed that Thais spend the most time online in the world, with an average of 4.2 hours per day. The top online activities were: 1) social media, 2) email, 3) watching TV, 4) listening to music, and 5) online purchasing. Additionally, a survey from 2018 found that online shopping was the most preferred activity among Thai users and ranked in the top five of the most preferable activities in the country. This demonstrates that Thailand has truly entered the digital society (Electronic Transaction Development Agency, 2019).

The logistics industry has been growing and transforming along with the changes in business caused by disruptive technology. Other offline businesses have changed to invest and compete more on online platforms, becoming e–commerce businesses. Consequently, the delivery and logistics industry has also been continuously developed to keep up with the growing e–commerce market. The logistics business for e–commerce has been growing along with the online market's expansion to meet customer demands for selling and purchasing products (Kovacs, 2004). With this convenient service for both buyers and sellers, products can be quickly delivered. As a result, the efficiency of supply chain operations for e–commerce businesses has been significantly improved. Quality logistics services are not only a development cost for organizations, but they are also significant factors in

gaining competitive advantages among logistics service providers because the quality of the service directly influences customer satisfaction. Nowadays, customers not only expect high–quality products but also excellence in the services of companies (Bowersox et al., 2008).

The quality of logistics service is essential to building long–term relationships with customers and improving service quality to create added value and sustainability for customers (Hua & Jing, 2015). Therefore, this research focused on the quality of logistics services that influence customer satisfaction. The objectives are to examine the quality of logistics services that influence customer satisfaction in online e–commerce purchases in Thailand. The findings provide empirical data on the quality of logistics service and in–depth information from the customer's perspective. Moreover, the findings can improve customer satisfaction by enhancing and improving the quality of their logistics service in the e–commerce market. The results will be beneficial for logistics service providers as they improve and develop their service quality.

Objective

1. Study the impact of logistics service quality on customer satisfaction in online shopping e–commerce in Thailand.

2. Develop a causal relationship model between logistics service quality and customer satisfaction in online shopping e–commerce in Thailand.

Scope of study

Content scope: This research studied the following contents.

Logistics service quality consists of the following factors: reliability quality, responsive quality, assurance quality, empathy quality, and timeliness quality.

Customer satisfaction of consists of customer expectations, perceived quality, and perceived value.

Population scope: Customers who shop online and receive services from logistics service providers in Thailand.

Spatial boundary: The researcher conducted research on customers who used to shop online and received services from logistics service providers in Thailand.

Time scope: The researcher collects data during the month. January–March 2023.

Literature reviews

Logistics service quality

Logistics service quality (LSQ) is considered crucial as there are numerous competitors in the market. Thus, the key factor that can be considered an advantage in this competitive landscape is the ability to understand customers and satisfy them to enhance loyalty towards the products. Moreover, good transportation or logistics service can influence customer satisfaction and loyalty (Murfield et al., 2017). The research related to logistics service quality is important to the organization's operation. The quality of logistics service has been developed over the years.

Mentzer et al. (1989) developed the physical distribution service quality (PDSQ) to measure how organizations provide value to customers through logistics. Aktas and Ulengin (2005) studied the criteria for selecting logistics service providers that included 31 indicators, which can be divided into 7 dimensions as follows: 1) reliability of the carrier 2) responsiveness to delivery timeliness; 3) prestige of the carrier 4) financial opportunities and flexibility for customer inquiries 5) reliability and quality of operations management and delivery cycle 6) ease of collaboration; and 7) accurate order receipt and follow-up. Additionally, other scholars have proposed additional factors for measuring LSQ. Bienstock et al. (2008) proposed an LSQ model that considers the components that guarantee the quality of logistics processes (steps, data, and post-sales communication). Saura et al. (2008) also suggested that LSQ measurements should emphasize the customer's perception of the order and delivery process. All in all, logistics service has become a crucial component of all businesses today to maintain competitive advantages and increase customer satisfaction (Bottani & Rizzi, 2006). Running a business nowadays is more complicated; thus, e-commerce that is related to logistics systems must be able to respond to customer needs and reflect the flexibility of the order process, delivery speed, and customization of products and services available online (Micu et al., 2013).

According to the previous studies and the literature review, researchers have synthesized the LSQ to consist of the following factors: reliability quality, responsive quality, assurance quality, empathy quality, and timeliness quality.

Customer satisfaction

The concept of customer satisfaction has been proposed in various previous studies. It was often considered an overall judgment of the effectiveness of logistics service quality (Ishfaq et al.,

2016). Rauyruen and Miller (2007) mentioned that providing quality service and achieving customer satisfaction were fundamental for developing customer relationships. Moreover, customer satisfaction influenced loyalty. Thus, the conceptual framework of customer satisfaction structure is often related to customer responses to retailers' offerings and the differences between actual performance and the expected performance in service quality (Yoo & Park, 2016). Customer satisfaction in the online channel can be defined as "the assessment of whether online stores' products and services exceed customer expectations" (Vesel & Zabkar, 2009). Ngo and Nguyen (2016) mentioned that the business competition was continuously increasing; thus, the strategies should focus on customers as an essential aspect of operations, taking into consideration customer satisfaction, customer loyalty, and service quality. These factors were previously confirmed to be significantly correlated. The measurement of customer satisfaction has been conducted in conjunction with marketing because every organization has tried to ensure customer satisfaction. The American Customer Satisfaction Index (ACSI) developed a tool to measure customer satisfaction based on customer involvement and real experiences that consists of three factors influencing customer satisfaction: customer expectations, perceived quality, and perceived value (Fornell et al., 1996). Firstly, customer expectations depend on customers' experiences with the product or service and their judgment regarding whether the product or service meets their expectations. Secondly, perceived quality is when customers have experiences with a product or service and can evaluate its quality, which further affects their perception and understanding of the product or service. Finally, perceived value is when customers evaluate the value by comparing the price they pay with what they receive from using the product or service and determining whether it is worth it or not. If customers perceive the value to be appropriate, they will gain satisfaction and repurchase intention due to their trust in the product or service.

This research, therefore, evaluated customer satisfaction with logistics service quality in terms of customer expectations, perceived quality, and perceived value. By understanding these dimensions, researchers can assess the level of customer satisfaction related to logistics service quality.

In this study, the researchers have proposed the research conceptual framework, which was developed based on a review of the literature on logistics service quality (LSQ) (Saura et al., 2008; Micu et al., 2013). There were several studies related to logistics service quality and

customer satisfaction. However, there is still limited research that specifically investigates the relationships between each dimension of logistics service quality and customer satisfaction from the customers' perspective. Therefore, this research aimed to fill this gap and explore the customers' perspective. Additionally, this study aimed to examine how logistics service quality influences customer satisfaction in online shopping. In this study, the level of customer satisfaction with logistics service quality can be measured by considering customer expectations, perceived quality, and perceived value. Therefore, this research used the theories of logistics service quality and customer satisfaction to develop hypotheses and the research conceptual framework to examine the causal relationships of logistics service quality influencing customer satisfaction with the empirical data.

Research model and hypothesis

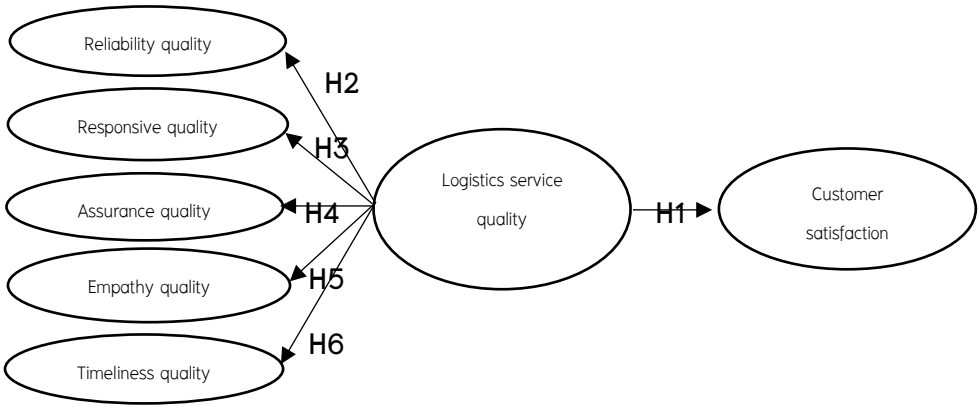

Figure 1. Research conceptual framework of the causal relationship between logistics service quality and customer satisfaction in online shopping e-commerce in Thailand

Research methodology

Research tool

Upon developing a conceptual framework, a primary questionnaire was developed as a tool for data collection, including the measurement items. The content validity of the questionnaire was tested using the Index of Item-Objective Congruence (IOC) by three experts to assess the appropriateness of the language used and the consistency of variables. The results of the IOC index revealed that all items were scored between 0.60 and 1.00. The tool's reliability is evaluated using the Alpha coefficient formula, and the results showed that the overall value of the questionnaire was 0.91, which was higher than 0.70 and is considered high reliability (Peterson & Kim, 2013).

Sampling methods and data collection

In this study, the researchers developed a questionnaire to collect data from a sample group of 456 customers who made online purchases and received logistics service. The sample population was selected using a convenient sampling technique. The researchers determined the sample size based on the number of variables studied in proportion to the number of parameters or variables, using a ratio of 5–10 samples per 1 parameter (Kline, 2023). The study included 31 parameters in the model, and the sample group consists of 456 individuals, which is considered sufficient and appropriate for data analysis. The researchers explained the research objectives and the method of response in the questionnaire to the respondent. After collecting the data, the researchers encoded it for data analysis.

Data analysis

The analyses to prove the hypotheses of the study consisted of a structure equation modeling (SEM) by using a package program to examine the parameters. The structure equation modeling is able to analyze several latent variables together. It is able to identify the causal relationships among variables at the same time to confirm the hypotheses and accept or reject the relationships among those variables (Raengsungnoen, 2011).

Results of data analysis

Confirmatory factor analysis

The researchers examined the components of logistics service quality, including: 1) reliability quality; 2) responsive quality; 3) assurance quality; 4) empathy quality; and 5) timeliness quality. The model was consistent with the empirical data, and the indices were normated chi–square (CMIN/DF) ≤ 5.00 (Tabachnick & Fidell, 2007). Comparative Fit Index (CFI) ≥ 0.90 (Schumacher & Lomax, 2016) Incremental fit index (IFI) ≥ 0.90 (Schumacher & Lomax, 2016). Tucker–Lewis Index (TLI) ≥ 0.90 (Bagozzi & Yi, 1988) Root mean square error of approximation (RMSEA): 0.05–0.08 (Schumacker & Lomax, 2016).

The results of confirmatory factor analysis of the measurement model, after model adjustments, revealed that the indices with observed data were as follows: Chi–square = 945.514, df = 258, CMIN/DF = 3.665, CFI = 0.933, IFI = 0.933, TLI = 0.922, RMSEA = 0.077. These values indicated that all indices met the criteria. Therefore, the model fits well with the observed data. Figure 2 and Table 1 present the results of the post–adjustment model analysis and the confirmatory factor analysis of the model, respectively.

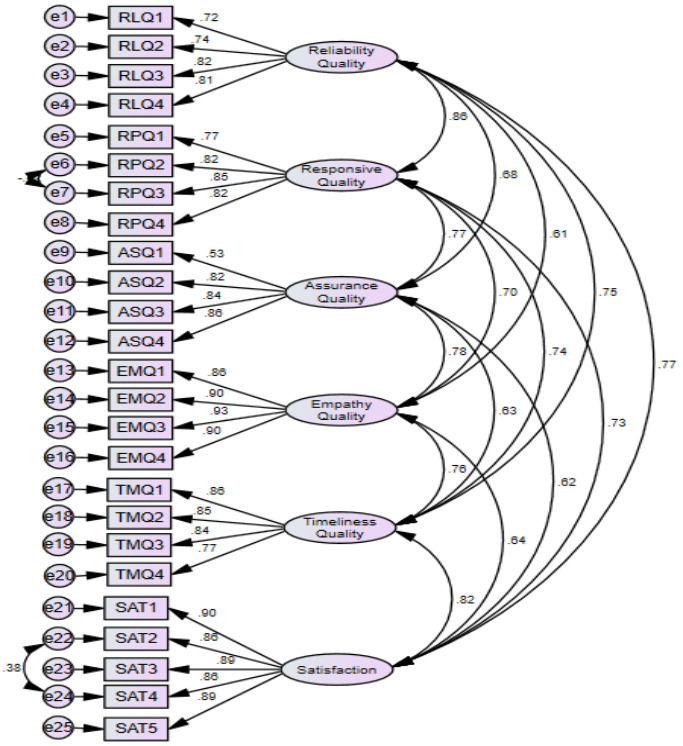

Figure 2. Adjusted confirmatory factor analysis of Reliability quality, Responsive quality, Assurance quality, Empathy quality, Timeliness quality, and customer satisfaction

Note: Chi–square= 945.514, df= 258, CMIN/DF = 3.665, CFI = 0.933, IFI = 0.933, TLI = 0.922, RMSEA = 0.077

Table 1 The results of the goodness of fit

Goodness–of–fit measures	Suggested criteria	First Model	Final Model
Chi square (CMIN)		1031.128	945.514
Degree of Freedom (DF)		260	258
Chi square/ Degree of Freedom (CMIN/DF)	≤ 5.00	3.966	3.665
Comparative fit index (CFI)	≥ 0.90	0.924	0.933
Incremental fit index (IFI)	≥ 0.90	0.925	0.933
Tucker–Lewis Index (TLI)	≥ 0.90	0.913	0.922
Root mean square error of approximation (RMSEA)	≤ 0.08	0.081	0.077

Measurement model

The researchers examined the validity, appropriateness, and accuracy of the measurement model for assessing reliability quality, responsive quality, assurance quality, empathy quality, and timeliness quality by using construct validity, convergent validity, composite reliability, discriminant validity analysis, composite reliability (CR), average variance extracted (AVE), and Cronbach's alpha coefficient. The results of the analysis are presented in Table 2.

Table 2 Construct reliability and variance extracted

Constructs	Indicator	Factor loading	α	CR	AVE
Reliability quality (RLQ)	RLQ1	0.715	0.854	0.856	0.599
	RLQ2	0.747			
	RLQ3	0.817			
	RLQ4	0.812			
Responsive quality (RPQ)	RPQ1	0.769	0.877	0.889	0.667
	RPQ2	0.829			
	RPQ3	0.852			
	RPQ4	0.815			
Assurance quality (ASQ)	ASQ1	0.532	0.839	0.854	0.601
	ASQ2	0.818			
	ASQ3	0.842			
	ASQ4	0.862			
Empathy quality (EMQ)	EMQ1	0.860	0.942	0.943	0.807
	EMQ2	0.904			
	EMQ3	0.927			
	EMQ4	0.900			
Timeliness quality (TMQ)	TMQ1	0.863	0.892	0.899	0.689
	TMQ2	0.851			
	TMQ3	0.837			
	TMQ4	0.767			
Satisfaction (SAT)	SAT1	0.894	0.947	0.947	0.780
	SAT2	0.873			
	SAT3	0.885			
	SAT4	0.862			
	SAT5	0.901			

Convergent validity refers to the assessment of the accuracy of measurements, considering factor loadings, composite reliability (CR), and average variance extracted (AVE) (Hair et al., 2010). The factor loadings should ideally be greater than 0.6 and statistically significant (Chin, 1998). The composite reliability of the latent variables should be above 0.70 (Fornell & Larcker, 1981), and the average variance extracted should exceed 0.50 (Hooper et al., 2008).

The results of the study showed that the factor loadings range from 0.532 to 0.927, exceeding 0.5, and are statistically significant at the 0.05 level (Hair et al., 2010). The construct reliability (CR) values range from 0.854 to 0.947, surpassing 0.70 (Fornell & Larcker, 1981). The average variance extracted (AVE) ranges from 0.599 to 0.807, higher than 0.50 (Hooper et al., 2008). These findings indicate convergent validity. Additionally, the analysis of the Cronbach's alpha reliability coefficients (α) yields values between 0.839 and 0.947, exceeding 0.70, demonstrating the data used in the analysis are reliable (Bryman, 2008).

Discriminant validity refers to the examination of the extent to which one variable differs from other variables by comparing the average variance extracted (AVE) with the squared correlations between the variable and other variables (Hair et al., 2010). The results of the study showed that the AVE values for all variables were higher than the squared correlations between variables, indicating good discriminant validity for the measurement model (Table 3).

Table 3 Discriminant validity result

	RLQ	RPQ	ASQ	EMQ	TMQ	SAT
RLQ	*0.775*					
RPQ	0.774	*0.817*				
ASQ	0.619	0.713	*0.775*			
EMQ	0.557	0.651	0.721	*0.898*		
TMQ	0.669	0.674	0.597	0.710	*0.830*	
SAT	0.687	0.668	0.593	0.607	0.767	*0.883*

Note(s): Diagonal numbers are the square root of the construct's AVE (in italics); off–diagonal numbers are correlations.

Structural equation modeling

The structural equation analysis was conducted to study the logistics service quality influencing customer satisfaction in online shopping e-commerce in Thailand. The analysis aimed to find the path analysis and compare the goodness-of-fit between the model and the empirical data by checking the model's goodness-of-fit criteria against the specified data. To ensure the model's compatibility with the observed data, researchers adjusted the model accordingly. The results of the analysis after the model adjustment showed the following values: Chi-square = 1011.779, df = 264, CMIN/DF = 3.832, CFI = 0.927, IFI = 0.927, TLI = 0.917, RMSEA = 0.079. These values indicate that the model met all the criteria for a good fit.

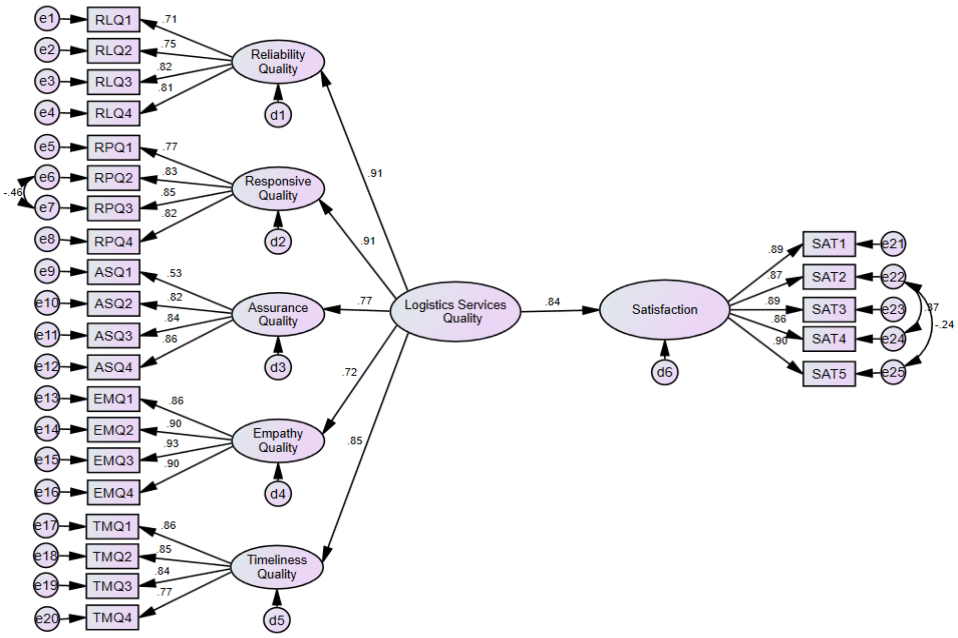

Figure 3. The adjusted model of the logistics service quality influencing customer satisfaction in online shopping e-commerce in Thailand.

Note: Chi-square = 1011.779, df = 264, CMIN/DF = 3.832, CFI = 0.927, IFI = 0.927, TLI = 0.917, RMSEA = 0.079

Table 4 The results of the goodness of fit Structural Model

Goodness–of–fit measures	Suggested criteria	Final Model
Chi square (CMIN)		1011.779
Degree of Freedom (DF)		264
Chi square/ Degree of Freedom (CMIN/DF)	≤ 5.00	3.832
Comparative fit index (CFI)	≥ 0.90	0.927
Incremental fit index (IFI)	≥ 0.90	0.927
Tucker–Lewis Index (TLI)	≥ 0.90	0.917
Root mean square error of approximation (RMSEA)	≤ 0.08	0.079

Note: ***p < 0.001, n/s not significant

Table 5 Hypothesis testing results

Hypothesis			Path coefficient	Standard error	*t*–value	*p*–value	Result
H1 Logistics service quality	→	Satisfaction	0.84	0.081	14.230	0.000	Supported
H2 Logistics service quality	→	Reliability quality	0.91	0.068	13.733	0.000	Supported
H3 Logistics service quality	→	Responsive quality	0.91	0.078	13.733	0.000	Supported
H4 Logistics service quality	→	Assurance quality	0.77	0.072	9.207	0.000	Supported
H5 Logistics service quality	→	Empathy quality	0.72	0.097	12.441	0.000	Supported
H6 Logistics service quality	→	Timeliness quality	0.85	0.087	13.964	0.000	Supported

Conclusion

This research aimed to study the causal relationship between logistics service quality and customer satisfaction of online shopping e–commerce in Thailand by developing the causal relationship between logistics service quality and customer satisfaction. This research was conducted based on the literature review related to logistics service quality, which consists of five components: 1) reliability quality; 2) responsiveness quality; 3) assurance quality; 4) empathy quality; and 5) timeliness quality. These five factors influence customer satisfaction. The confirmatory factor analysis was conducted to examine the quality of the measurement model concerning reliability quality, responsive quality, assurance quality, empathy quality, timeliness quality, and customer satisfaction.

The results of the confirmatory factor analysis indicated that the model fits the observed data well. After refining the model, the following fit indices were obtained: Chi–square = 945.514, df = 258, CMIN/DF = 3.665, CFI = 0.933, IFI = 0.933, TLI = 0.922, RMSEA = 0.077. These values met the acceptance criteria, suggesting that the model adequately fits the observed data. Additionally, the researchers assessed the model's construct validity by examining convergent

validity, composite reliability, and discriminant validity. Factor loadings ranged from 0.532 to 0.927, all exceeding the recommended threshold of 0.6 (Chin, 1998). The construct reliability (CR) ranged from 0.854 to 0.947, all surpassing the recommended threshold of 0.70 (Fornell & Larcker, 1981). The extracted variability (AVE) fell between 0.599 and 0.807, exceeding 0.50 (Hair et al., 2010), indicating convergent validity. Additionally, the analysis of reliability (Cronbach's alpha: α) yielded values ranging from 0.839 to 0.947, surpassing 0.70, demonstrating the data's reliability (Bryman, 2008). Moreover, discriminant validity was examined by comparing the square root of AVE for each variable with the inter-variable correlation coefficient (Hair et al., 2010). The results showed that the square root of AVE for each variable was higher than the inter-variable correlation coefficient, suggesting good discriminant validity. Based on the above analysis, it is evident that the confirmatory factor analysis model was consistent with the empirical data, confirming a well-fitting structural model, consistent with the study of Raengsungnoen (2011) that an essential step in SEM analysis is conducting a confirmatory factor analysis. The results of the developed confirmatory factor analysis were consistent with the empirical data and provided a valid means of analyzing the causal relationships influencing the logistics service quality that impact customer satisfaction in online shopping e-commerce in Thailand. Additionally, this study examined the causal relationship model of logistics service quality influencing customer satisfaction of online shopping e-commerce in Thailand. The study found that logistics service quality directly influenced customer satisfaction. The results of the structural equation modeling indicated that the model fits the observed data well. After refining the model, the following fit indices were obtained: Chi-square = 1011.779, df = 264, CMIN/DF = 3.832, CFI = 0.927, IFI = 0.927, TLI = 0.917, RMSEA = 0.079. These values met the acceptance criteria, suggesting that the model adequately fits the observed data.

Discussion

The study found that logistics service quality directly influenced customer satisfaction. Similar to the study of Hua and Jing (2015), who studied post-online transaction logistics service quality and found that it significantly influenced customer satisfaction. Thus, improving the logistics service quality is crucial for online B2C retailers to enter the market (Zheng, 2008; Bian et al., 2011; Bask et al., 2012). Additionally, the study revealed significant correlations between reliability quality, responsive quality, assurance quality, empathy quality, timeliness quality, and customer satisfaction.

The most significant contribution of this research is the demonstration of the LSQ model for online shopping e–commerce in Thailand, providing valuable insights to enhance logistics service quality that directly influences customer satisfaction.

The study identified the critical factors in reliability quality, which included 1) accurate product delivery, 2) accurate shipping cost calculation, 3) a clear and accurate delivery process, and 4) timely delivery service according to customer notifications. Moreover, the factors concerning responsive quality included 1) logistic service providers' politeness, 2) logistic service providers' understanding of the customer's needs, 3) logistic service providers' responsibility and accountability, and 4) prompt responsiveness when customers seek assistance. These factors highlight that customers give the highest importance to reliability quality and responsive quality, followed by timeliness quality, assurance quality, and empathy quality, respectively. This research was conducted using empirical data to expand our understanding of logistics service quality in online shopping. Logistics service providers must comprehend customer changes, attitudes, and requirements to gain advantages in this competitive market. If the logistic service providers failed to understand the underlying factors of customer behavior, they would have difficulty surviving in a highly competitive market. Those logistics service providers who want to gain competitive advantages should prioritize reliability quality and responsive quality; otherwise, they will have difficulty building long–term relationships with customers and will not get a proper understanding of the fundamental factors that influence customer behavior, as service quality directly influences customer satisfaction (Uvet 2020; Bowersox et al., 2008). Nowadays, customers not only seek high–quality products but also excellence in service providing. Similarly, Bowersox et al. (2002) and Parasuraman et al. (1985) mentioned that service quality excellence directly influences customer satisfaction. It was evident that logistics service providers cannot compete effectively if they fail to meet customer needs. Currently, logistics quality is considered a crucial component in the competition among various companies, indicating the attractiveness of offers and factors that differentiate products from competitors (Gajewska et al., 2020).

New knowledge

The new knowledge findings revealed the model causal relationship of logistics service quality influencing customer satisfaction of online shopping e–commerce in Thailand. This can be used as a model for logistics service providers as well as implemented to create customer satisfaction.

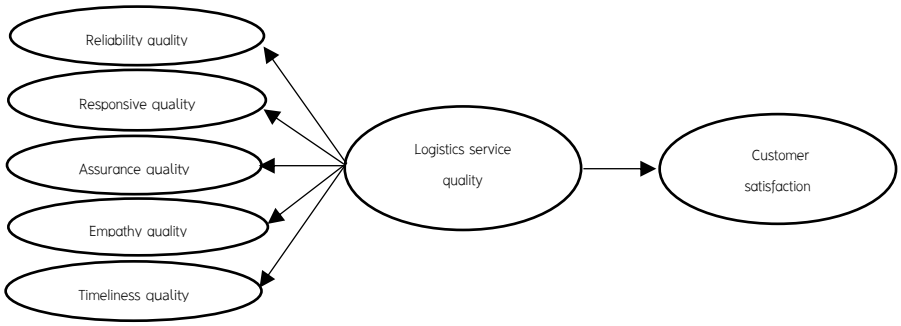

Figure 4. The model of the logistics service quality influencing customer satisfaction in online shopping e–commerce in Thailand.

The study found that logistics service quality directly influenced customer satisfaction. Logistics service quality, which consists of five components: 1) reliability quality; 2) responsiveness quality; 3) assurance quality; 4) empathy quality; and 5) timeliness quality. These five factors influence customer satisfaction. Therefore, to gain an advantage in business competition, logistics service providers must prioritize customer satisfaction. They cannot build long–term relationships without understanding the underlying factors influencing customer satisfaction.

Recommendation for academic

– Data were collected over a period of time. Thus, repetition studies can be conducted periodically as the quality of logistics services is constantly changing over time.

– In this study, the researchers examined the logistics service quality from the perspective of customers (B2C). Therefore, the future study can expand to include the business–to–business (B2B) perspective to make the research more comprehensive.

– The future study can use qualitative methods such as in–depth interviews or focus groups to reflect the in–depth results of this research.

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