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Factors That Impact the Logistics Service Performance in Online Marketplaces

Çevrimiçi Pazaryerlerinde Lojistik Hizmet Performansını Etkileyen Faktörler

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Abstract: This study aims to reveal factors that impact the logistics service performance of sellers in online marketplaces. The convenience of online shopping is changing the shopping habits and steering consumers towards online channels. This situation compels retailing firms to be visible online. However, unlike big retailing firms, smaller firms (especially SMEs) find it very difficult to sell their products on their proprietary websites due to high marketing, technical, and marketing costs. For this reason, many of them choose to sell their products in online marketplaces, but price-based competition among sellers in these marketplaces increases the importance of logistics service performance for competitiveness. Therefore, there is a need to reveal factors that impact the sellers' logistics service performance in online marketplaces. To this end, this study examines the sellers on a Turkish online shopping site GittiGidiyor, using a multi-group structural equational modelling. As a result of this examination, the factors found to affect logistics service performance are as follows: i) the number of different product categories offered by sellers, ii) selling items within particular product categories, iii) the 3PL company choice, iv) free shipping policy, v) the city from which products are shipped. These findings provide both theoretical and managerial insights. They not only enhance the understanding on the determinants of logistics service quality in an online marketplace context, but also provide guidance to e-tailers in elevating their logistics service performance in online marketplaces.

Keywords: Logistics Service Quality, E-Fulfilment, Online Marketplaces, E-tailing, Group Code Analysis

Öz: Bu çalışma, çevrimiçi pazaryeri satıcılarının lojistik hizmet performanslarını etkileyen faktörleri ortaya koymayı amaçlamaktadır. İnternet alışverişinin getirdiği kolaylıklar alışveriş alışkanlıklarını değiştirerek tüketicileri çevrimiçi kanallara yöneltmiştir. Bu durum perakende firmalarının internet ortamında da görünür olmalarını zorunlu kılmaktadır. Fakat büyük perakende firmaları haricindeki firmaların (özellikle orta ve küçük boyutlu firmaların) ürünlerini kendi web sitelerinde satabilmeleri yüksek pazarlama, teknik ve finans maliyetlerinden ötürü oldukça zordur. Bu sebeple, birçok firma ürünlerini çevrimiçi pazaryeri platformlarında satmayı tercih etmektedir fakat bu platformlarda yaşanan fiyat rekabeti lojistik hizmet kalitesinin rekabetçilik açısından önemini arttırmaktadır. Bu yüzden, çevrimiçi pazaryeri satıcılarının lojistik hizmet performansını etkileyen faktörlerin ortaya konması önem arz etmektedir. Bu faktörlerin ortaya çıkarılması için bu çalışma, Türkiye'nin çevrimiçi alışveriş platformu GittiGidiyor'da ürünlerini satan satıcıları çok gruplu yapısal eşitlik modellemesi yöntemini kullanarak incelemiştir. Bu incelemenin sonucunda, çevrimiçi pazaryerlerinde lojistik hizmet kalitesini etkileyen faktörler şu şekilde tespit edilmiştir: i) satılan ürünlerin ilişkili olduğu ürün kategorisi sayısı, ii) belirli ürün kategorilerinde satış yapılması, iii) kargo firması seçimi, iv) ücretsiz kargo gönderim politikası ve v) ürünlerin gönderildiği şehir. Elde edilen bu bulgular hem teorik hem de yönetimsel birçok çıkarım yapmaya imkân vermektedir. Bu çalışma teorik olarak lojistik hizmet kalitesinin çevrimiçi pazaryeri bağlamında belirleyicilerini ortaya koyarken, çevrimiçi pazaryerlerinde faaliyet gösteren internet perakendecilerine de lojistik hizmet kalitelerini nasıl arttırabilecekleri konusunda yol göstermektedir.

Anahtar Kelimeler: Lojistik Hizmet Kalitesi, E-Siparişlerin Karşılanması, Online Pazaryerleri, İnternet Perakendeciliği, Grup Kodu Analizi

1. Introduction

Retail e-commerce sales are growing exponentially year-by-year, reaching 2.3 trillion US dollars worldwide in 2017 (Statista 2018). This figure is almost the twice 2014 figure (1.3 trillion US dollars), and it is anticipated to more than double by 2021, to reach 4.8 trillion US dollars (Statista 2018). This strong growth trend is also being observed in Turkey. Mr. Kantarci, the CEO of GittiGidiyor (a big e-commerce platform in Turkey), expects the retail e-commerce sales to double in Turkey in 2019 compared to 2017 (Demirel 2017). Hence, the increasing consumer tendency towards online shopping both worldwide and in Turkey compels retailers to emphasize their online channels and stores. In this regard, big retailing firms have been attempting to adapt to omni-channel strategy in which they integrate their online and physical channels to provide a superior seamless shopping experience to consumers (Yumurtaci Huseyinoglu, Sorkun and Boruhan 2018). Since it is not easy for small and medium sized enterprises (SMEs) to run a proprietary website for online sales due to their lack of sufficient technical, marketing, and financial capabilities (Yu 2006; Wei, Zha and Ma 2018), for online visibility, they focus on social media and online marketplace platforms.

Online marketplaces have an important role in retail e-commerce with the advantages they provide to both buyers and sellers. According to the TUSIAD report on e-commerce (Demirel 2017), in Turkey low price and convenience are two main consumer motivations for using online marketplaces. The abundance of sellers offering the same item in online marketplaces decreases prices (Duch-Brown et al. 2017). In addition, it is easy for consumers to compare different providers and offers on the same platform (Hong 2015). Online marketplaces provide various advantages also to the retailing firms (sellers). High consumer traffic in popular e-marketplaces enables sellers to reach a larger number of consumers (Jiang, Zhan and Shu 2017). In addition, the marketplace firm's intermediary in transactions reduces consumers' concerns over trustworthiness, which may be a problem for SME selling directly (Tadelis 2016). In online marketplaces, sellers also do not need to cope with technical issues, such as payment system, website design, website

maintenance, and website security (Wei, Zha and Ma 2018). All these functions of online marketplaces make them the hub of e-commerce in Turkey, given the dramatic growth of many marketplace firms, such as GittiGidiyor, Hepsiburada, and N11.com (Yeniova 2017). Such high potential has even attracted the global giant marketplace firms, such as Amazon, which has recently started to operate in Turkey.

Despite many advantages of online marketplaces to sellers, the level of competition is very high. Since it is common for consumers to find many sellers offering the same product, providing a superior logistics performance is one of the few opportunities for sellers to differentiate themselves (Lim, Jin and Srai 2018). Also, online transparent rating system exacerbates the importance of logistics performance in online marketplaces, because consumers prefer sellers whose logistics performance (e.g. delivery time and packaging) have received high ratings in previous transactions. The logistics performance is also important for retaining existing customers, because any logistics-related dissatisfaction (e.g. late delivery, damaged cargo) during e-fulfilment process is likely to cause consumers to switch to another seller (Jain et al. 2017). Therefore, it is highly critical for sellers to understand the factors that impact their logistics service quality (LSQ) in online marketplaces. To the best knowledge of authors, no study has yet comprehensibly investigated these factors in an online marketplace context.

Drawing on the importance of logistics performance on sellers' competitiveness in online marketplaces, this study aims to reveal factors that impact the sellers' logistics service performance in online marketplaces. For this purpose, a multi-group analysis was carried out to test whether logistics service performance varies with respect to the sellers' product assortment decisions, third-party logistics (3PL) company choice, shipment fee policy, delivery lead-time promise, online sales experience, and city from which products are shipped. In order to reveal these factors' effects on logistics service performance, online sellers on a popular Turkish online shopping site (GittiGidiyor) were examined. The results of this study provide important managerial and theoretical insights by showing that logistics service performance are affected by decisions in online marketplaces (e.g., selling products within a particular product category, the number of different product categories offered by sellers, the 3PL company choice, and free shipping policy). These findings could guide managers in elevating their firms' logistics service performance in online marketplaces. The results also point to many theoretical discussion points by shedding light on why some factors but not others covered by this study affect the logistics service performance significantly in an online marketplace context.

The structure of paper is as follows. Section 2 presents the theoretical background, while Section 3 develops hypotheses. Next, Section 4 introduces methodology, and Section 5 reports the findings. Finally, Section 6 discusses the theoretical and managerial implications of findings, and then concludes the paper.

2. Literature Review

2.1. Online Marketplaces

Online marketplaces are e-commerce platforms that bring together many buyers and sellers (Li et al. 2015). They are governed by profit-seeking firms (i.e. marketplace firms), which can generate revenue in various ways. When the marketplace firm plays only an intermediary role between sellers and buyers (called as two-sided platform), it charges a commission on each transaction (Hagiu and Wright 2015). It may additionally charge a participation and/or annual fee from sellers and buyers affiliated to its platform (Hong 2015). The marketplace firm may also act as buyer and/or seller in the platform; therefore, they can generate an income through commerce (Hagiu 2007). Advertising is another important revenue item for marketplace firms, especially when their platforms have high consumer traffic (Lee et al. 2018).

Online marketplaces are called either B2B, C2C, or B2C according to the profiles of sellers and buyers (Täuscher and Laudien 2018). In B2B marketplaces, both sellers and buyers are firms, while in C2C marketplaces, they are both real persons. In B2C marketplaces, which is the focus of this study, sellers are firms and buyers are consumers. It is noted that sellers are usually SMEs in B2C marketplaces (Wang, Cavusoglu and Deng 2016). As mentioned in the introduction section, B2C marketplaces offer many advantageous to both sellers and buyers. The advantages to sellers can be summarized as low entry cost (Wang Cavusoglu and Deng 2016), reaching a larger customer segment (Jiang, Zhan and Shu 2017), no need to promote a proprietary website (Yu 2006), no need to deal with technical issues (Wei, Zha and Ma 2018), and reducing consumers' concerns over trustworthiness (Tadelis 2016), while the advantages to buyers can be listed as low prices, (Duch-Brown et al. 2017), low searching costs (Hong, 2015), easy to switch to another seller (Jain et al. 2017), and the increased trust owing to the marketplace firm's intermediation (Tadelis 2016).

2.2. Logistics Service Quality

Logistics service quality (LSQ) refers to the firm's "ability to deliver the right product in the right amount at the right place at the right time for the right customer in the right condition at the right price" (Leuschner, Charvet and Rogers 2013, 47). Many firms offer identical or very similar products, for this reason, LSQ (i.e. how the product is delivered) has become a key factor to gain competitive advantage (Qadir and Ali, 2017). Customers get satisfied when they receive their orders fast, conveniently, at a low cost, and with a high relational support (Daugherty, Bolumole and Grawe 2018). In addition, customer trust towards sellers increases, as the delivered product meets the promised performance standard and its return is easy in case of any problem (Daugherty, Bolumole and Grawe 2018). In this regard, high LSQ is able to

keep customers loyal by creating a value for them, which in turn positively affects market share, and firm profitability (Pellathy et al. 2018).

LSQ gains more importance in online shopping due to temporal and spatial separation (Luo, Ba and Zhang 2012). Spatial separation in online shopping prevents consumers inspecting and trying on products before purchase (Griffis et al. 2012); therefore, consumers need greater guidance and information from online sellers in the pre-transaction period, and also during delivery for tracking their orders' shipment status. Moreover, problems related to the order condition are more likely in online purchases, since consumers cannot check the accuracy and completeness of their orders at the time of purchase (Nguyen, De Leeuw and Dullaert 2018). The ability to resolve these problems is critical in online retailing, because an inefficient, complex, and slow return management negatively affects customer loyalty (Griffis et al. 2012). Another idiosyncratic characteristic of online shopping is temporal separation between purchase and delivery. Consumers pay in advance and so desire to receive products quickly (Han and Xie 2018). They want both fast and flexible delivery (Daugherty, Bolumole and Grawe 2018). Any delay in the delivery process easily escalates the concerns of consumers, which in turn, decreases their satisfaction (Ma 2017).

Such importance attached to LSQ has encouraged studies to investigate its elements. Many different elements are discussed, but the following are stated as the three main operational elements: the timeliness of order, the condition of order, and the availability of order (Murfield et al. 2017). Accordingly, the 'timeliness' refers to the delivery of products on time, the 'condition' refers to the accuracy and completeness of order without damage, and the 'availability' refers to the readiness of items for on-time delivery (Xing et al. 2010). In addition to these three operational LSQ items, the relational aspect of LSQ is also emphasized (Bouzaabia, Bouzaabia and Capatina 2013; Stank et al. 2003), which indicates the ability of providing an individualized, prompt, and confidential service to consumers with sufficient levels of information and courtesy (Bouzaabia, Bouzaabia and Capatina 2013).

A number of studies (Koufteros et al. 2014; Rao et al. 2011; Sohn et al. 2017) have incorporated additional elements into LSQ to address the distinct features of online retailing. The last-mile delivery is the most important of these, because it requires sellers to deliver products to the location designated by consumers (Hubner et al. 2016). Whereas the last-mile delivery creates a time and place utility for consumers, it causes an extra operational challenge for online sellers. Especially in online marketplaces, the need to deliver small orders to geographically dispersed locations is a great logistics challenge for sellers (Boyer et al. 2009), especially considering that the majority of sellers are SMEs (Wang, Cavusoglu and Deng 2016). This situation compels sellers to use 3PL service providers for the physical distribution of products (Ishfaq et al. 2016), and for other logistics services, such as packaging, return, and inventory management. Therefore, fulfilling online orders usually creates a logistics service triad covering consumer, seller, and the 3PL company, implying that the 3PL company's performance also affects the LSQ perceived by consumers (Yu et al. 2015). This effect is greater in online marketplaces because of a customer facing logistics service triad, in which consumers physically interact with the 3PL company's employees at the time of delivery (Sengupta et al. 2018).

In an online marketplace context, some issues play a key role in determining the logistics service performance of online sellers. To begin with, online sellers should make complete, objective, and visually enriched product descriptions on website. Also, if necessary, they should give a strong relational support to customers by providing a further relevant information about products (Daugherty, Bolumole and Grawe 2018). Otherwise, customers would not rate online sellers highly due to discrepancies between the product itself and the website image (Nguyen, De Leeuw and Dullaert 2018). The relational support should continue even after-sale if consumers have any query/problem, because the seller's good communication with consumers positively influences their repurchasing behavior (Micu, Aivaz and Capatina 2013). The delivery time is another crucial determinant of logistics service performance in online marketplaces (Ma 2017). Therefore, online sellers should be able to transfer the ordered products to the 3PL company as early as possible. Although 3PL companies make the physical distribution, online sellers are still responsible for ensuring the satisfactory product delivery by choosing the appropriate 3PL company, and giving accurate packaging and delivery instructions to the 3PL company.

3. Research Hypotheses

This section develops the research hypotheses that discuss factors expected to impact the sellers' logistics service performance in online marketplaces. Accordingly, the hypotheses are formulated to examine the possible impacts of seven factors: product assortment decisions, particular product categories, experience on e-commerce platform, 3PL company choice, city from which products are shipped, shipping fee policy, and same day delivery.

The product variety decisions of online sellers may affect their LSQ. High product variety enables online sellers to increase their sales by meeting the heterogeneous needs of consumers (Chiu et al. 2014). Thus, the virtual limitless shelf-space in online marketplaces incites sellers to display a larger number of items for sale, although these may not be held physically at the time of purchase (Ailawadi and Farris 2017). Although possible to organize a direct shipment from supplier to consumer (i.e. drop-shipping), it may cause logistics problems such as late delivery and wrongly shipped orders, due to the difficulty of coordinating multiple actors (i.e. suppliers and 3PL companies) involved in the e-fulfilment process. Moreover, the increased sales with a larger product variety also increases the number of orders that need to be fulfilled in a particular time-period. This exerts an extra pressure on employees, who tend to make more picking and order entry errors (Bruccoleri, Cannella and La Porta 2014), thus decreasing inventory accuracy (i.e.

increase the likelihood of being stock out for the item which is assumed to be available in stocks). Hence, the first hypothesis is:

H_1: The number of items offered by online seller negatively affects its LSQ.

In addition, high product variety often implies that online sellers offer many different product categories. Since each product category may have different logistics requirements, a seller's lack of specialization, knowledge and expertise may decrease LSQ (Fernhaber and Patel 2012; Lee and Song 2015). Therefore, the second hypothesis is developed as follows:

H_2: The number of different product categories offered by online seller negatively affects its LSQ.

Furthermore, product variety implies a high price dispersion between items offered by online sellers. Consumers' LSQ expectations, especially on relational support, differ with respect to the price of item purchased. Therefore, high price variance between items makes it more difficult for online sellers to conform to the different consumer expectations (Cho 2014). Accordingly, the third hypothesis is:

H_3: The price dispersion among items offered by online seller negatively affects its LSQ.

The characteristics of items offered by online sellers may also impact the effectiveness of their logistics activities. Items within a particular product category (e.g. furniture) may pose extra logistics challenges due to size (Pyke, Johnson and Desmond 2001). Alternatively, the packaging of certain products (e.g. toys) brings greater logistics difficulties (Rabinovich and Knemeyer 2006), and therefore are more likely to cause consumer complaints. In a similar vein, in contrast to technological products, an individual experience is highly important in certain products (e.g. makeup products), making objective description more difficult, increasing the likelihood of discrepancies between the product itself and the website image (Weathers and Makienko 2006). Similarly, the relational support and guidance of online sellers gain more importance in some items (Hsieh, Chiu and Chiang 2005), for example, shoe size may vary with respect to each shoe model. Also, for some products (e.g. underwear products), privacy is an important issue. These products' packaging and delivery should not allow the recipient or the item in package to be recognized by others (Jones, Barney and Farmer 2018). Hence, considering the idiosyncrasies within each product category, the following hypothesis is formulated:

H_4: The product category posing logistics challenges negatively affects the online seller's LSQ.

The longer the seller operates in online marketplaces, the more they become aware of the range and frequency of problems. Such greater experience is expected to be useful in allowing online sellers to address consumers' different needs and problems. Moreover, it is likely that sellers' long-term acting in online marketplaces brings a larger customer base, who make repeated purchases from them on these platforms. Thus, these online sellers probably have a greater amount knowledge on the special requests of this group of consumers, enabling them to personalize their services. For example, if the consumer complained about the product packaging in a previous transaction, the seller can focus on the packaging in the following transactions made with this consumer. Similarly, the consumer feedback received from previous transactions enables online sellers to emphasize the pieces of information on product and delivery process for which consumers are primarily searching for on website. Furthermore, it is likely that long-term sales online could give sellers a clear idea regarding the 3PL company they should choose to optimize LSQ. Hence, the fifth hypothesis is developed as follows:

H_5: The length of time the online seller makes sales in an online marketplace positively affects its LSQ.

The 3PL company choice can profoundly affect the online sellers' logistics service performance in online marketplaces (Subramanian et al. 2014). After the completion of transactions, online sellers usually transfer the ordered products to the 3PL company for physical distribution. Hence, it is the responsibility of 3PL companies to deliver orders on time to the designated location. 3PL companies are also expected to take the necessary measures to protect orders from any damage during transportation and handling processes. Consumers also require instant tracking of their orders' shipment status. Thus, the relational support of 3PL companies is highly important to provide timely and accurate information to consumers on shipment status. Furthermore, since the 3PL company interacts with consumers on the behalf of online sellers at the time of delivery, the treatment of consumers by the 3PL company's employees influences the perceived LSQ. The number of branches that a 3PL company is also a key factor in regards to LSQ. When consumers are not present at delivery point at the time of delivery, consumers can easily collect their orders, if a 3PL company has many branches across a city. This is also important when consumers have any problem with the product delivered, because, in these situations, consumers usually return the products via the 3PL company's branch. Hence, the 3PL company choice also significantly affects the ease of product return process. Based on these arguments, the sixth hypothesis is formulated as follows:

H_6: The online seller's appropriate 3PL company choice for physical distribution positively affects its LSQ.

The city from which online sellers ship their products could especially impact the timeliness of orders. The ratio of orders fulfilled on time is expected to increase if the shipping depot is close to consumers. Therefore, shipping products from populous cities could leverage the LSQ of online sellers by shortening the average delivery distance. In the case that the online seller and consumer are within the same city, online sellers may even make the physical distribution without a 3PL company. Hence, sometimes they have an opportunity to accelerate the delivery process and build stronger relationships with consumers via physical contact. Moreover, a geographic proximity with consumers enables online sellers to shorten the return process by eliminating the lengthy return shipment. Furthermore, a physical proximity allows online sellers to better understand their customers' logistics requirements due to their acquaintance with the consumers' cultural, social, and economic environments. The city from which products are shipped is also important from the perspective of the availability of various shipping options and different 3PL company alternatives, which are usually more in metropolitan cities. These arguments lead to the following hypothesis:

H_7: Shipping orders from a metropolitan city positively affects the online seller's LSQ.

Whether to follow the free shipping policy is another critical decision for sellers in online marketplaces. Consumers clearly prefer to avoid a shipping fee (Huang and Cheng, 2015). Therefore, the free shipping option is expected to boost the level of LSQ perceived by consumers. In contrast, when consumers pay for shipping, they are expected to be less tolerant to the logistics-related problems (e.g. late delivery and improper product packaging) during e-fulfilment (Cao et al. 2018). Although the free shipping policy has such advantages, this extra cost decreases the profit margin or even causes a loss, when the dollar value of order is low. In order to cover the shipping expenses, online sellers sometimes increase their items' prices (Cavallo, 2017), but this may cause consumers to choose another seller for their purchases. Since free shipping has both advantages and disadvantages, online sellers may sometimes follow a contingent-free shipping policy (Song et al. 2017). This entails offering value-based or quantity-based free shipping which incentivize consumers to make more purchases (Kwon and Cheong 2014). Alternatively, online sellers may offer selective free shipping with respect to specific items, usually for high price-items without logistics challenges in their delivery. Based on the arguments raised above, the eighth hypothesis is formulated as follows:

H_8: The online seller's free shipping policy positively affects its LSQ.

One of the most important issues in e-fulfilment is the delivery lead-time on which consumer expectations are always increasing (Nguyen, De Leeuw and Dullaert 2018). Consumers prefer to receive products as soon as possible after purchase (Han and Xie, 2018). Therefore, the short delivery lead-time promise is an instrument to attract and retain online consumers (Nguyen, De Leeuw and Dullaert 2018). Many online sellers guarantee the ordered products are transferred to the 3PL companies on the day of transaction. For this reason, customers expect the same day shipping service given. Thus, the failure of meeting this promise (e.g. due to one item's being stock out on that day) might cause a greater customer dissatisfaction. Also, the same day delivery promise could increase the pressure and operational complexity on online sellers, which could increase the missing and wrongly shipped orders. Hence, the last hypothesis is formulated as follows:

H_9: The online seller's same day shipping promise negatively affects its LSQ.

4. Method

4.1. Data Collection

The sellers on the online shopping site GittiGidiyor were examined in order to collect data for hypotheses testing. GittiGidiyor rapidly became Turkey's leading e-commerce marketplace after its foundation in 2001 (GittiGidiyor 2018). This strong growth attracted the global e-commerce giant eBay which first acquired a minority stake in GittiGidiyor in 2007, and then 93% of its shares in 2011 (Jose 2011). GittiGidiyor has maintained its popularity and continued to grow given the fact that it has today 19 million registered users and 60 million monthly visits on average (GittiGidiyor 2018). The e-commerce platform hosted by GittiGidiyor allows thousands of retailing firms to sell on its e-commerce platform. In return, GittiGidiyor charges a listing fee with respect to the number of items offered. It also charges a commission on each transaction between 6% and 20% with respect to the product category of the transaction.

GittiGidiyor specifies 23 main product categories on its platform. They are namely: i) antique & art; ii) baby & mother; iii) white goods & small household appliances; iv) computers & tablets; v) mobile phone & accessory; vi) DVD, VCD & Blu-ray; vii) home, decoration & garden; viii) pet products; ix) photos & cameras; x) supermarkets; xi) clothing & accessories; xii) books & magazines; xiii) cosmetic & personal care; xiv) jewelry & watches; xv) music, platters & instruments; xvi) office & stationery; xvii) automobiles, motorbikes & accessories; xviii) toys & hobby; xix) audio and video systems; xx) sport & outdoor; xxi) video games & consoles; xxii) construction market & repairs; xxiii) all others.

GittiGidiyor has an agreement with a number of 3PL companies which allows sellers special shipping rates. At the time of data collection, GittiGidiyor had an agreement with six 3PL companies whose names are not revealed in this study due to confidentiality. In the rest of the paper, these six 3PL companies will be called the 3PL Company A, B, C, D, E, and F. Before purchase, consumers are informed which 3PL company the online seller uses. If 'other' is written without specifying any 3PL company name, the online seller either uses a different 3PL company from the above-

mentioned six companies, or makes the delivery by itself. Also for each item, online sellers specify on the website the party (buyer or seller) paying the shipping fee, and whether item would be transferred to the 3PL company on the day of purchase.

The online rating system in GittiGidiyor allows consumers to rate the online seller's performance after each transaction. Consumers rate the sellers' performance on the 1-5 rating scale on the following dimensions: i) the conformance of the delivered products to their depiction on the website, ii) the seller's relational performance, iii) the timely delivery of items to the cargo (3PL) company, iv) cargo fee, and v) the delivery service.

The random walk sampling algorithm (Lu and Li 2012; Papagelis, Das and Koudas 2013; Zhong and Shen 2006) was used to select sellers to be sampled from GittiGidiyor. The first seller was chosen by clicking arbitrarily on one online store in GittiGidiyor, and for the rest, the following procedure was followed:

1. All consumers who posted a text-comment on the performance of the online seller (which is the most recently included into the sample) were listed.
2. Among these, the consumer who made the highest number of purchase (transactions) on GittiGidiyor was chosen.
3. All online sellers on which the chosen consumer also posted a text-comment were listed.
4. Among these sellers, the one with the highest number of transactions on GittiGidiyor was chosen.
5. a) If the chosen seller had less than 100 transactions, it was omitted to avoid bias risk due to a low number of evaluations. Then, the process returned to Stage 2, and the next consumer in terms of his/her number of transactions on GittiGidiyor was chosen.

   b) If the chosen seller had greater than 100 transactions, the seller was included into sample, and the process returned to Stage 1 to continue the sampling process.

This procedure stopped when the number of sellers to be sampled reached to 500, which is statistically sufficient sample size for consistent estimates.

Table 1 shows the sample characteristics below. Accordingly, the sampled sellers offered over 2000 items on average on their online stores, but this value could be misleading due to the large standard deviation, because the median value is 370 items. Likewise, the median values for the number of product categories and price range are 4 and 710.10 respectively. The sample statistics show that the sampled sellers had been active on GittiGidiyor more than 6 years on average.

According to Table 1, almost half of the sampled sellers offered items within the product category 'home, decoration & garden'. The other popular product categories were 'cosmetic & personal care', 'clothing & accessories', and 'sport & outdoor'. Approximately the half of the sampled sellers shipped from Istanbul. As shown in Table 1, many offered free shipping and guaranteed the delivery of items to the 3PL company on the day of purchase.

Table 1. Sample Characteristics

Variable	*Mean (Std. Deviation)*
# of items the seller offers	2427.56 (8749.55)
# of different product categories offered by the seller	4.70 (4.27)
The price range of items offered by the seller	4362.14 (18661.72)
The length of time (days) the seller is active on GittiGidiyor	2230 (1463)
The percentage of the sampled sellers selling products within the product category:	*% (N=500)*
Home, Decoration & Garden	48.6 % (n=243)
Cosmetic & Personal care	34.0 % (n=170)
Sport & Outdoor	33.8 % (n=169)
Clothing & Accessories	29.2 % (n=146)
Computers & Tablets	26.6 % (n=133)
Automobiles, Motorbikes & Accessories	26.4 % (n=132)
White goods & Small household appliances	24.4 % (n=122)
Baby & Mother	23.6 % (n=118)
Mobile phone & Accessory	22.0 % (n=110)
Toys & Hobby	22.0 % (n=110)
Supermarkets	19.6 % (n=98)
Office & Stationery	17.2 % (n=86)
Audio and Video Systems	17.0 % (n=85)
Jewelry & Watches	16.4 % (n=82)
Antique & Art	14.8 % (n=74)
Construction market & Repairs	14.8 % (n=74)

Music, Platters & Instruments	14.8 % (n=74)
Photos & Cameras	14.2 % (n=71)
Pet products	10.4 % (n=52)
Books & Magazines	9.0 % (n=45)
Video games & Consoles	5.6 % (n=28)
DVD, VCD & Blu-ray	5.2 % (n=26)
The percentage of the sampled sellers shipping their products via the 3PL company:	*% (N=500)*
3PL Company A	31.8 % (n=159)
3PL Company B	24.4 % (n=122)
3PL Company C	10.8 % (n=54)
3PL Company D	7.2 % (n=36)
3PL Company E	4.4 % (n=22)
3PL Company F	0.6 % (n=3)
Other	20.6% (n=103)
The percentage of the sampled sellers shipping their products from:	*% (N=500)*
Istanbul	45.6 % (n=228)
Ankara	12.6 % (n=63)
Izmir	10.2 % (n=51)
The percentage of the sampled sellers using:	*% (N=500)*
Same-day delivery to 3PL company	67.4 % (n=337)
Free-shipping	60.2 % (n=301)
Contingent-free shipping	24.4 % (n=122)

4.2. A Multi-group Structural Equational Modelling

This study employed a multi-group structural equational modelling for testing its research hypotheses. In the structural equation modelling (SEM), the confirmatory factor analysis (CFA) is used to operationalize latent variables (that cannot be directly measured) via indicator (observed) variables (Kline 2011). Since this latent variable system eliminates the random error of measurement for indicator variables, it is able to measure latent variables more consistently. Thus, the use of structural equation modelling (SEM) is recommended to examine the differences among groups, rather than methods such as multivariate analysis of variance (Dimitrov 2006).

One of the SEM-based methods used to compare the latent variable means across groups is the group code analysis (Dimitrov 2006). In this method, as shown in Figure 1, the group code variable is incorporated into the model as a binary variable. Hence, it is coded as either 0 or 1, depending on each observation's membership to the examined group. Then, one-way arrow from the group code variable to latent variable is specified to identify whether there is a significant group effect on the latent variable of interest (Dimitrov 2006). This study carried out this method to compare the LSQ level for different grouping variables. Please note that the 23rd version of AMOS software was used for analyses.

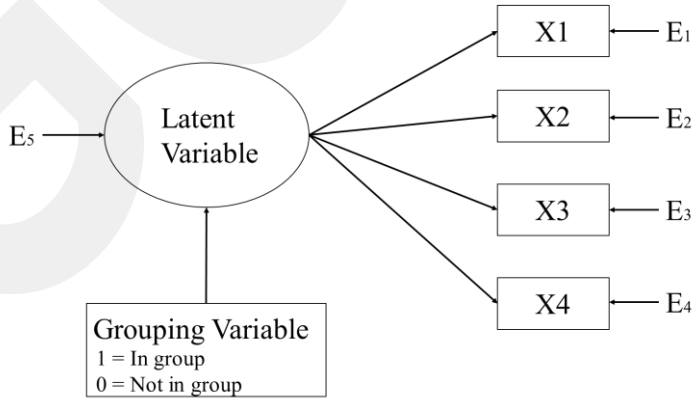

Figure 1. Group Code Model

Source: Dimitrov (2006)

5. Data Analysis and Findings

LSQ was modelled as a latent variable in this study's research model. Confirmatory factor analysis (CFA) was applied to measure LSQ with four items (indicator variables). These items were operationalized with the average rating given

by consumers to the online seller's logistics performance on GittiGidiyor. Table 2 below shows the descriptive statistics and operationalization of LSQ items, i.e. the statements that were the basis of consumers' rating of the online sellers' logistics performance on GittiGidiyor. Additionally, Table 3 shows the correlation matrix of LSQ items

Table 2. The Operationalization of LSQ Items

Latent Variable	*Item*	*Operationalization*	*Mean (Std. Dev.)*
Logistics Service Quality	LSQ_1	The product was delivered as depicted on the website.	4.73 (.158)
	LSQ_2	The seller's communication with the buyer was good.	4.68 (.172)
	LSQ_3	The product was transferred to the 3PL company on time.	4.78 (.142)
	LSQ_4	The delivery of the product was satisfactory.	4.63 (.163)

Table 3. The Correlation Matrix of LSQ Items

	LSQ_1	LSQ_2	LSQ_3	LSQ_4
LSQ_1	1.000			
LSQ_2	.863	1.000		
LSQ_3	.767	.822	1.000	
LSQ_4	.740	.786	.747	1.000
The values are Pearson correlation coefficients				

The four LSQ items which are operationalized in this study address the four main dimensions of LSQ, which are the timeliness of order, the condition of order, the availability of order, and the relational logistics service (Bouzaabia, Bouzaabia and Capatina 2013; Murfield et al. 2017; Stank et al. 2003). As shown in Table 2, LSQ_1 addresses the condition of order that refers to the accuracy and completeness of order without a damage. LSQ_2 addresses the relational aspect of LSQ that indicates the ability of providing an individualized, prompt, and confidential service to consumers with sufficient levels of information and courtesy (Bouzaabia, Bouzaabia and Capatina 2013). LSQ_3 addresses both timeliness and availability of order, referring to the capability to hold items to ensure on-time delivery (Xing et al. 2010). LSQ_4 addresses all LSQ elements by asking for a general assessment on the delivery service.

Table 4. The Results of CFA

Latent Variable	*Item*	*Factor Loading*	*Estimate*	*Std. Error*	*t-value*	*p-value*	*Error Var. Estimate*	*Std. Error*	*t-value*	*p-value*
Logistics Service Quality AVE = .89 CR = .94 α = .94	LSQ_1	.899	.805	.031	25.649	< .001	.153	.013	11.815	< .001
	LSQ_2	.893	.031	.031	28.400	< .001	.079	.011	7.101	< .001
	LSQ_3	.87	.90	.030	24.053	< .001	.177	.013	13.145	< .001
	LSQ_4	.83	.99	.035	22.580	< .001	.283	.020	13.856	< .001
AVE: Average Variance Extracted; CR: Composite Reliability; α: Cronbach alpha										

Table 4 shows the results of CFA analysis. Accordingly, all items load on LSQ significantly with high factor loading scores. High average variance extracted score (AVE = .89) ensures the achievement of convergent validity, while high composite reliability (CR = .94) and Cronbach's alpha (α =.94) scores provide an evidence for the scale reliability.

This study tested the impact of each grouping variable on LSQ in a separate model. For this purpose, the sampled sellers were coded 1 for each product category within which they offer items, for each 3PL company used, for the city from which they ship, and for their shipping policy (free shipping, contingent free shipping, same day delivery). Likewise, they were coded 0 for product categories within which they do not offer items, for 3PL companies not used, for cities from which they do not ship, and for shipping policies not followed.

The online sellers were coded 1 for same day delivery if offered 80% or more of their products, and 0 when they offer the same day delivery for less than 20%. Likewise, while coding free shipping, the online sellers were coded 1 when they offer free shipping for 80% or more of their products, and 0 when they offer free shipping for less than 20%. Between 20% and 80%, sellers were coded 1 for the contingent-free shipping, and 0 otherwise.

In addition, the sampled sellers were ranked in a descending order with respect to the number of different items offered, the number of product categories, the price dispersion of their products, and the length of time selling on GittiGidiyor. The online sellers were then split into two groups with respect to each ranking order. The online sellers in the upper 50^{th} percentile were coded 1, the others were coded 0 with respect to each ranking order.

Since the maximum likelihood estimation was used to estimate parameters in this study, the group sample size should be sufficiently large for consistent estimates. There are various suggested rules-of-thumb for the sufficient sample size, such as the absolute values 100 or 200 cases, 5 or 10 observations per estimated parameter, and 10

observations per variable (Wolf et al. 2013). Regarding these suggestions, this study considered only groups whose sizes are at least ten times larger than the number of parameters estimated in the research model. As the number of parameters estimated in this study's model is 10 (see Figure 1), the grouping variables with the sample size lower than 100 were removed from analysis (see Table 1). After these removals, the remaining number of grouping variables whose impact on LSQ were tested was 21. Below, Figure 2 shows research models that separately test the impact of grouping variables on LSQ.

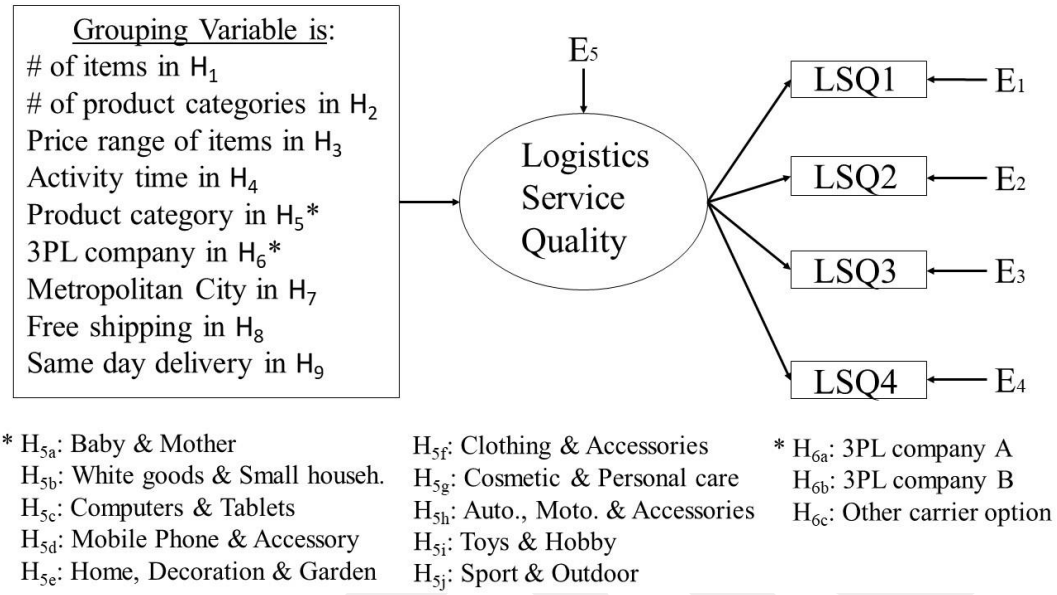

Figure 2. Research Model

Before applying the SEM-based group code analysis, the measurement invariance was checked, because the research model should be invariant across groups for meaningful comparison (Sass 2011). The measurement invariance requires the achievement of both configural invariance, metric invariance, and scalar invariance. Configural invariance is initially checked by controlling if the model fits well with data for each group. Once configural invariance is achieved, the metric invariance is checked, requiring similar factor loading scores across groups. Next, the scalar invariance is controlled, i.e. similar indicator variable intercepts across groups. The scalar invariance indicates a strong factorial invariance, implying that it is appropriate to compare latent variable means across groups (Sass, 2011).

Although it is not possible to illustrate the measurement invariance test for all models due to its high number in this study, Table 5 shows the Model #1's measurement invariance test as an illustrative example. In Model #1, the online sellers were split into two groups (the upper and lower 50th percentiles) with respect to the number of different items offered by online sellers. In the first step, the good model fit values (CFI > .98; SRMR < .02) for both two groups ensure configural invariance. Then, the chi-square test was carried out to check metric invariance and scalar invariance. The non-significant p-values in measurement weights and measurement residuals models indicate the achievements of metric invariance and scalar invariance. However, please note that although p-value was found insignificant in this illustrative example, it was found significant in many other models' measurement invariance tests. Nonetheless, studies (Meade, Johnson and Braddy, 2008; Xu and Tracey, 2017) caution that this could occur due to the sensitivity of the chi-square value to large sample size. Therefore, they suggest that ΔCFI smaller than .01 (between unconstrained and constrained models) is sufficient for proceeding to the multi-group analysis. All models in this study meet the 'ΔCFI < .01' criterion.

Table 5. The Measurement Invariance Test of Model #1

Grouping Variable: # of different items	*df*	*χ2*	*P*	*ΔCFI*
Measurement weights	4	1,469	0,832	0,002
Measurement residuals	8	4,056	0,852	0,002

After these analyses, the model fitness of 21 models were separately checked through the following model fit indices: comparative fit index (CFI), goodness of fit index (GFI), relative chi-square (χ2/df), root mean square error of approximation (RMSEA), standardized root mean square residuals (SRMR). Table 6 shows that the CFI and GFI values are around .99 in all models, indicating a very good model fit. Similarly, the SRMR value is lower than .03 in all models, validating that each model fits well with data (Hu and Bentler 1999). Also, when the relative chi-square and RMSEA values are considered, all models, except from Model #1, have an adequate model fit. Only in Model #1, the

relative chi-square and RMSEA values exceed the permissible values (i.e. $\chi 2/df > 5$, and RMSEA > .08) for the goodness of model fit (Hu and Bentler 1999).

Table 6. Model Fit

#	*Model*	*CFI*	*GFI*	χ^2/df	*RMSEA*	*SRMR*
1	# of different items => LSQ	.984	.976	6.663	.107	.027
2	# of product categories => LSQ	.993	.986	3.587	.072	.017
3	The price range of items => LSQ	.997	.992	2.034	.046	.012
4	Activity time on GittiGidiyor => LSQ	.996	.991	2.256	.050	.013
5	Baby & Mother => LSQ	.996	.990	2.514	.055	.015
6	White goods & Small household appliances => LSQ	.994	.987	3.234	.067	.017
7	Computers & Tablets => LSQ	.992	.985	3.792	.075	.019
*8	Mobile phone & Accessory => LSQ	.992	.985	4.612	.085	.021
9	Home, Decoration & Garden => LSQ	.993	.987	3.414	.070	.016
10	Clothing & Accessories => LSQ	.990	.982	4.783	.087	.025
11	Cosmetic & Personal care => LSQ	.994	.988	3.001	.063	.017
12	Automobiles, Motorbikes & Accessories => LSQ	.995	.989	2.712	.059	.014
13	Toys & Hobby => LSQ	.996	.990	2.519	.055	.014
14	Sport & Outdoor => LSQ	.996	.991	2.298	.051	.012
*15	3PL Company A => LSQ	.997	.993	2.280	.051	.009
16	3PL Company B => LSQ	.998	.993	1.706	.038	.009
17	Other => LSQ	.998	.993	1.746	.039	.009
18	Istanbul => LSQ	.995	.990	2.682	.058	.016
*19	Free-shipping => LSQ	.996	.990	2.984	.063	.011
20	Contingent-free shipping => LSQ	.992	.984	3.706	.074	.021
*21	Same-day delivery to 3PL company => LSQ	.994	.987	3.902	.076	.016

* In models #8, #15, #19 and #21, modification indices were used to improve model fit by specifying a covariance between/with error terms.

The model testing results (Table 7) show that the logistics service performance of online sellers decreases when they offer items related to different product categories. Nevertheless, it could not be confirmed that LSQ decreases due to the high number of items offered, or large price range between items. Neither were the results able to verify the positive effect of the sellers' online marketplace experience on their LSQ at the .05 significance level, although it was shown at the .10 significance level.

Almost all product categories examined were found to negatively impact LSQ, and it was possible that this was caused by the correlation between product categories, because sellers usually offer items on product categories complimentary to each other. Therefore, it is high likely that online sellers involved in multiple product categories offer similar bundle of categories. For example, when a seller offers items within the product category ‘Computers & Tablets', it is more likley to offer items within the product category 'Mobile phone & Accessory' than within the product category ‘Baby & Mother’. Therefore, a new model (#22) was constructed into which all product category variables were included to account for the individual effect of each product category on LSQ. Table 7 reports the results with respect to this model (#22). According to the results, the product categories that significantly impact sellers’ logistics performance are as follows: ‘Computers & Tablets', 'Mobile phone & Accessory', 'Home, Decoration & Garden', 'Automobiles, Motorbikes & Accessories', and 'Sport & Outdoor'. These jointly explain 14% variance in LSQ. Please note that the model #22 has an also good model fit (CFI = .983; GFI = .979; $\chi 2/df = 2.429$; RMSEA = .054; SRMR = .019).

The findings confirm that the online seller’s 3PL company choice could significantly impact its logistics service performance. The results show that sellers working with the 3PL Company A have a superior LSQ. However, the findings did not validate the hypothesis of a higher LSQ for sellers shipping from metropolitan cities due to their geographic proximity to consumers. On the contrary, the findings show that the sellers shipping from Istanbul have a worse logistics service performance. Other interesting findings are that the same day delivery promise has no effect on LSQ, and free shipping has a negative effect on the LSQ perceived by consumers.

Table 7. Model Testing Results

#	*Hypothesis*	*Model*	*Std. Est.*	*Unstd. Est.*	*Std. Error*	*t-value*	*p-value*	R^2
1	H_1	# of different items => LSQ	.038	.061	.074	0.82	>.10	0.1%
2	H_2	# of product categories => LSQ	-.118	-.190	.074	-2.57	< .01	1.4%
3	H_3	The price range of items => LSQ	.015	.024	.074	0.32	>.10	0.0%

4	H_4	Activity time on GittiGidiyor =>	.080	.129	.074	1.74	>.05*	0.6%
22	H_{5a}	Baby & Mother => LSQ	-.044	-.083	.093	-0.89	>.10	14%
22	H_{5b}	White goods & Small household	-.016	-.030	.091	-0.33	>.10	
22	H_{5c}	Computers & Tablets => LSQ	.164	.300	.099	3.03	< .01	
22	H_{5d}	Mobile phone & Accessory =>	-.110	-.214	.106	-2.02	< .05	
22	H_{5e}	Home, Decoration & Garden =>	-.106	-.170	.076	-2.24	< .05	
22	H_{5f}	Clothing & Accessories => LSQ	-.021	-.037	.083	-0.45	>.10	
22	H_{5g}	Cosmetic & Personal care => LSQ	-.018	-.030	.082	-0.37	>.10	
22	H_{5h}	Auto., Moto. & Accessories =>	-.137	-.251	.058	-4.33	< .01	
22	H_{5i}	Toys & Hobby => LSQ	-.063	-.123	.097	-1.27	>.10	
22	H_{5j}	Sport & Outdoor => LSQ	-.167	-.285	.086	-3.31	< .001	
15	H_{6a}	3PL Company A => LSQ	.233	.403	.078	5.17	< .001	5.4%
16	H_{6b}	3PL Company B => LSQ	-.088	-.165	.086	-1.92	>.05*	0.8%
17	H_{6c}	Other => LSQ	-.034	-.067	.091	-0.74	>.10	0.1%
18	H_7	Istanbul => LSQ	-.115	-.186	.074	-2.51	< .05	1.3%
19	H_8	Free-shipping => LSQ	-.109	-.179	.075	-2.39	< .05	1.2%
20	-	Contingent-free shipping => LSQ	-.021	-.039	.086	-0.45	>.10	0.0%
21	H_9	Same-day delivery to cargo	-.075	-.110	.067	-1.64	>.10	0.6%

Based on the model testing results, Figure 3 shows the variables found to significantly impact LSQ in online marketplaces. Accordingly, the examined sellers using the 3PL Company A and selling items within the product category "Computer & Tablets" provide a superior LSQ. In contrast, online sellers offering items within product categories "Mobile phone & Accessory", "Home, Decoration & Garden", "Automobiles, Motorbikes & Accessories", and "Sport & Outdoor" have a lower LSQ. In addition, offering too many product categories, shipping from Istanbul, and pursuing a free shipping policy are other variables found to decrease the LSQ of online sellers. With respect to these findings, Table 8 reports the results of this study's research hypotheses.

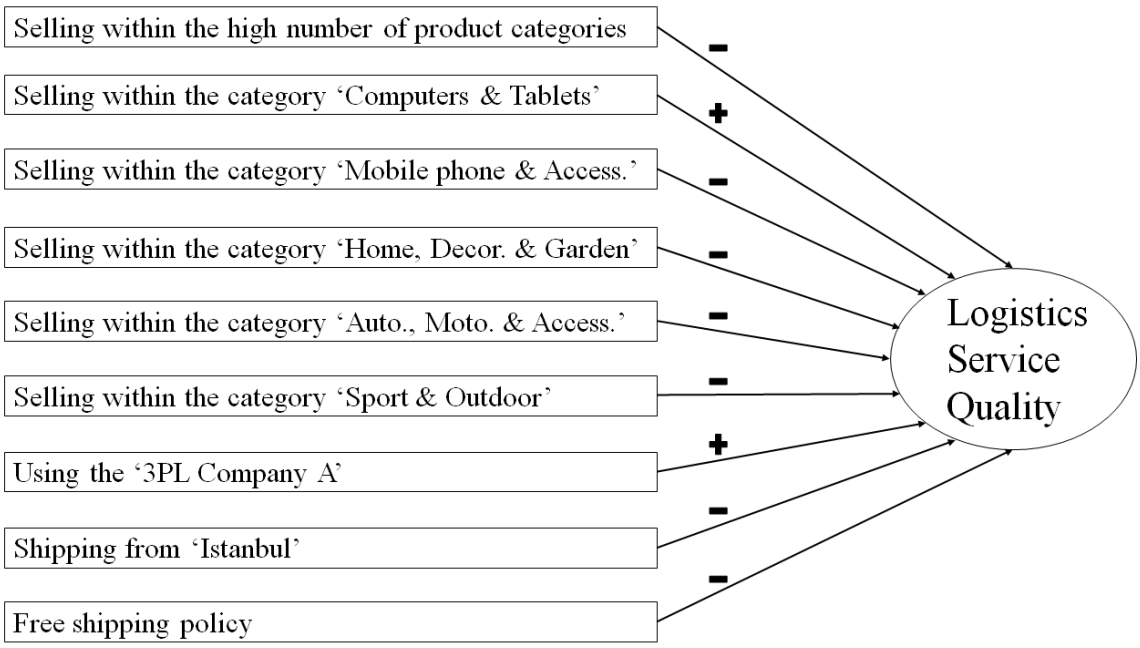

Figure 3. Significant Determinants of LSQ

Table 8. The Results of Research Hypotheses

	Result	*Explanation*
Hypothesis 1	Not Supported	The hypothesized negative effect of the number of offered items on LSQ could not be validated (see Model #1 in Table 7).
Hypothesis 2	Supported	The number of product categories offered has a negative impact on LSQ (see Model #2 in Table 7).

Hypothesis 3	Not Supported	The hypothesized negative effect of the price dispersion on LSQ could not be validated (see Model #3 in Table 7).
Hypothesis 4	Not Supported	The hypothesized positive effect of the activity time on the shopping site platform on LSQ could not be validated (see Model #4 in Table 7).
Hypothesis 5	Supported	Selling items within some product categories ('mobile phone & access.', 'home, décor. & garden', 'auto., moto. & access' and 'sport & outdoor') have a negative impact on LSQ (see Model #22 in Table 7).
Hypothesis 6	Supported	The appropriate 3PL company choice has a positive impact on LSQ (see Model #15 in Table 7).
Hypothesis 7	Not Supported	In contrast to the hypothesized positive effect, shipping from a metropolitan city (e.g. Istanbul) has a negative impact on LSQ (see Model #18 in Table 7).
Hypothesis 8	Not Supported	In contrast to the hypothesized positive effect, free shipping policy has a negative impact on LSQ (see Model #19 in Table 7).
Hypothesis 9	Not Supported	The hypothesized positive effect of the same-day delivery on LSQ could not be validated (see Model #21 in Table 7).

6. Discussion and Conclusion

This study does not claim to show each single element's impact on LSQ in an online marketplace. For instance, it does not intend to reveal the impact of each specific product category or particular 3PL companies on LSQ. Instead, based on particular examples, it aims to provide evidence for the existence of factors that impact LSQ. In this regard, this study makes a solid contribution by revealing a number of factors that explain the sellers' logistics service performance in online marketplaces. These factors could provide online sellers with guidance in elevating their LSQ with some minor adjustments in their managerial decisions. The authors of this study believe that such guidance is invaluable in the online marketplace context, where logistics service performance is a source of competitiveness due to intensive price-based competition. The findings of this study also provide theoretical insights. Almost all variables examined were found to negatively affect the sellers' LSQ, confirming that LSQ 'becomes the norm rather than the exception' (Daugherty, Bolumole and Grawe 2018) for consumers, who are becoming increasingly intolerant of the logistics service failures in online shopping. In this respect, it could be argued that this study comprehensibly highlights the factors that could trigger the logistics service dissatisfaction.

The results of this study show that product variety could negatively impact LSQ in an online marketplace setting. This negative effect of high product variety on operational performance was previously acknowledged in a physical retailing setting (Wan and Sanders 2017). However, such a negative effect in online context might be less expected due to temporal separation between purchase and delivery. Therefore, online sellers do not have to physically hold items advertised on the websites because of the possibilities of supplying items or making drop shipping (a direct shipment from suppliers to consumer) after the order is received. According to the results, this premise may be true when product variety is conceptualized as the number of different items offered by online seller; nevertheless, the results show that the problems occur when the items offered belong to wide range of product categories, because this implies the sellers' lack of specialization in and knowledge of each specific product category. Since each product category has idiosyncrasies with respect to its logistics processes (e.g. in their transportation, packaging, handling, and relational support), more categories could mean increased difficulty in carrying out the effective logistics processes. Thus, in order to boost LSQ, the results suggest that sellers focus on a small number of categories with similar requirements in logistics processes. However, the results also suggest that online sellers can offer a very high number of items, provided that they are within the same product category. This could help online sellers increase sales without damaging LSQ (Chiu et al. 2014). Another notable finding is that selling on particular product categories diminish the LSQ, possibly due to the logistics challenges pertaining to these categories. Hence, sellers should avoid these product categories unless they drive their sales.

The results reveal the importance of the 3PL company choice for the logistics service performance in online marketplaces. This finding is not surprising considering that 3PL companies actually carry out the logistics activities in e-fulfillment process by following the instructions of online sellers. Although the seller transfers the ordered products to the 3PL company on the day of purchase, the 3PL companies may delay delivery. Alternatively, the order could be damaged during transportation process because of the 3PL company's ignoring the seller's particular instruction on the packaging. In addition, the 3PL company's employees interact with consumers at delivery point. Similarly, they contact consumers at pre-delivery phase to respond to their queries on the order shipment status, and after delivery if the order is returned to the seller. Therefore, the 3PL company's care and interest in consumer problems impact the perceived LSQ by consumers. Regarding such important role of 3PL companies in e-fulfillment process, cargo fee should not be only criterion for online sellers; 3PL companies should also be assessed with respect to their capability of complying with the seller's instructions, and their communication with consumers.

This study also has counter-intuitive findings. The online sellers offering free shipping were found to have lower LSQ compared to others. Although the interpretation of this finding is quite difficult in this quantitative study, one

possible explanation relates to the perspective of sellers. It is possible that sellers could have the misperception that free shipping is a favor to consumers; hence, it enables them to mask the logistics-related problems during e-fulfilment. Therefore, they may not make as great effort to improve logistics service quality as the sellers who charge for shipping. However, consumers today expect the free shipping given; therefore, it may not have the function of increasing LSQ. As the results show, free shipping may actually prevent online sellers from making efforts to improve the logistics service level. Another counter-intuitive finding is that online sellers shipping from Istanbul have worse logistics service performance. Due to its large population, it could be expected that online sellers in Istanbul could have fewer delivery time problems; however, the results indicate the opposite. This finding could be interpreted from consumer perspective. Accordingly, it might be argued that online consumers in Istanbul may have higher service expectations because they are also aware that the most of sellers are geographically close to them. The other interesting finding is that the same day delivery promise does not affect the perceived LSQ. Similar to free shipping, today consumers expect online sellers to transfer the purchased items to the 3PL company on the day of purchase. Therefore, the results show that free shipping and same day delivery to the 3PL company are not exceptional elements in e-fulfilment.

This study has a number of limitations that may guide future work. First, the impacts of some group categories were not tested in this study due to their small group size. The additional data were not collected, because the purpose of this study was to show the factors that impact LSQ rather than showing the impact of each element on LSQ, such as specific product categories, cities, and 3PL companies. However, future studies investigating the impacts of these elements on LSQ could collect greater amounts of data. Their analysis on these variables at more micro level could also provide a better understanding of why some but not all product categories and 3PL companies affect LSQ. Second, although this study reveals interesting findings, e.g. the sellers offering free shipping have lower logistics service performance, there is a need for qualitative studies for more comprehensive explanation and interpretation of these findings. Another limitation of this study could be that the construct of LSQ has a low r-square value. Future research could incorporate additional variables (e.g. the location of consumers and differences between items at SKU level) to increase the explained variance in LSQ. Finally, this study measured the LSQ from consumer perspective using the online ratings on GittiGidiyor. Future research could attempt to validate this study's findings with primary data collected by online retailing firms, such as lead-time in days, and the number of complaints on logistics processes filed by consumers.

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