

E-Commerce Logistics Service Quality: Customer Satisfaction and Loyalty

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ABSTRACT

With the recent developments in technology, globalization, and the COVID-19 pandemic, the volume of e-commerce logistics activity has been growing rapidly. However, a literature review for this study indicated that there is a lack of research on commerce logistics service quality. This study intends to fill this gap in the literature. It aims to identify the e-commerce logistics service quality factors that affect customer satisfaction. It is also interested in identifying if there is any relationship between the satisfaction of e-commerce customers and their loyalty. Data from 1,562 e-commerce customers living in Turkey were collected via a web-based survey. The results were analysed using structural equation modelling. Timeliness, order condition, order accuracy, and order discrepancy handling were found to have a positive effect on customer satisfaction. A positive relationship between customer satisfaction and customer loyalty was also found.

KEYWORDS

Customer Loyalty, Customer Satisfaction, E-Commerce, Logistics Service Quality

INTRODUCTION

To keep up with the competition, contemporary organizations need to continuously improve the quality of the services they offer to their customers and ensure that more transactions can be made electronically. Due to technological developments, globalization, and the COVID-19 pandemic, e-commerce will be preferred by more companies and customers in the future.

Electronic commerce has increased productivity, reduced operating costs, and changed people's lifestyles and social aspects by performing many things initially considered impossible (Qin, 2009). The COVID-19 pandemic, which has affected many countries worldwide, significantly affects social, economic, and academic life. People use electronic commerce even for their daily shopping needs because it is not safe to go out on the street, the rule of keeping the social distance, quarantines, and prohibitions. With the beginning of COVID-19, a worldwide recession and a slowdown in industrial activity were observed, while the growth rate in the electronic commerce and logistics sector, unlike many other sectors, increased (Neger & Uddin, 2020).

COVID-19 has accelerated the spread of e-commerce to new companies, customers (i.e., elderly), and new product types (i.e., groceries). According to the UNCTAD (United Nations Conference on Trade and Development) report, the pandemic has caused a significant growth in e-commerce volume (<https://unctad.org>). This report shows that the two countries where the popularity of e-commerce

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has increased the most are Turkey and China. The e-commerce volume in Turkey's January-June period of 2020 increased from \$ 9.98 billion to \$ 14.2 billion (<https://www.aa.com.tr>). Even when the COVID-19 pandemic stops, the e-commerce sector is expected to continue to grow (Pantelimon et al., 2020).

It is very likely that some of the behaviors adopted by consumers during the pandemic will become new normal, meaning that consumers will get used to new shopping methods (Guthrie et al., 2021). In parallel, customer expectations have also been increased. People nowadays expect to receive their packages the next day, and their purchase decisions are becoming increasingly influenced by shipment times. A survey conducted by Mckinsey showed that 46% of potential customers abandon a shopping cart due to a shipping time that was too long or not provided, and 35% of customers who did not purchase an item online due to long delivery times (<https://www.mckinsey.com>).

The growth of e-commerce volume has increased the importance of logistics activities and caused this sector to face many opportunities but also challenges. Especially in the early stages of the pandemic, even world giants such as Amazon, FedEx, and UPS had difficulties meeting the increasing orders on time (<http://www.thefamuanonline.com>). Therefore, companies need to reconsider their supply chains, inventories, and delivery systems (Roggeveen & Sethuraman, 2020).

It is widely accepted that the quality of logistics service partly determines customer satisfaction, and thus firms gain the upper hand in the competition (Singh, 2021). In parallel, numerous factors affecting the quality of logistics services are mentioned in the literature, and different studies use a different set of constructs mainly due to methodological constraints. This study includes timeliness (Zailani et al., 2018), order condition (Politis et al., 2014), order accuracy (Chaisaengduean, 2019), and order discrepancy handling (Sutrisno et al., 2019) as they are considered as the leading factors.

It has been suggested in various studies that the quality of logistics services contributes to customer satisfaction (e.g., Grant et al., 2014). In recent years, gaining new customers is more expensive, time-consuming, and requires more effort than retaining existing customers due to the intensity of competition (Javed & Wu, 2020). Customer loyalty has therefore become a major concern and strategic issue for businesses. The majority of the research (e.g., Liao et al., 2017) has found that customer satisfaction has a significant positive effect on customer loyalty but not all (e.g., Mittal & Kamakura, 2011).

This study aims to determine the factors affecting customer satisfaction and the relationship between customer satisfaction and customer loyalty in the e-commerce climate. Some studies are investigating the relationship between these factors in bricks and mortar businesses. On the other hand, to our best knowledge, there is a lack of studies investigating the relationships mentioned above in e-commerce content. Choi et al. (2019) pointed out that literature on the e-commerce logistics service quality is insufficient. Therefore further research is needed on leading variables.

As explained above, the increasing e-commerce volume has affected customer behavior and caused many new companies to enter this field. This has led to reconsider the relationships between logistics service quality factors, customer satisfaction, and loyalty. This is the major motivation for the authors to undertake this research.

In this study, the following research questions will be answered:

- (1) What e-commerce logistics service quality factors affect customer satisfaction?
- (2) Is there any relationship between customer satisfaction and loyalty in the e-commerce environment?

The paper's outline is as follows: literature review and hypothesis development; methodology and results; theoretical contributions and managerial implications; limitations and suggestions for future research.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Logistics Service Quality

High-quality service delivery strengthens corporate brands and contributes to customer satisfaction. Therefore, the quality of service has become an important issue of interest to both practitioners and academicians. To compete successfully in the future, companies need to define how service quality is perceived by consumers and improve it. Logistics creates an opportunity for companies to differentiate themselves from their competitors (Leuschner & Lambert, 2016). On the other hand, logistics service quality emerges as a result of comparing the expectations and perceptions of customers (Giao et al., 2020).

Therefore, since customers' perceptions of quality may differ, the factors affecting it must also be accurately identified. Service quality has varying characteristics depending on the nature of the service (Chaisaengduean, 2019). To improve the quality of logistics processes that directly affect the benefit of customers from the products they buy, it is necessary to improve the concrete aspects of the logistics service as well as manage the customer's expectations (Gil-Saura et al., 2008).

Customer Satisfaction

Globalization has emerged as a significant force shaping firms' business policy and strategy in the last few decades. Customer satisfaction is seen as essential and becoming a key factor of business strategy as firms gain customers by competing effectively in an increasingly difficult globalized market (Chin et al., 2013). Logistical activities provide time and space benefits to customers and thus affect customer satisfaction (Mentzer et al., 2001). It is positively related to the quality of products or services provided to the customer (Yeo et al., 2015). According to McKnight et al. (2017), delivery performance will have a stronger impact on dissatisfaction than satisfaction, as customers want every seller to at least deliver the product.

Customer satisfaction is a term used to indicate how happy *customers* are with a company's products, services, and capabilities (Priyanka & Monica, 2018). Companies will be able to gain a competitive advantage and maintain their position in the market if they improve the quality of existing services to provide services that meet customers' demands by anticipating customer needs (Chen et al., 2019).

In the literature, logistics service quality has been shown to have a positive effect on customer satisfaction (e.g., Suresh et al., 2020). Customers' needs in different segments regarding the dimensions of logistics service quality (e.g., timeliness) are different, and satisfaction levels may be affected. The focus of attention of every organization should be the customers and their preferences (Kadłubek, 2020). Logistics providers need to understand how customer preferences differ between logistics service quality dimensions and how these dimensions affect satisfaction levels (Mentzer et al., 2004).

Customer Loyalty

Customer loyalty is one of the critical success factors in e-commerce, leading to increased long-term profitability (Wu & Li, 2018). Customer loyalty is a measure of the customer's positive attitude towards the service provider and thinking of the only same provider when the same service is needed. Customer loyalty can vary from a fully loyal customer to a customer who will never think of using the same provider in the future (Gremler & Brown, 1996). A highly "loyal" customer is a customer who regularly uses a service provider, really likes the firm, and does not think about using another service provider for the same service. A customer who is extremely "nonloyal" is the one who will never use the same provider again, has negative feelings towards it, and will be willing to try other providers.

Due to the intensification of competition, firms focus on building long-term relationships with their existing customers and increasing their loyalty rather than acquiring new customers. Gaining new customers is much more expensive and requires more effort than retaining existing customers (Soh et al., 2015), so customer engagement is increasingly recognized as a way to achieve long-term

success (Jang & Kim, 2012). For this reason, companies need to make improvements in the quality of service to surpass their competitors by keeping their customers (Soh et al., 2015). Companies with long-term customers can perform better financial performance than their competitors with lower costs and high market share.

Logistics services are emerging as one of the effective tools for companies to build closer and lasting relationships with customers and ultimately gain and maintain their loyalty (Jang & Kim, 2012). Studies in logistics report that operational elements related to product availability, product status, delivery reliability, delivery speed, and relational elements such as communication and response positively affect customer satisfaction and purchasing habits (Stank et al., 1999). Previous studies found that logistics service quality affects customer loyalty (e.g., Fernandes et al., 2018). Also, it was found that the quality of logistics services directly or indirectly affects customer loyalty through customer satisfaction (e.g., Rachmawati & Agus, 2020).

FACTORS AFFECTING LOGISTICS SERVICE QUALITY

Timeliness

Globalization and technological developments help today's customers to reach more easily the products they want. These customers also do not tolerate waiting, and therefore they expect that their orders are realized at the promised time. Timeliness is one of the first-mentioned logistics service quality factors in the literature. It is defined as the timely delivery of customers' orders as promised (Zailani et al., 2018). On the other hand, some authors define timeliness as the frequency of delayed orders (Politis et al., 2014).

Timeliness is closely related to the workflow and efficiency of receiving, sorting, and sending, especially choosing the mode of transportation (Yang & Wang, 2019). Timeliness can be considered in four dimensions: total logistics cycle time, total production cycle time, delivery cycle time, and new demand response time (Garcia et al., 2012). The total logistics cycle time is the average time between placing an order, and the moment the order reaches the customer's location. The total production cycle time is the average time required to drill down and produce the product, including quality control and packaging. Delivery cycle time includes vehicle loading/unloading time, traffic delay time. Response time to new demand is the average time it takes for a supplier to respond to a new supply request. Many studies in different sectors have found a positive relationship between timeliness and customer satisfaction (e.g., Esmaeili et al., 2015).

H1: There is a positive relationship between timeliness and customer satisfaction.

Order Condition

Order condition is related to whether customer orders are intact in reaching the customer (Mentzer et al., 2001). For the customer, the condition of the delivered goods, as well as the fast and complete delivery, is critical. If they are not well protected, the products may be damaged during transportation. The customers want to receive the ordered product intact. Otherwise, they may choose a different supplier in the next purchase. Therefore, it is necessary to determine the factors that may affect the order condition (Zlatkovic, 2013).

Companies need to ensure that customers' orders are safely and appropriately maintained, as the products may be damaged during the numerous transfer and handling processes required until they are delivered to the customer. Since customers cannot use damaged products, correction procedures must be performed with suppliers or other vendors depending on the source of the damage (Mentzer et al., 2001). The order condition may be negatively affected by some factors such as transport mode selection and packaging. For this reason, improvements are needed in delivery services, such as the use of special packaging for liquid products or glassware, to ensure the safe delivery of the product

to customers. Damaged or defective product deliveries to the customer will result in customer dissatisfaction with product return or order cancellation (Vasic et al., 2021).

Previous studies report that order condition affects customer satisfaction and loyalty (e.g., Sutrisno et al., 2019), particularly damaged orders have been found to significantly reduce the customer's level of satisfaction with logistics services. Also, the delivery of products with damage will cause customer dissatisfaction and bring additional costs to the company, such as product retrieval and repair.

H2: There is a positive relationship between order condition and customer satisfaction.

Order Accuracy

Customers prefer that the products they order are delivered in the quantity and quality specified at the order stage, and substitute products are not sent. Order accuracy is defined as whether the delivered products are the correct ones with correct quantities (Politis et al., 2014). To talk about order accuracy, the logistics service provider must fully understand and perform the logistics service that the customer requests (Jang et al., 2014).

Order accuracy is related to the courier service's accuracy in delivering orders placed by clients (Hendayani & Dharmawan, 2020). The return of products is strongly associated with the accuracy of the order delivered to the customer (Xing et al., 2011). Order inconsistency's effect on customer satisfaction may vary from region to region due to different levels of tolerance for errors (Mentzer et al., 2004). Previous studies (e.g., Chaisaengduean, 2019) in different sectors have found a positive relationship between order accuracy and customer satisfaction.

H3: There is a positive relationship between order accuracy and customer satisfaction.

Order Discrepancy Handling

Order discrepancy handling refers to how well a company addresses the inconsistencies experienced in the order fulfillment process after receiving the customer's order. It has several dimensions, from easily reporting an order inconsistency to the logistics company to a hassle-free return of wrong products. After a customer reports an incorrect, bad, or poor-quality product, the firm takes steps to improve the customer perception of logistics service quality (Mentzer et al., 2001). Order discrepancy handling can be time-consuming and will impose additional costs on the company. However, in today's highly competitive environment, companies must understand that product returns are inevitable, and more importantly, return management can help save costs, identify areas for improvement, develop stronger customer relationships, and contribute to the long-term growth of the firm (Chen et al., 2017). Online retailers must manage the flow of products returned by customers in a way that does not affect customer satisfaction or sales (Walsh et al., 2016).

Several studies in the literature examine order errors and how satisfactory the response to them is, and the adequacy of the reporting process. (e.g., Kilibarda et al., 2019). Vakulenko (2019) stated that retailers do not understand the impact of delivery and return processes on customer satisfaction and loyalty but rather as necessary. Firms' performance in handling product returns has been found to play an essential role in influencing customer loyalty (Ramanathan, 2011). In their study, Javed & Wu (2020) showed that customer satisfaction and trust in post-delivery services, which they consider product exchanges, returns, and financial refunds in electronic commerce, significantly mediate repurchase intention, a dimension of customer loyalty.

Especially for clothing items, customers consider it important whether they can easily return the products due to possible color and size incompatibilities (Zhang et al., 2015). However, even though the logistics company has done its best to resolve inconsistencies, customers can often feel disappointed and unsatisfied. (Sutrisno et al., 2019). Various studies (e.g., Masudin et al., 2020) determined that order discrepancy handling is effective in evaluating the logistics service quality by customers. A

positive and significant relationship was found between the management of order discrepancies and customer satisfaction (Gaudenzi et al., 2021).

H4: There is a positive relationship between order discrepancy handling and customer satisfaction.

Relationship Between Customer Satisfaction and Customer Loyalty

Customers' overall satisfaction with a service provider affects their loyalty (Lewin, 2009). Nevertheless, customers who are satisfied with the offered product or service may not remain loyal to the company, especially if they have different options. On the other hand, it is also seen that a dissatisfied customer can remain loyal to the company when there is no better alternative.

Customer satisfaction and loyalty are unquestionably two important behavioral outcomes that each service firm aspires to accomplish (El-Adly, 2019). It would be appropriate to talk about customer satisfaction when the performance of a product or service offered by a company exceeds the customer's expectations, and a loyal customer when the customer comes back several times to purchase a service from the same company (Meesala & Paul, 2018). Positive and long-term interactions with customers, which are generally the result of customer satisfaction arising from the quality of the service offered to customers, are reflected in the company's profit (Kadlubek, 2020). Customers' satisfaction or dissatisfaction with the purchase may affect their subsequent behavior. Satisfied customers are more likely to repurchase the product. Also, satisfied customers tend to say good things about the brand to others. That is why many marketing professionals say "satisfied customers do the best advertising". Customers who are not satisfied will be able to give up or return the product, complain to the company, publicly announce their dissatisfaction, take particular actions such as not rebuying the product or warning their friends. Therefore, e-commerce companies need to increase customer satisfaction, optimize their shopping experience, and encourage them to adopt more positive post-purchase behaviors (Luo et al., 2020).

Customer satisfaction has a significant impact on company performance and can lead to customer loyalty (Lewin, 2009). Oliver (1999) noted that while loyal customers are satisfied in the general sense, satisfaction does not necessarily mean loyalty. To explain the relationship between satisfaction and loyalty, this author states that it is necessary to investigate which aspect of customer satisfaction affects loyalty. The same author indicates that satisfaction is necessary for loyalty formation, but ultimate loyalty arises as a combination of perceived product superiority, social bonding, and synergistic effects.

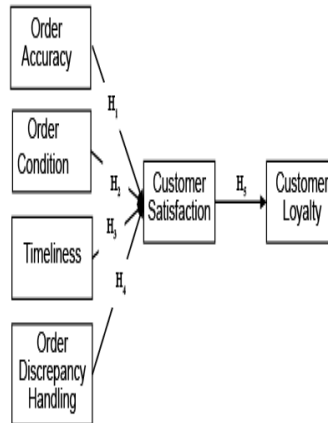
Previous studies have found that customer satisfaction plays a mediator role between service quality and customer loyalty (Javed & Wu, 2020), that customer satisfaction directly affects customer loyalty (Gautam & Sharma, 2021), and that there is a positive linear relationship between customer satisfaction and repurchase intent (Choi et al., 2019).

Narayandas (2005), on the other hand, found that satisfaction and loyalty were little related. This author stated that making purchases from a company does not mean that they are loyal to it. Companies should develop positive relationships with customers, and thus customer loyalty can be increased over time. Singh & Saini (2016) have found that satisfaction in retail services has no significant impact on customer loyalty. Service quality and satisfaction are essential prerequisites for customer loyalty. However, it is rare for today's customers to show lifelong loyalty to a firm. Indeed, their degree of satisfaction with products or services tends to continue until they encounter a competitive product and service whose quality and price are more attractive.

H5: There is a positive relationship between customer satisfaction and customer loyalty.

The research model was created based on the discussions provided in Figure 1.

Figure 1. Research model



METHODOLOGY

As a research design, the quantitative method was employed. Data were collected through a web-based questionnaire. Because of its advantages, such as access to distinct demographics and covering a large geographic area at relatively low costs in a short length of time, the web-based survey was deemed the most suited. Furthermore, an online survey is more similar to an online purchase experience. The questionnaire and covering letter that outlined the objectives of the study were provided via <https://www.online-anket.gen.tr/>. For the data collection, a convenience sampling procedure was adopted. Convenience sampling is a nonprobability sampling where people are sampled because they are easy to reach (Hair *et al.*, 2020). The online survey was posted on social media sites to reach the targeted population with this sampling strategy. The group members were then friendly asked to share the questionnaire link to their contacts. In other words, a “chain referral” recruitment approach was used. As a result, in addition to the original point of contact, the link was shared with potential respondents, and so on. When the respondents clicked on the link, they were directed to the Web-based questionnaire.

The population of the research consists of individuals using electronic commerce in Turkey. In total, 1562 samples were collected. There was no missing sample as the survey website automatically eliminated uncompleted survey forms. Due to the nature of sampling, the response rate cannot be calculated because it is unknown how many potential respondents did not participate even if they saw the survey. Regarding the sample size, there are different approaches in the literature. However, the highest is 20 observations per indicator variable (Kline, 2015). A sample size of 660 (33*20) is required to reach sufficient statistical power. As a result, it was concluded that the sample size of this study (N=1562) is much larger than the minimum required.

The questionnaire used for this study consisted of three parts. The first part contained a brief introduction, which explained the research objectives and instructions to fill out the survey form. In this part, the potential participants were asked to complete a completely voluntary anonymous online questionnaire that took about 10-15 minutes to complete. They also were asked to think about the website that they shop for the most frequently when answering the survey questions to ensure consistency across responses.

The second part was about the sample demographics and purchasing habits of potential respondents. The third part included the study constructs employed in this study. Six constructs were measured: ‘order discrepancy handling (ODH)’, ‘timeliness (TM)’, ‘customer loyalty (CL)’, ‘order condition (OC)’, ‘customer satisfaction (CS)’, ‘order accuracy (OA)’. These constructs were chosen

as we identified them as the leading logistics service process factors. The items in each construct were obtained based on a comprehensive literature review and the opinions of academics and practitioners.

The constructs included in this study and the items associated with them are presented in Table 1.

Table 1. The constructs included in this study and the items associated with them are presented here

Timeliness
TM1: Delivery takes place on the date specified at the order stage.
TM2: The time between placing an order and receiving an order is short.
TM3: The time between ordering and receiving the order is stable.
TM4: The rate of non-compliance with the specified delivery time is low.
TM5: The delivery time of the order is not affected by weather conditions.
Order Condition
OC1: The products I ordered are shipped with the appropriate protection.
OC2: The products I ordered are delivered undamaged.
OC3: There is no damage caused by the transportation process in the delivered products.
OC4: Delivered products are rarely delivered badly.
Order Accuracy
OA1: The delivered products comply with the conditions (model, color) specified at the order stage.
OA2: Wrong product delivery is not made.
OA3: There is no wrong product delivery.
OA4: When the product I ordered is not in stock, the product recommended by the company is satisfactory.
Order Discrepancy Handling
ODH1: If the delivered product does not meet the criteria specified in the ordering stage, I can easily report this to the company.
ODH2: If the delivered product does not meet the criteria specified at the order stage, the procedures are easy.
ODH3: If the delivered product does not meet the criteria specified at the ordering stage, a solution is produced quickly by the company.
ODH4: If the delivered product does not meet the criteria specified at the ordering stage, the company offers satisfactory solutions.
ODH5: Since I do not meet my expectation when I receive the product I ordered, the company provides convenience when I want to change it.
ODH6: In case of product return, a money payment/shopping check option is offered.
ODH7: No shipping fee will be charged from me for returns and exchanges.
ODH8: When there is a problem with the product I bought, the shopping site helps in the solution.
Customer Satisfaction
CS1: I feel happy when I buy products from this shopping site.
CS2: It is a pleasure to trade on this shopping site.
CS3: I would like other websites that are shopping online to be as good as this site.
CS4: When I trade on a site other than this shopping site, I definitely encounter a problem.
CS5: I am generally satisfied with the transactions related to this shopping site.
Customer Loyalty
CL1: I feel loyal to this shopping site.
CL2: I intend to shop again from the same site.
CL3: When asked, I say good things about this shopping site.
CL4: When I use the internet, I usually visit this shopping site.
CL5: When I need to buy a product over the Internet, I first look at this site.
CL6: Even if another shopping site offers the same product at the same price, I prefer to trade from this site.
CL7: I make maximum effort to use this shopping site while buying products on the internet.

The scale for order accuracy was adapted from Bienstock et al. (2008), Mentzer et al. (2001); the scale for order condition was adapted from Gil-Saura & Ruiz-Molina (2011); the scale for timeliness was adapted from Bienstock et al. (2008); the scale for order discrepancy handling was adapted from Bienstock et al. (2008); the scale for customer satisfaction was adapted from Gil-Saura & Ruiz-Molina (2011), Stank et al. (1999); and the scale for customer loyalty was adapted from Stank et al. (1999).

All of the constructs were measured on a 5-point Likert-type scale as follows: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree.

RESULTS

Before presenting the results, non-response bias and common method variance tests were conducted. The non-response bias test indicated that there are no significant differences between the early and late responses. Harman's single-factor method was used to assess the Common method variance. The factor analysis produced six different factors. Therefore, it can be concluded that common method variance is not a problem for this study.

Sample Profile

The profile of sample firms is shown in Table 2. The distribution of female (49.5%) and male (50.5%) respondents was relatively balanced. 83.2% of the participants are younger than 45 years old. The sample is well-educated, as 78.1% of the participants hold an undergraduate degree or higher. The majority of participants (86.9%) do online shopping for more than a year. Most of the respondents (31.8%) participated in online shopping activity at a frequency of several times per month. 58.0% of participants work as an employee in the public and private sector. Most participants (32.6%) spend 10%-25% of their expenditures on the internet shopping. Food (99.9%), clothing (77.2%), book (66.6%), and electronics (57.9%) is the most bought items, jewelry and watch (24.0%), and automotive parts and accessories (15.35%).

Research Model Results

The analysis was done in two stages. For the first stage, an explanatory factor analysis using SPSS 21 was conducted. For the second stage, the partial least squares (PLS) approach using SmartPLS 3.0 was used to investigate the hypothesized relationships.

Exploratory phase

An EFA with varimax rotation was conducted to evaluate whether items were loaded on their associated constructs. Before EFA, factor feasibility and sampling adequacy tests were performed. Bartlett's sphericity test was used to investigate the factor's feasibility and showed that the factor is feasible ($p < 0.000$). KMO value of 0.944 showed that the sample is adequate for factor analysis. In the initial analysis, OC4, OA4, CS4, CL1, and CL4 were eliminated due to cross-loading. After this elimination, factor analysis was rerun and resulted in 6 factors explaining 74.62% of the total variance (See table 3).

The first factor, termed 'order discrepancy handling', accounted for 17.62% of the total variance and included eight items. The second factor, termed 'timeliness', accounted for 15.50% of the total variance, including five items. The third factor, termed 'customer satisfaction', accounted for 12.41% of the total variance and included four items. The fourth factor, 'customer loyalty', which made up 12.27% of the total variance, contained five items. The fifth factor, 'order condition', which made up 8.70% of the total variance, contained three items. The sixth factor, 'order accuracy', which made up 8.12% of the total variance, contained three items.

CONFIRMATORY PHASE

Measurement Model

The constructs were assessed in terms of convergent and discriminant validity (Anderson & Gerbing, 1988). For the convergent validity, the following criteria are applied: variable loadings should be equal or greater than 0.60, composite reliabilities (CR) for each construct should be equal or greater

Table 2. The profile of sample firms

	Category	Frequency	Percent (%)
Gender	Female	773	49.5
	Male	789	50.5
Age	18-25	441	28.2
	26-35	394	25.2
	36-45	466	29.8
	46-54	147	9.4
	55-64	74	4.7
	65+	40	2.6
Education	Elementary School	22	1.4
	Secondary School	25	1.6
	High School	150	9.6
	Vocational Schools	145	9.3
	Undergraduate	748	47.9
	Masters	373	23.9
	Doctorate	99	6.3
Duration of online shopping	About a month	34	2.2
	About 6 months	50	3.2
	About 1 year	121	7.7
	About 3 years	236	15.1
	More than 3 years	1121	71.8
Occupation	Public sector	458	29.3
	Private Sector	448	28.7
	Student	266	17.0
	Retired	77	4.9
	Business Owner	181	11.6
	Unemployed	128	8.2
	Other	4	0.3
Frequency of online shopping	Once a week	210	13.4
	Several times a week	209	13.4
	Once a month	358	22.9
	Several times a month	497	31.8
	Several times a year	288	18.4
Online shopping expenditure as a percentage of total expenditures	Less than 10%	537	34.4
	10%-25%	509	32.6
	25%-50%	330	21.1
	50%-75%	152	9.7
	More than 75%	34	2.2
Most bought product category	Food	1532	99.9
	Clothing	1206	77.2
	Book	1041	66.6
	Electronics	905	57.9
	Cosmetics	794	50.8
	Phone and accessories	701	44.8
	Travel	628	40.2
	Household appliances	569	36.4
	Pet products	492	31.5
	Hotel and accommodation	444	28.4
	Sports and outdoor	444	28.4
	Personal care and hygiene	417	26.7
	Jewelery and watch	375	24
	Automotive parts and accessories	240	15.35
	Other	23	1.5

than 0.8, and the average variance extracted (AVE) for each construct should be equal or greater than 0.5 (Henseler et al., 2014; Fornell & Larker, 1981; Hair et al., 1998).

Factor loading is the correlation coefficient for the variable and factor. Composite reliability is a measure of internal consistency in scale items (Netemeyer, 2003). The average variance extracted (AVE) is a measure of the amount of variance that is captured by a construct in relation to the amount of variance due to measurement error (Fornell & Larker, 1981)

As shown in Table 4, all of the criteria for convergent validity are being met. A procedure suggested by Fornell & Larker (1981) was followed to assess discriminant validity. According to this,

Table 3. Variance total

Kaiser-Meyer-Olkin measure of sampling adequacy: 0.944						
Indicator	F1	F2	F3	F4	F5	F6
ODH1	0.524					
ODH2	0.703					
ODH3	0.761					
ODH4	0.672					
ODH5	0.797					
ODH6	0.636					
ODH7	0.672					
ODH8	0.715					
TM1		0.676				
TM2		0.763				
TM3		0.787				
TM4		0.781				
TM5		0.583				
CS1			0.770			
CS2			0.760			
CS3			0.752			
CS5			0.534			
CL2				0.580		
CL3				0.593		
CL5				0.715		
CL6				0.801		
CL7				0.717		
OC1					0.438	
OC2					0.736	
OC3					0.672	
OA1						0.635
OA2						0.717
OA3						0.666
Eigenvalue	4.935	4.340	3.474	3.436	2.437	2.273
Variance (%)	17.623	15.498	12.406	12.272	8.704	8.117
Cumulative variance (%)	17.623	33.122	45.528	57.800	66.503	74.620

first, the square root of AVE for each construct was calculated. Then, it was checked if the square root of the AVE of a construct is greater than the correlations between the rest of the constructs. No multicollinearity problem was detected between the independent variables as the variance inflation factors (VIF) for all indicators ranged between 1,469 and 4,292, and for constructs ranged between 2,253 and 2,727, which are far below the threshold of 5 (Ringle et al., 2015). (Table 4)

The results of the discriminant validity assessment are shown in Table 5. As seen from the table, the square root of AVE is greater than all of the correlations for each construct, and therefore it can be claimed that discriminant validity is achieved. The correlation matrix indicates that customer satisfaction has a significant positive correlation with all of the factors (order discrepancy handling; $p < 0.001$; order accuracy; $p < 0.001$, order condition; $p < 0.001$, timeliness; $p < 0.01$). There is also a significant positive correlation between customer satisfaction and customer loyalty ($p < 0.001$).

Before analyzing the hypothesized relationships, the predictive validity, explanatory power, and model fit were assessed.

Cross-validation communality and redundancy indices are checked to evaluate the predictive validity of the structural model (Tenenhaus et al., 2008). The Q^2 statistic determines the model's predictive significance by having the model reproduce the observed values. A Q^2 is greater than 0 means the model has predictive relevance (Fornell & Cha, 1994). Also, 0.02 represents a "small" effect size, 0.15 represents a "medium" effect size, and 0.35 represents a "high" effect size (Cohen, 1988). In Smart PLS, two kinds of Q^2 statistics are estimated: cross-validated communality and cross-validated redundancy. While commonality is calculated for all constructs and indicators, redundancy

is only calculated for endogenous variables. As it can be seen in Table 6, all Q² values are positive and

Table 4.

Indicator	Mean	Std. dev.	Factor Loadings	t-Statistics	VIF	Cronbach's Alpha	CR	AVE
OA					2.392	0.87	0.92	0.79
OA1	4.44	0.635	0.873	118.73	2.334			
OA2	4.39	0.735	0.937	230.82	3.568			
OA3	4.39	0.705	0.871	81.81	2.327			
OA4*	3.75	1.05						
ODH					2.366	0.93	0.94	0.65
ODH1	4.25	.831	0.775	66.37	2.445			
ODH2	4.14	.901	0.881	129.61	3.918			
ODH3	4.06	.978	0.814	68.13	2.752			
ODH4	4.03	.857	0.803	58.39	2.576			
ODH5	4.13	.834	0.843	80.39	2.911			
ODH6	4.14	.880	0.692	41.25	1.927			
ODH7	4.24	0.959	0.794	69.96	2.432			
ODH8	4.20	0.785	0.844	94.21	2.700			
TM					2.253	0.89	0.93	0.71
TM1	4.27	.813	0.841	93.507	2.359			
TM2	4.15	.923	0.907	150.59	4.083			
TM3	4.10	.940	0.914	153.92	4.292			
TM4	4.16	.958	0.852	80.146	2.519			
TM5	3.93	1.025	0.691	38.092	1.469			
OC					2.328	0.85	0.92	0.77
OC1	4.40	.721	0.848	95.82	1.763			
OC2	4.37	.788	0.914	136.36	2.787			
OC3	4.29	.809	0.878	95.47	2.478			
OC4*	2.68	1.395						
CS					2.727	0.89	0.93	0.75
CS1	4.26	.730	0.887	120.48	2.844			
CS2	4.21	.776	0.872	95.61	2.591			
CS3	4.27	.709	0.879	106.50	2.571			
CS4*	3.50	1.117		74.55				
CS5	4.35	.636	0.836		1.935			
CL					2.538	0.89	0.92	0.70
CL1*	3.49	1.180						
CL2	4.16	.803	0.863	117.57	2.438			
CL3	4.29	.754	0.870	113.97	2.526			
CL4*	4.08	.987	0.856					
CL5	4.33	.790	0.735	79.65	2.485			
CL6	4.18	.908	0.849	33.806	1.708			
CL7	4.11	1.019		81.137	2.466			

Table 5.

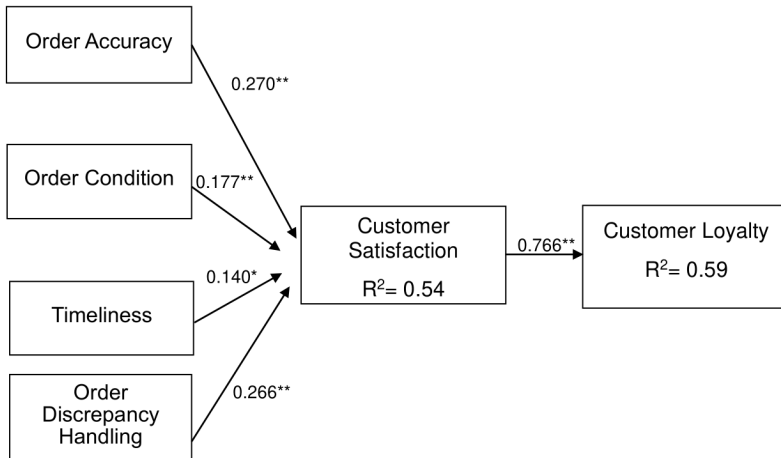
Construct	CL	CS	ODH	OA	OC	TM
CL	0.836					
CS	0.766**	0.869				
ODH	0.633**	0.645**	0.807			
OA	0.626**	0.647**	0.654**	0.894		
OC	0.593**	0.613**	0.622**	0.662**	0.880	
TM	0.599**	0.597**	0.660**	0.615**	0.688**	0.845

greater than 0.35; therefore, it can be concluded that the model has predictive validity. See Table 6
 Table 6.

Construct	CV- communality	CV -redundancy
CL	0.548	0.401
CS	0.576	0.401
OA	0.569	-
ODH	0.552	-
TM	0.570	-
OC	0.524	-

The model’s explanatory power was assessed using the coefficient of determination (R^2) of the endogenous constructs. The results of the structural model analysis are shown in Figure 2. The path coefficients, their significance levels, and the R^2 values of endogenous constructs can be seen in Figure 2. Based on the scores of R^2 , it can be interpreted that the model explains 54.4% of the variance of customer satisfaction and 58.6% of the variance of customer loyalty. These are substantial as they are greater than 26% (Cohen, 1988).

Figure 2.



The model’s quality of fit is measured using the standardized root mean square residual (SRMR) (Henseler et al., 2014). The SRMR is defined as the difference between the observed correlation and the model implied correlation matrix and indicates whether the model sufficiently explains the empirical data. The SMRM value of 0.063 indicates a good model fit as it is lower than the threshold of 0.08 (Hu and Bentler, 1998).

Table 7 shows the results of the hypothesis testing.
 All of the hypotheses were accepted.

Table 7.

Hypothesis	Link	Path Coefficient	t-value	p-value	Accepted?
H1	OA-CS	0.270	8.23	0.000	Yes
H2	OC-CS	0.177	6.36	0.000	Yes
H3	TM-CS	0.140	2.89	0.004	Yes
H4	ODH-CS	0.266	6.58	0.000	Yes
H5	CS-CL	0.766	65.24	0.000	Yes

CONCLUSIONS

Research Summary and Conclusion

This study aimed to determine the effect of electronic commerce users' evaluations about logistics service quality on customer satisfaction and the relationship between customer satisfaction and customer loyalty.

A positive relationship was found between timeliness and customer satisfaction. This finding is consistent with the findings of other researchers (e.g., Esmaeili et al., 2015). Timeliness requires that the ordered product is delivered to the customers completely and robustly at the time promised at the order stage. When the product delivery date to the customers occurs later than the specified date, the customers may not benefit from the product as expected. In this case, the customers may choose another company for their next purchase.

A positive relationship was found between order condition and customer satisfaction. Other studies also support this finding (e.g., Zlatkovic, 2013). It requires that the ordered product should be delivered to the customer undamaged and intact. To ensure this, the products should be stored with appropriate packaging that will not be damaged in handling, transportation. Anti-spoilage measures should also be taken, especially in products with special resistance restrictions, such as health and food products, taking into account the transport time.

A positive correlation was found between order accuracy and customer satisfaction. This finding is in line with the findings of other studies (e.g., Chaisaengduean, 2019). In case of incorrect delivery, correcting this error causes a loss of time and will bring additional costs to the company. The customer who does not receive the ordered product correctly will remember this experience in the following order and therefore may not place an order to the same company again.

In this study, a positive relationship between order discrepancy handling and customer satisfaction was found. Previous work (e.g., Sutrisno et al., 2019) supports this finding. For some customers, a company's approach to address post-order issues is more important than smooth shopping. On the other hand, some customers are not interested in how the problem is handled because their dissatisfaction will not turn to satisfaction.

Another important finding of this study is that customer satisfaction affects customer loyalty. This finding is consistent with several other research (e.g., Gautam & Sharma, 2021).

Theoretical Contributions, Practical Implications

This study makes some contributions to the e-commerce literature. First, a unique model was created for investigating the relationship between logistics service quality factors, customer satisfaction, and loyalty. It is unique because the set of logistics service quality factors' (i.e., order condition, order accuracy, order discrepancy handling, and timeliness) impact on customer satisfaction were examined for the first time. This study was added to the literature that there is a positive and significant

relationship between customer satisfaction and customer loyalty. Previous studies in the e-commerce context focused on repurchase intention, which is a sub-dimension of loyalty. This current study departed from them in that sense. Second, the large sample size and thereby higher reliability of the results than other survey studies in this area makes a significant contribution to the literature. Third, identifying the relative effects of logistics service quality factors on customer satisfaction may inspire academics to focus on these factors for further research.

The findings of this study have several important managerial implications. First of all, in this study, the relative effects of logistics service quality factors on customer satisfaction are identified. This finding will help companies allocate their resources accordingly by knowing which logistics service factor requires more attention to increase customer satisfaction and loyalty.

Second, the findings imply that high rate of success in logistics quality factors require a comprehensive approach and companies need to invest in technology, supply chain infrastructure, and people. Companies that want to gain customer satisfaction with logistics service quality can use technology to improve their operations and minimize human error. Thanks to advanced technologies, companies can monitor all stages of the process from order to delivery and offer alternatives to customers at the order stage until the delivery date. Investing in digital technologies like augmented reality, drones, advanced robotics, and smart glasses for hands-free select, pack, and ship is essential for lowering costs and ensuring the company's competitiveness and customer satisfaction. For example, drones provide fast and contactless delivery during the pandemic. Logistics personnel should be trained in logistics practices and technology used to minimize human-related errors.

The rapid growth of e-commerce marketplaces will necessitate a similarly quick and innovative response from the logistics industries. Decisions about modes of transportation, warehousing, material handling, and packaging should all be reconsidered to provide more efficient solutions. E-commerce companies need to expand their distribution networks, build more fulfillment centers, change the composition of fleets to accommodate an increase in last-mile delivery, and build partnerships with local retailers. It should be noted that logistics practices for brick and mortar businesses do not work for e-commerce companies. For example, e-commerce needs more than three times more logistics space than traditional stores as it requires a wide variety of SKUs, more buffer stocks, more space for processing returned items, etc.

Third, the process of resolving order discrepancies must be well managed so that the company can establish a long-term relationship with the customer. For a consumer who has had negative experiences to purchase from the same company again, the customer must be satisfied with the resolution of the problem in the prior purchase. For example, in return or exchange transactions, the company should take the product from the customer's address without demanding a return fee, or it should offer customers the option to make transactions from physical stores and give the impression that the process can be carried out smoothly with similar solutions. Similarly, presenting a short apology or small gifts to the customer along with the returned products may reduce the impact of the negative experience of the customer.

Limitations and Future Research Directions

This study has certain limitations to consider in future research. Conducting an assessment with survey data includes a subjective approach. Quantitative data may be used in future studies. As the study was conducted in Turkey, the generalization of its results may be problematic. Future research can be carried out on an international scale to determine the impact of countries' social, economic, and cultural differences on customer's logistics service quality assessments. This study included four process-related logistics service quality factors. Different set factors may be considered in the future research. The relationship among the factors also warrants further research.

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