Technology Analysis & Strategic Management

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ctas20

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To cite this article: Nebojša Vasić, Milorad Kilibarda, Milan Andrejić & Srđan Jović (2021) Satisfaction is a function of users of logistics services in e-commerce, Technology Analysis & Strategic Management, 33:7, 813-828, DOI: 10.1080/09537325.2020.1849610

To link to this article: https://doi.org/10.1080/09537325.2020.1849610

TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT
2021, VOL. 33, NO. 7, 813–828
https://doi.org/10.1080/09537325.2020.1849610

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Satisfaction is a function of users of logistics services in e-commerce

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ABSTRACT

Customer satisfaction in e-commerce directly depends on diverse dimensions of logistics services. In the market, there is a constant dilemma which logistics service dimensions affect customer satisfaction in e-commerce. The aim of the paper is to determine how certain dimensions of logistics services affect customer satisfaction in e-commerce. Thus, a methodological approach has been developed, as well as an original measuring instrument with eight dimensions: availability, delivery time, shipping costs, delivery reliability, product quality and condition, consumer complaints and return policy, information quality, and e-customers' perception and satisfaction, with 31 items in total. The model is based on Confirmatory Factor Analysis (CFA) and Partial Least Squares method (PLS) and has been applied on the market of Serbia. A web survey was conducted on a sample of 425 respondents, i.e. final consumers who have used e-commerce services significantly in recent years. The obtained results clearly indicate that the satisfaction of e-commerce consumers directly depends on the observed dimensions of logistics service. The developed procedure and measuring instrument represent a concrete scientific contribution to better understanding of the dimensions of logistics service and customer satisfaction in e-commerce. The measuring instrument can be used to increase the satisfaction of e-commerce clients.

ARTICLE HISTORY
Received 8 December 2019
Revised 22 September 2020
Accepted 5 November 2020

KEYWORDS
Customer satisfaction; E-commerce; logistics service dimensions; confirmatory factor analysis (CFA); SmartPLS 3

1. Introduction

E-commerce brings great business opportunities (such as product sales and online services) and revenue growth for a number of companies, including e-retailers, due to its practical and interactive nature, lower costs and a high degree of customization and personalization with customers. Nevertheless, even with a growing number of e-customers, e-commerce has proven to be more complicated in comparison to traditional business. Improving the quality of e-commerce services is regarded as one of the key factors leading to success or failure in the e-retail supply chain. Over the past two decades, the quality of services in the context of e-commerce has been defined differently: as an efficient manner of obtaining and maintaining competitive advantage (Zeithaml, Parasuraman, and Malhotra 2002), a strategic issue for long-term success (Parasuraman, Zeithaml, and Malhotra 2005), or a key determinant of customer satisfaction and loyalty (Ribbink et al. 2004).

In the last decade, e-commerce has demonstrated an impressive growth in the world. It is projected that, globally, e-commerce revenue in 2020 will reach $\$2{,}275{,}953 \times 10^6$. This revenue is expected to grow

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at an annual rate of 8.1%, and it will reach a value of $\$3{,}102{,}791 \times 10^6$ in 2024 (Statista, eCommerce worldwide 2020). The largest e-commerce markets are located in China, the US and Europe, with revenues in 2019 equal to $862.2 billion, $356.4 billion and $355.26 billion, respectively. Indeed, the Chinese market will continue to be dominant in the world until 2024 (Statista, eCommerce report 2020). As for the e-commerce market in Europe, the largest is in the UK, then Germany and France, where revenues in 2019 amounted to $141.93 billion, $81.85 billion and $69.43 billion, respectively (Global eCommerce 2019).

The research in this paper encloses the e-commerce market in Serbia, which is estimated to have a revenue of about $413 million in 2020, as well as the annual growth rate of 7.1%. Likewise, it is estimated that in 2024, that revenue will amount to about $545 million (Statista, eCommerce Serbia 2020).

On the Serbian market, e-commerce has experienced a significant growth only in the last few years. There has been no significant research and work on this topic. In recent years, several papers have been published with the results of research on a number of aspects of e-commerce. Melovic et al. (2020) investigated the importance of technical and organizational factors on the assimilation of electronic customer relationship management (e-CRM) in companies in Southeast Europe, including Serbia. Vasić, Kilibarda, and Kaurin (2019) stated the direct conditionality between customers' satisfaction and the security of the e-retailer's website, availability of information on the e-retailer's website, delivery of online purchased products, quality of the e-retailer's website, cost of online shopping and the time required for online shopping. Đurić (2019) pointed out that customers in Serbia with established habits and attitudes (ages 26–65), highly educated and with more money available for online shopping, generally do not trust online advertisements, do not follow online advertisements and trust more the people from their environment than online advertising messages. Bakator et al. (2019) highlighted the positive correlation between customer satisfaction and brand advertising, brand quality, brand relationship quality, and brand credibility.

According to a study by the CNNIC (2013), the two most common problems in the online purchase are long shipping period and the mismatch between the received product and online product specification. In order to achieve a greater prevalence of e-commerce, certain conditions have to be met, and one of the most important is the development of logistics capacities and services. Providing logistics service is one of the most expensive operations in e-commerce and plays a critical role in promoting online shopping (Qin, Liu, and Tian 2020). Hong et al. (2019) believe that practicality, communication, reliability and responsiveness in providing logistics services present important predictors of customer satisfaction. Huang (2019) indicates that the efficient delivery is a key factor in customer satisfaction and loyalty. According to Choi, Chung, and Young (2019), the greatest impact on customer satisfaction, and thus on the repetition of purchases, is attributed to LSQ, or the quality of delivery. Likewise, in the paper by Grant and Philipp (2020), the significant impact of LSQ on customer satisfaction and loyalty was highlighted.

Logistics service quality (LSQ) is a key factor in creating customer satisfaction (Mentzer, Flint, and Hult 2001), which in turn has a major impact on customer loyalty. Research on LSQ began in 1970s; yet, the results demonstrate that it is difficult to be measured, particularly in the context of e-commerce. Unfortunately, sometimes its significance and function are underrated, while the research on the role of logistics services in relation to contributions to e-commerce and success in e-commerce supply chains remain scarce (Xing et al. 2011). Hood et al. (2020) established that in the UK, groceries delivery to customers' home addresses is the dominant distribution channel in e-commerce. He, Zhang, and He (2019) analysed the business of two B2C companies, one of which organizes logistics activities, and the other hires 3PL providers for this purpose, with both of them sharing the same logistics resources – the concept of sharing logistics resources, such as vehicles, infrastructure, information systems, human resources, etc. According to the mentioned authors, three key parameters in such businesses are as follows: the degree of difference between these two companies, the user logistics benefit, and the logistics efficiency of the B2C company, which organizes the logistics activities itself.

Apart from introduction and conclusion, there are four other sections. In the second section, an overview of the literature is presented and research hypotheses are defined. In the third part, the methodology and research model are developed, followed by testing the hypotheses and research

model in the section four. The section five displays the obtained research results. Finally, concluding considerations and main directions of future research are presented in the final section.

2. Problem description and definition research hypotheses

Logistics is the backbone of the distribution chain in e-commerce, where the success of the retailer is essentially related to the logistics efficiency (Bhattacharjya, Ellison, and Tripathi 2016). Since logistics plays a major role in the development of e-commerce, e-retailers with strong logistics capabilities are more likely to create a sustainable competitive advantage and improve their performances. Logistics service is considered to be the main dimension of business service quality in e-commerce, along with marketing, operations and cooperation services. LSQ is also a critical success factor and a differentiation tool, affecting the level of e-customer satisfaction and their retention rate.

Product quality and condition refers to any damage to the product delivered to the customer (Bienstock, Mentzer, and Bird 1997; Mentzer, Gomes, and Krapfel 1989), i.e. the accuracy and functionality of the product (Mentzer, Flint, and Hult 2001). In their paper, Gil Saura et al. (2008) emphasized the quality of the product as an important dimension of logistics services in the creation of customer satisfaction. Damaged or faulty product causes the customer dissatisfaction manifested through the product return or order cancellation. In a study by Gök, Ersoy, and Börühan (2019), the authors highlighted a significant positive relationship between user manual quality and perceived product quality, as well as the fact that customers perceive the user manual as a part of their product-related quality assessment.

According to all the above, the following hypothesis has been defined:

H1. The dimensions of product availability and quality affect the perception and satisfaction of e-customers.

Delivery time is related to the process of ordering, and for the customer, it is the elapsed time between a requisition and delivery (Mentzer, Gomes, and Krapfel 1989). Additionally, this dimension includes the dates and timeframes selected by the customer for the ordered product delivery. When the delivery time is longer than expected, customers become dissatisfied, and retailers may lose one or more sales, or even the loyalty of their customers. According to Shang and Liu (2011), delivery delays impair the delivery reliability and have a long-term negative impact on customer demand. It is therefore essential for retailers to provide fast delivery and reduce the average delivery waiting time.

H2. The dimensions of delivery affect the perception and satisfaction of e-customers.

The information quality refers to the customer perception about product information offered by retailers. Based on available information and information of appropriate quality, the customer decides on the purchase (Mentzer, Flint, and Hult 2001). Customers expect from e-retailers to provide relevant and accurate information on products. E-retailers should seek to provide detailed product information to be sure that e-customers will receive what they want (Xing et al. 2011). Since e-customers do not have the possibility to touch and feel the product before making a purchasing decision, e-retailers should provide them with adequate information. Customers value information that will satisfy their requirements.

H3. The dimensions of information and complaints affect the perception and satisfaction of e-customers.

In order to further investigated and prove the proposed hypotheses, the conceptual research model, presented in Figure 1, has been defined.

3. Research methodology

3.1. Development of the measuring instrument

The measuring instrument has been designed on the basis of already developed instruments, reviewing relevant literature in Thomson Reuters Web of Science for the period 1996–2019

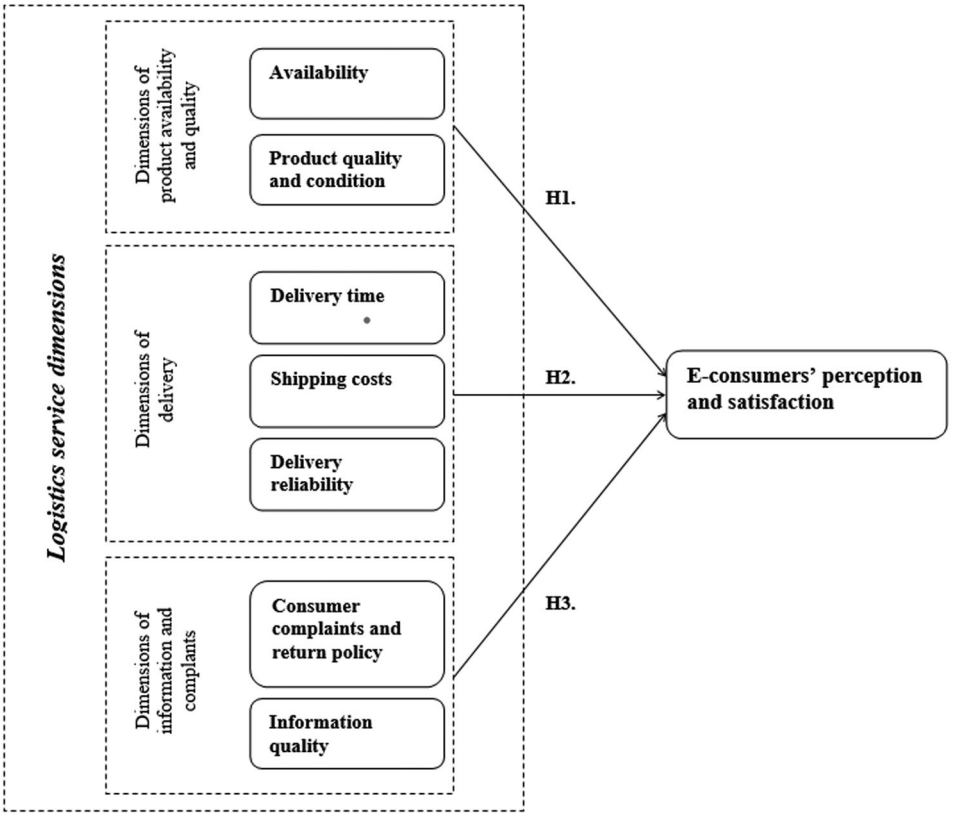

Figure 1. Conceptual model.

(Table 1). On the basis of the defined measuring instrument, the structure of the questionnaire provided in the appendix (Appendix A) was conceived. The developed questionnaire is a specific tool that e-retailers can actively use in the testing process, but also in identifying problematic or potentially problematic dimensions of logistics services that negatively affect the perception and satisfaction of their e-customers.

In the initial stage, variables included 34 items. The measuring instrument was tested in a pilot study, which included 30 customers who used the online purchase in the previous year and who have been selected at random. Furthermore, 5 experts engaged in online shopping and consumer protection on the Serbian market were surveyed. Customers and experts answered questions related to the defined variables and items. After testing the sample and after the pilot research, it was established that certain items overlap to a large extent and that the respondents observe them in the same way; thus, a correction of the measuring instrument was performed, and downsized from 34 to 31 items. In this way, the measuring instrument more precisely and clearly incorporated the relevant dimensions and items related to the logistics service (Table 1).

The questionnaire was designed with questions answered by the five-point Likert scale ranging from 1 (completely agree) to 5 (completely disagree). On the basis of the questionnaire, the variables were defined, and used for measuring e-customers' perception and satisfaction. All listed variables were measured using the five-point Likert scale.

Data for the research in this paper were collected using the survey method. It means that subjective attitudes of respondents were gathered using a questionnaire that was distributed by the internet tool as an instrument for data gathering. For contacting the respondents to participate in the study, an instruction was used with the link to access the questionnaire. The use of the internet

Table 1. Variables and items of the conceptual model – measuring instrument.

Dimensions	Items	Source
Availability (AV)		
AV1	Products are in stock at the time of placing the order.	Authors
AV2	E-retailer provides information regarding product availability.	
AV3	E-retailer, in the case of product unavailability, can provide it in the reasonably short time period.	
AV4	E-retailer offers the shipment tracking option.	
Delivery time (DT)		
DT1	Time period between placing the order and product delivery is short.	Adopted according to: Mentzer et al. (2001), Lin et al. (2016)
DT2	Products are delivered in accordance with the set dates and deadlines.	Authors
DT3	E-retailer delivers products in the strictly defined time.	
DT4	Products that were not delivered in time are subsequently sent fast.	Adopted according to: Mentzer et al. (2001), Ribbink et al. (2004), Lin et al. (2016)
Shipping costs (SC)		
SC1	E-retailer offers the possibility of free product delivery.	Authors
SC2	E-retailer provides delivery at low cost.	
SC3	Product delivery to the home address or shop's drop point does not have any additional hidden costs.	
Delivery reliability (DR)		
DR1	E-retailer delivers products in accordance with the set conditions.	Authors
DR2	Shipment content is in accordance with the customer's order.	
DR3	Shipment rarely contains mistaken products.	Adopted according to: Mentzer et al. (2001), Lin et al. (2016)
DR4	Shipment seldom contains mistaken product quantity (number).	
Product quality and condition (QC)		
QC1	Transport packaging of the delivered products is rarely damaged.	Adopted according to: Bienstock et al. (1997), Lin et al. (2016)
QC2	Delivered products are seldom damaged.	Adopted according to: Mentzer et al. (2001), Lin et al. (2016)
QC3	Product damage rarely occurs due to inadequate shipping/handling.	
QC4	Delivered products are in accordance with online specifications.	Adopted according to: Mentzer et al. (2001), Lin et al. (2016)
QC5	Delivered products work.	Authors
Consumer complaints and return policy (CR)		
CR1	Shipment content is seldom liable to complaints.	Authors
CR2	Return policy is simple.	
CR3	E-retailers offer multiple return policies.	Adopted according to: Xing et al. (2011)
CR4	Damaged, unwanted or faulty products are collected and replaced fast and easy.	
Information quality (IQ)		
IQ1	E-retailer provides easily accessible information on products.	Adopted according to: Mentzer et al. (2001), Lin et al. (2016)
IQ2	E-retailer offers adequate product information.	
IQ3	E-retailer offers accurate product information.	
E-consumers' perception and satisfaction (PS)		
PS1	This e-retailer completely satisfies my expectations.	Authors
PS2	I enjoy online shopping at this retailer's website.	Adopted according to: Mentzer et al. (2001), Ribbink et al. (2004), Lin et al. (2016)
PS3	This e-retailer does business in accordance with the promised conditions.	
PS4	I would recommend this e-retailer to other consumers.	Authors

tool for data collection using the survey avoids the possibility of human error and increases the data reliability (Fowler 2002). The tool for internet surveys, Google Forms, was used for the research.

3.2. Sample structure and characteristics

In Serbia in 2019, 34% of citizens aged 16–74 shopped online, 1% less than in 2018. A decade earlier, in 2009, that share was only 5%. On the other hand, 60% of EU citizens in the same age range performed online shopping in 2019. The fact is that Serbia still stays far behind the EU in this respect, though not behind the countries in the region, some of which are even members of the EU, for example: Bulgaria (22%), Romania (23%), Montenegro (16%), Northern Macedonia (29%) and Bosnia and Herzegovina (23%) (Eurostat 2019).

Results obtained by processing answers to questions related to the control variables, the total of eight, lead to the conclusion that the distribution of participants in the study was adequate (Table 2).

The questionnaires having less than 5% of missing responses were treated in a manner that missing data were replaced by arithmetic means, according to the recommendations offered as an option in the software package SmartPLS (Tenenhaus et al. 2005).

T-tests were performed to evaluate the difference between the responses obtained in the individual periods of the research and it was determined there were no statistically significant differences in the responses, leading to the conclusion that there is no significant bias (Armstrong and Overton 1977).

Table 2. Sample structure and characteristics.

Control variables		No.	(%)
Gender	Male	180	42.4
	Female	245	57.6
Age	Under 20	58	13.6
	Between 21 and 30	180	42.4
	Between 31 and 40	118	27.8
	Between 41 and 50	38	8.9
	Over 50	31	7.3
Education	Elementary school	2	0.5
	Secondary school	118	27.8
	Polytechnic school	65	15.3
	University	217	51.1
	Master and Doctoral studies	23	5.4
Length of shopping online	Less than 1 year	49	11.5
	Less than 2 years	73	17.2
	Less than 3 years	81	19.1
	Less than 4 years	75	17.6
	Less than 5 years	60	14.1
	More than 5 years	87	20.5
Favorite e-retailer	Domestic	234	55.15
	Foreign	191	44.9
Group of most common products purchased online	Car parts	4	0.9
	Home appliances	132	31.1
	Toys	1	0.2
	Tickets for cultural events	4	0.9
	Books/Magazines	27	6.4
	Music and film CDs/Game CDs	1	0.2
	Clothing/footwear/cosmetics	221	52.0
	Accessories and food for pets	16	3.8
	Furniture	9	2.1
	Food and drinks	10	2.4
Costs the consumer is willing to pay for the delivery of online purchased goods	I am willing to pay any shipping costs which make my total purchase expenses the lowest.	177	41.6
	I always decide for the product with the free shipping option.	151	35.5
	I always decide for the reduced shipping costs so I feel that I got the best price for both the product and the shipping.	97	22.8
Possibility to collect the product in the shop	Yes	230	54.1
	No	195	45.9

3.3. Data analysis and the evaluation of validity

Confirmatory Factor Analysis (CFA) was used to assess the validity of the model's measuring scales. The Partial Least Squares method (PLS) was applied by using the program SmartPLS 3. PLS was selected because it does not have strict requirements in relation to the type of the data distribution or the size of the sample. This is a method of soft modeling with the ability to be flexible in dealing with various statistical modeling problems. The method was introduced to the widespread use in the late twentieth and early twenty-first century, and it has been used by a growing number of researchers in diverse fields such as strategic management, information systems management, e-commerce, marketing and consumer behavior (Henseler, Ringle, and Sinkovics 2009). The sample size is adequate for the component-based PLS approach which requires that the sample cannot be lower than the number obtained by multiplying the number of items of the largest block by 10 (Chin 1993-2003). SmartPLS is a stand-alone software specialized for the PLS method and independent from the operating system. Input data can be used in a variety of file formats (Ringle, Wende, and Becker 2015).

The collected data were used as the input to the PLS program, and statistical significance was evaluated using the bootstrapping resampling method. At the stage of the initial evaluation, 500 subsamples were initiated, while 5000 permutations were used for the final preparation of results (Hair, Ringle, and Sarstedt 2011).

The value of the Normed Fit Index (NFI) is 0.8838. According to Forza and Filippini (1998), since the value of this index suggests good suitability (NFI>0.80), it can be considered that the proposed model is suitable for the application.

Convergent validity assessment was completed based on testing the Average Variance Extracted (AVE) (Hair et al. 2010). The condition of convergent validity is for AVE to exceed the lower limit of 0.50 (AVE≥0.50). AVE values for all model variables have exceeded 0.50 (Bagozzi and Yi 1988) and the lowest AVE value was 0.715 for the product quality and condition, meaning that this condition is fulfilled (Table 3).

In addition, the factor load was tested, as well as composite reliability (ρc), in order to determine the reliability of each item and construct in the model. The established factor load ranges from 0.832 to 0.913, which is significantly higher than 0.7 as the lower limit of acceptability (Hulland 1999) (Table 4). Composite reliability (ρc) for all factors exceeds the required minimum of 0.80 (Daskalakis and Mantas 2008), with the lowest value of 0.911 for availability (Table 3).

On the basis of the obtained values, it can be concluded that all items and all variables fulfill the requirement of reliability and convergent validity (Chin 1993-2003; Hulland 1999).

In assessing the discriminant validity between the model variables, it has to be evaluated whether the square root exceeds AVE for each correlation variable between the variables themselves. The highest correlation between any pair of variables in the model is between the delivery reliability and the perception and satisfaction of e-customers, and it is 0.76 (Table 3). This correlation number is lower than the lowest square root of AVE for any variable, which is 0.846 for the product quality and condition (Fornell and Larcker 1981), meaning that the discriminant validity criterion is satisfied. The values presented diagonally (in italic) are the square roots from AVE for that model variable.

Table 3. Properties of the proposed model's scales.

			Correlation coefficient - Fornell-Larcker criterion							
Model variables	ρ_c	AVE	DT	AV	IQ	PS	DR	CR	QC	SC
DT	0.921	0.745	*0.863*							
AV	0.911	0.718	0.677	*0.847*						
IQ	0.913	0.777	0.651	0.589	*0.881*					
PS	0.928	0.763	0.74	0.714	0.698	*0.874*				
DR	0.936	0.786	0.661	0.67	0.62	0.76	*0.887*			
CR	0.918	0.736	0.588	0.596	0.529	0.678	0.63	*0.858*		
QC	0.926	0.715	0.634	0.62	0.622	0.754	0.697	0.599	*0.846*	
SC	0.933	0.822	0.651	0.592	0.587	0.735	0.665	0.606	0.679	*0.907*

In this paper, in addition to Fornell-Larcker criterion, the evaluation of the discriminant validity also included the Heterotrait-Monotrait ratio of correlations (HTMT). Since it is impossible to provide a completely reliable assessment of discriminant validity between the model variables using only Fornell-Larcker criterion, it has been proposed to use the HTMT criteria as well. If HTMT value is below 0.90 (Henseler, Ringle, and Sarstedt 2015), then the discriminant validity between two variables is established. Given that all the values presented in Table 5 are lower than 0.90, it can be concluded that the discriminant criterion is valid and thus satisfied.

4. Testing the hypotheses and research model

Testing the explanatory power of the proposed model (Figure 2), as well as the strength and the statistical significance of individual paths, was conducted using the PLS method. The proposed model explained 77.5% ($R^2 = 0.7753$) of the variance of the dependent variable the perception and satisfaction of e-consumers (Figure 2). The obtained result is in accordance with the results from previous, similar researches, where it is important to note that the framework of independent variables in these researches was not identical to the one from the paper. Thus, a study by Deyalage and Kulathunga (2019) found a significant relationship between e-customers' satisfaction and product information, web design, shopping process benefits, security perceptions, and customer service ($R^2 = 0.605$). Furthermore, in the study by Othman et al. (2013), the model explained 67.6% of the variance of the dependent variable e-customers' satisfaction, where, in addition to trust and emotional intelligence as independent variables, the variable mediator – perceived value was also considered. Likewise, in the study by Vasić, Kilibarda, and Kaurin (2019) it was concluded that

Table 4. The results of the confirmatory factor analysis for the proposed model.

Items	Arithmetic mean	Standard deviation	Factor load	T-statistics
DT1	0.852	0.015	0.853	56.427
DT2	0.886	0.012	0.885	72.289
DT3	0.857	0.041	0.854	20.871
DT4	0.86	0.014	0.859	61.9
AV1	0.837	0.017	0.838	49.702
AV2	0.842	0.015	0.842	55.255
AV3	0.844	0.013	0.844	64.8
AV4	0.865	0.012	0.865	69.64
IQ1	0.866	0.013	0.866	67.427
IQ2	0.873	0.011	0.873	76.245
IQ3	0.904	0.009	0.904	105.301
PS1	0.868	0.012	0.869	70.324
PS2	0.876	0.011	0.877	79.745
PS3	0.875	0.011	0.876	77.309
PS4	0.873	0.012	0.874	73.472
DR1	0.869	0.011	0.87	76.451
DR2	0.891	0.009	0.891	101.104
DR3	0.886	0.01	0.887	89.106
DR4	0.899	0.01	0.899	93.548
CR1	0.862	0.012	0.862	69.939
CR2	0.862	0.012	0.863	74.58
CR3	0.851	0.015	0.852	55.835
CR4	0.854	0.014	0.854	60.533
QC1	0.834	0.017	0.835	48.491
QC2	0.846	0.014	0.847	59.221
QC3	0.831	0.016	0.832	51.857
QC4	0.851	0.013	0.851	63.107
QC5	0.863	0.012	0.863	69.05
SC1	0.903	0.009	0.903	104.08
SC2	0.913	0.007	0.913	124.431
SC3	0.904	0.008	0.904	107.371

DT–Delivery time; AV–Availability; IQ–Information quality; PS–E-consumers' perception and satisfaction; DR–Delivery reliability; CR–Consumer complaints and return policy; QC–Product quality and condition; SC– shipping costs.

Table 5. Correlation coefficient – HTMT criterion.

	Correlation coefficient – HTMT criterion							
Model variables	DT	AV	IQ	PS	DR	CR	QC	SC
DT								
AV	0.7702							
IQ	0.7452	0.6806						
PS	0.8293	0.808	0.7936					
DR	0.7364	0.7516	0.7034	0.8406				
CR	0.6641	0.6798	0.6099	0.763	0.7044			
QC	0.7097	0.6992	0.7089	0.8374	0.7697	0.6727		
SC	0.7318	0.6709	0.6721	0.8211	0.7372	0.6838	0.7574	

there was a strong link between e-customers' satisfaction and security, information availability, delivery, quality, cost and time ($R^2 = 0.724$). Finally, in the study by Chang and Wang (2011), the model explained 81% of the variance of the dependent variable e-customers' satisfaction, treating the quality of e-service and perceived customer value as independent variables.

5. Result analysis

5.1. The influence of dimensions of product availability and quality on e-consumers' perception and satisfaction

Product availability is essential for minimizing negative emotions during online purchases. The obtained results demonstrate that the dimension of availability affects the perception and satisfaction of e-customers, which is in accordance with the research results of Armstrong and Kotler (2009). Suggesting the replacement products or predicted time for the purchase of unavailable products, an e-retailer can affect the experience of e-customers. If the desired product is available, e-customer

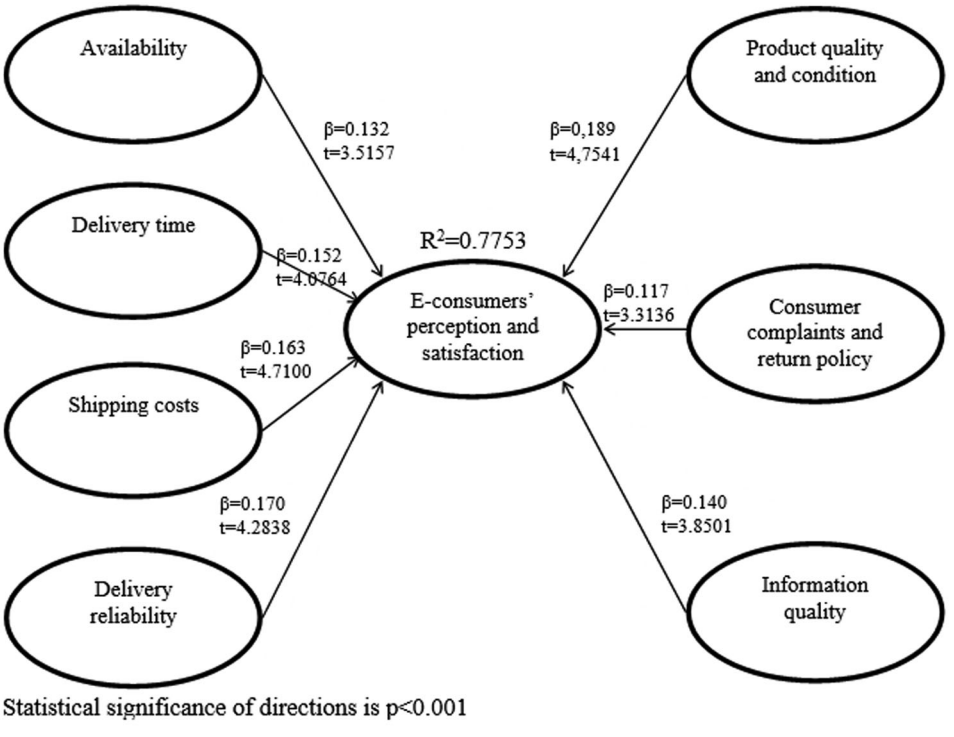

Figure 2. PLS analysis of the research model.

responds positively (in most cases, product availability is assumed); otherwise, they are dissatisfied (Steinhart, Mazursky, and Kamins 2013). According to Sfenrianto, Wijaya, and Wang (2018) and Murfield et al. (2017), the dimension product availability is one of the most significant dimensions in creating e-customer satisfaction.

The dimension product quality and condition is the most closely related to the perception and satisfaction of e-customers. Similar results were also obtained in the research by Lin, Wu, and Chang (2011), Delima, Ashary, and Usman (2019), Ekasari et al. (2019), and Vasić, Kilibarda, and Kaurin (2019). The reason lies in the fact that e-customers cannot judge the product quality directly, but rather they have to rely on the information provided on the e-retailers' websites. If the customer accepts the product and the product satisfies their expectations, they will continue to buy from this website. Therefore, e-retailers should strive for a consistent quality of the products offered, since that is a key dimension of logistics service that develops, maintains and enhances the e-customer satisfaction. According to Patterson (1993), the perceived quality of the product is the most powerful determinant of customer satisfaction.

5.2. The influence of dimensions of delivery on e-consumers' perception and satisfaction

The dimension delivery time has a positive impact on the perception and satisfaction of e-customers, which is in accordance with the research results by Otim and Grover (2006). A similar result was obtained in the study by Handoko (2016), which emphasizes the positive impact of timely delivery onto the satisfaction of e-customers. According to Roy and Zhao (2010), time of delivery plays a key role in achieving e-customers' satisfaction. The endeavor of e-retailers to deliver e-customers their products as soon as possible is one of the key success factors in online shopping. Delivering the product on time increases the customers' confidence, leads towards a larger number of online purchases and helps in retaining customers. Ziaullah, Feng, and Akhter (2014) believe that a reliable, safe and timely delivery is the fundamental and integral objective of e-customers. On-time delivery is considered one of the most important elements leading to success in the e-commerce market (Huang, Shen, and Liang 2019). Late arrival and a long wait time significantly increase customer dissatisfaction (Ramanathan 2010). In additionally, speedy and uneventful delivery add to the value of online shopping (Campo and Breugelmans 2015).

5.3. The influence of dimensions of information and complaints on e-consumers' perception and satisfaction

The research result displays that the dimension of information quality has a positive impact on the perception and satisfaction of e-customers, which is in accordance with the research by Delone and McLean (2003), Liu et al. (2008), Gounaris, Dimitriadis, and Stathakopoulos (2010), and Guo, Ling, and Liu (2012). In a number of studies, this dimension was utilized in the analysis of consumer behavior in e-commerce (Kuan, Bock, and Vathanophas 2008). Information about products plays a key role in deciding on the online purchase and is positively associated with customer satisfaction (Bennett, Härtel, and McColl-Kennedy 2005). The success of e-retailers largely depends on the fact how the information about the products and services are presented to customers on the Internet (Chau, Au, and Tam 2000).

6. Conclusion

This research aimed to overview to what extent the variables (dimensions of logistics services) of availability, delivery time, shipping costs, delivery reliability, product quality and condition, consumer complaints and return policy, and information quality, affect the dependent variable the perception and satisfaction of e-customers. The model developed for this research was tested by means of confirmatory factor analysis. Confirmatory factor analysis generated the results which demonstrated a high

level of reliability and validity in the relationship of variables. The present model explained 77.5% of variance of the dependent variable perception and satisfaction of e-customers. The results from this study confirmed that all three groups of dimensions of logistics service: dimensions of product availability and quality, dimensions of delivery, and dimensions of information and complaints are significant predictors of perceptions and satisfaction of e-customers, thus supporting the defined hypotheses. In other words, all seven analyzed variables: availability, delivery time, shipping costs, delivery reliability, product quality and condition, consumer complaints and return policy, and information quality have a significant positive impact on the perception and satisfaction of e-customers.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This paper was supported by the Ministry of Education, Science and Technological development of the Republic of Serbia, through the project TR 36006.

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Appendix A. Research Instrument – Questionnaire

The full list of questions.

1. What is your gender?

a) Male
b) Female

2. How old are you?

a) Less than 20
b) 21–30
c) 31–40
d) 41–50
e) More than 50

3. What is your degree of education?

a) Elementary school
b) Secondary school
c) Polytechnic school
d) University
e) Master and Doctoral studies

4. How long have you been purchasing online?

a) Less than 1 year
b) Less than 2 years
c) Less than 3 years
d) Less than 4 years
e) Less than 5 years
f) More than 5 years

5. Name a favourite e-retailer (e.g. AliExpress, Tehnomanija …).

_____

6. Mark/Write a group of most common products purchased online?

a) Groceries and beverage
b) Clothing/footwear/cosmetics
c) Home appliances
d) Books/magazines
e) Music and film CDs/game CDs

f) Tickets for cultural events
g) Accessories/food for pets
h) Luxury products
i) Other: _____

7. Which statement best describes the expenses you are willing to pay for product delivery in online purchase?

a) I always decide for the product with the free shipping option.
b) I always decide for the reduced product shipping rate so I believe to be given the best price for both the product and the delivery.
c) I am willing to pay any product delivery expense that makes my total purchase pricing the lowest.

8. Does the e-retailer offer the possibility of collecting products in the city (in their stores or in some other facilities, not including the facilities of PE 'Post of Serbia' and courier services)?

a) Yes
b) No

Please, rate LOGISTICS SERVICE DIMENSIONS related to the following statements, as follows: 1 – strongly agree, 2 – agree, 3 – neither agree nor disagree, 4 – disagree, 5 – strongly disagree.

Availability

	Question	1	2	3	4	5
a)	Products are in stock at the time of placing the order.					
b)	E-retailer provides information regarding product availability.					
c)	E-retailer, in the case of product unavailability, can provide it in the reasonably short time period.					
d)	E-retailer offers the shipment tracking option.					

Delivery time

	Question	1	2	3	4	5
a)	Time period between placing the order and product delivery is short.					
b)	Products are delivered in accordance with the set dates and deadlines.					
c)	E-retailer delivers products in the strictly defined time.					
d)	Products that were not delivered in time are subsequently sent fast.					

Shipping costs

	Question	1	2	3	4	5
a)	E-retailer offers the possibility of free product delivery.					
b)	E-retailer provides delivery at low cost.					
c)	Product delivery to the home address or shop's drop point does not have any additional hidden costs.					

Delivery reliability

	Question	1	2	3	4	5
a)	E-retailer delivers products in accordance with the set conditions.					
b)	Shipment content is in accordance with the customer's order.					
c)	Shipment rarely contains mistaken products.					
d)	Shipment seldom contains mistaken product quantity (number).					

Product quality and condition

	Question	1	2	3	4	5
a)	Transport packaging of the delivered products is rarely damaged.					
b)	Delivered products are seldom damaged.					
c)	Product damage rarely occurs due to inadequate shipping/handling.					
d)	Delivered products are in accordance with online specifications.					
e)	Delivered products work.					

Customer complaints and return policy

	Question	1	2	3	4	5
a)	Shipment content is seldom liable to complaints.					
b)	Return policy is simple.					
c)	E-retailers offer multiple return policies.					
d)	Damaged, unwanted or faulty products are collected and replaced fast and easy.					

Information quality

	Question	1	2	3	4	5
a)	E-retailer provides easily accessible information on products.					
b)	E-retailer offers adequate product information.					
c)	E-retailer offers accurate product information.					

E-customers' perception and satisfaction

	Question	1	2	3	4	5
d)	This e-retailer completely satisfies my expectations.					
e)	I enjoy online shopping at this retailer's website.					
f)	This e-retailer does business in accordance with the promised conditions.					
g)	I would recommend this e-retailer to other consumers.					