



## Wojciech Zdrenka

Creation of logistics value in electronic  
commerce

Kreowanie wartości logistycznej w handlu  
elektronicznym

**Abstract of the Doctoral Dissertation**

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## **1. Justification for the choice of subject**

E-commerce over the last decade has become an important part of the economy and thus an important area of business (Papas, Pateli, Michail, Giannakos and Chrissikopoulos, 2014). Nowadays, e-commerce is the fastest-growing form of retail sales in the world (Centre for Retail Research, 2021; eMarketer, 2021). In 2020, e-commerce in Europe represented about 15% of total retail sales, and its year-on-year growth rate amounted to 12%. Poland, with a 34% year-on-year growth rate, ranked among the top 10 European countries with the highest e-commerce dynamics (Lone, Harboul and Weltevreden, 2021).

As e-commerce transactions have become more popular among individual customers, opportunities, as well as challenges, have emerged for e-commerce players and the entities that support them. In the case of online transactions, where the object is a physical commodity, a particularly important and problematic area is logistics - including the logistics of distribution to end customers and handling returns. Logistics, therefore, plays a critical role in e-commerce (Wang et al., 2016). Without logistics, and especially without the delivery of goods to the customer, the online sales process would be significantly limited (Kawa and Swiatowiec-Szczepańska, 2021). The logistics for e-commerce orders can be organized in numerous ways, each of which is associated with certain benefits as well as limitations. The logistics service models that online retailers adopt fulfill the customers' expectations in terms of the time, cost, or quality of processed orders in a diverse manner. Thus, the models and the logistics processes implemented within them create value for customers in different ways and, consequently, have a different impact on online retailers' performance.

Therefore, e-commerce, and in particular logistics, which is undergoing intensive development in terms of delivery and return models for goods ordered online, seems to be a highly interesting research area. In the author's opinion, understanding which elements of logistics create customer value in e-commerce and how they affect the performance of online retailers is an issue that is interesting as a theoretical as well as an applied matter.

The research on customer value creation in e-commerce was inspired by the author's participation in a research project entitled "Value network creation in e-commerce from a logistics and marketing perspective"<sup>1</sup>. By participating in the project, the author developed

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<sup>1</sup> Research project carried out under the direction of dr Arkadiusz Kawa in 2016-2021, funded by the National Science Center of the Ministry of Science and Higher Education (DEC-2015/19/B/HS4/02287).

the research methods and obtained part of the research results that were used to design, evaluate, and test the theoretical model presented in the dissertation.

The motivation for the research on the chosen topic was also the practical value of this issue; E-commerce is currently the subject of interest of many enterprises – those that offer sales of their products via the Internet as well as those that are just planning to do so. During years of professional experience, the author had the opportunity to participate in projects that were aimed at starting online sales for companies in various industries. As part of the designed and implemented solutions, logistics processes had a significant role in these initiatives.

## **2. Research problem and identified research gaps**

The discussion concerning the creation of customer value by logistics-related factors is based on the theoretical concept of logistics value, introduced in the 1990s by Novack, Rutner and Langley (1994). Logistics value is a theoretical construct that is understood as the customers' subjectively perceived benefits and costs resulting from logistics services.

Although the concept was the subject of numerous studies and publications in relation to various economic areas and contexts, the logistics value for the customer in e-commerce is a research area that is still in the early stages of development (Francis, Fisher, Thomas, & Rowlands, 2014; Gil-Saura, Servera-Francés, & Fuentes-Blasco, 2010; Kawa, 2019). The literature review conducted as part of this dissertation indicates that in the existing publications on the logistics of e-commerce the authors mostly attempt to explain the impact of logistics services components on customer contentment or satisfaction (Iwińska-Knop, 2015; Iwińska-Knop & Zajęc, 2014; Kawa, 2017b; Szymanski & Hise, 2000; Liu, He, Gao, & Xie, 2008; Xing, Grant, McKinnon, & Fernie, 2011). Some authors have also discussed the impact of logistics service elements on customer satisfaction and the relationship of satisfaction with factors such as re-purchase intention (Cao, Ajjan, & Hong, 2018; Jain, Gajjar, Shah, & Sadh, 2017; Pham & Ahammad, 2017), customer loyalty (Choi, Seol, Lee, Cho, & Park, 2008; Lin, Luo, Cai, Ma, & Rong, 2016), willingness to pay more (Pham and Ahammad, 2017), complaints and claims (Choi, Seol, Lee, Cho, & Park, 2008). The issue of how customer value is created by elements of e-commerce logistics has so far been addressed only in a limited number of publications by, e.g., Kawa (2017a), Kawa, Pierański, and Zdrenka (2019), Kawa and Światowiec-Szczepanska (2021), Majchrzak-Lepczyk and Blaskova (2019), and Skurpel (2019).

None of these publications, however, have addressed the issue of the impact of customer value created by components of logistics on the performance of online retailers. At the time of writing this paper, to the best of the author's knowledge, there is no study in either the Polish- or English-language literature that attempts to conceptualize and operationalize the idea of logistics value for the customer and examine its impact on online retailers' performance (theoretical and empirical gap). There is a lack of methods and tools to measure the logistics value for customers in e-commerce and to measure the impact of this value on the performance of online retailers (methodological gap). There is also a lack of systematic approach among online resellers regarding the creation of customer value through logistics service components and a lack of sufficient awareness on how these components affect the performance of the companies (application gap).

Based on the identified research gaps, a research problem being an insufficient understanding of which logistics components create customer value in e-commerce, and the lack of knowledge regarding the impact of logistics value for customers on online retailers' performance, was highlighted.

### **3. Objectives, conceptual model, and research hypotheses**

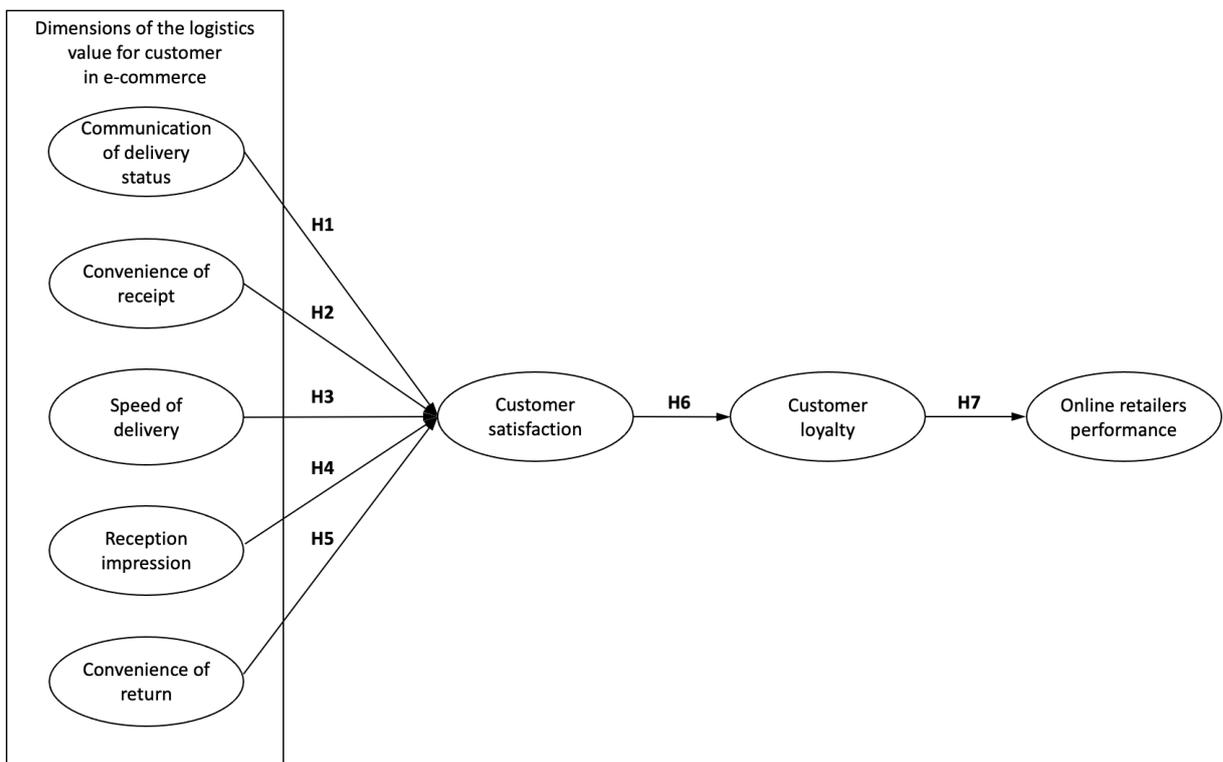
The main objective of the dissertation is the development of a model for the influence of logistics value for customers in e-commerce on the performance of online retailers. To achieve the main objective, six specific objectives have been formulated as follows:

1. Systematization of concepts related to customer value in e-commerce.
2. Conceptualization of the e-commerce logistics value for customers concept and its constructs.
3. Identification of the influence of the elements of logistics value for customers in e-commerce on online retailers' performance.
4. Development of measurement methods for e-commerce logistics value for customers.
5. Design measurement and structural models of the influence of logistics value for customer in e-commerce on online retailers' performance.
6. Presentation of the relationship between the variables of the structural model.

Due to the quantitative nature of the research conducted in the dissertation, the research objectives and hypotheses have been defined; however, the definition of the

research questions has been omitted. The purpose of the latter is to eliminate redundancy in the description of the research (Dyduch, 2015).

As part of the conceptualization of the idea of logistics value for the customer in e-commerce and its constructs, a theoretical model was proposed in the dissertation. Based on the model, the research hypotheses were derived. The model assumes that the independent variables are the dimensions of logistics value for the e-commerce customer (communication of delivery status, convenience of receipt, speed of delivery, reception impression, convenience of return). On the other hand, the adopted dependent variables are customer satisfaction, customer loyalty, and the performance of online retailers. The graphical presentation of the model is shown in Figure 1.



**Figure 1: A theoretical model of the influence of logistics value for customers in e-commerce on the performance of online retailers**

Source: Own study

Based on the proposed theoretical model and the stated methodological assumptions, the paper adopts seven theoretical hypotheses:

- H1. Communication of delivery status positively affects customer satisfaction in e-commerce.

- H2. Convenience of receipt positively affects customer satisfaction in e-commerce.
- H3. Speed of delivery positively affects customer satisfaction in e-commerce.
- H4. Reception impression positively affects customer satisfaction in e-commerce.
- H5. Convenience of return positively affects customer satisfaction in e-commerce.
- H6. Customer satisfaction positively affects customer loyalty in e-commerce.
- H7. Customer loyalty in e-commerce positively influences online retailers performance.

The hypotheses presented in the dissertation have a directional character, which is justified by the application of directional dependence analysis in the dissertation with the use of Structural Equation Modeling (SEM) (Dyduch, 2015; Klimas, 2019; Piórkowska, 2021). Following Czakon's (2021) recommendation regarding hypothesis setting, the author decided to omit the main hypothesis from the paper.

#### **4. Research methods, time, and spatial scope of the study**

The research procedure adopted in the dissertation consists of two stages, which directly follow the requirements of the structural modeling applied in the dissertation. In the first stage, the author has made an attempt to conceptualize the theoretical construct of logistics value for the customer in e-commerce and has presented a conceptual model. For this purpose, the author analyzed the Polish- and English-language literature including peer-reviewed and non-peer-reviewed publications in scientific journals, monograph publications, industry reports, and other doctoral dissertations. In the second phase, the author operationalized eight constructs in the form of logistics value for customers in e-commerce (communication of delivery status, convenience of receipt, speed of delivery, reception impression, convenience of return), customer satisfaction, customer loyalty, and performance of online retailers. Through operationalization, the author derived 35 indicators, which were then validated by content and face validation. Based on the validated indicators, a measurement instrument in the form of a survey questionnaire was developed. In the

empirical study, the author applied a mixed-mode survey<sup>2</sup>. CATI (computer-assisted telephone interview) and CAWI (computer-assisted web interview) techniques were used.

In consideration of the stated research problem and the research hypotheses, in which the author refers to the performance factors of online retailers, and the positioning of the paper in the field of management and quality studies, it was assumed that the best source of information (key informants) for the empirical data would be online retailers' representatives.

The participants of the study were online retailers that have been selling goods over the Internet for a minimum of 12 months. The survey respondents were the owners or employees of these entities. The research was conducted between September 2017 and August 2018. The quantitative research obtained 592 correctly completed survey questionnaires, which, with an acceptable level of measurement error, enabled inferences to be made regarding the entire community of online retailers in Poland. The obtained results were used for both descriptive and causal research.

Within the descriptive research, the author presented the characteristics of the research sample and the structure of the obtained answers. Next, in accordance with methodological requirements for newly created measurement scales, the validation of the scale was performed using factor analysis. As a result of the analysis, the reliability and credibility of the measurement scale were confirmed, and the number of indicators was reduced from 36 to 25.

Causal research was conducted with the use of structural equation modeling. As part of the modeling, a measurement model was developed and tested. The model met the required reliability and fit criteria, which provided the basis for developing a structural model in which the author determined the causal relationships between the latent variables and the unexplained variance. The structural model also was evaluated for goodness of fit and tested. The model met the expected criteria, which enabled the formulation of conclusions.

For the above analyses and modeling, advanced statistical analysis programs IBM SPSS Statistics (version 25) and IBM SPSS Amos (version 24.0.0) were used.

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<sup>2</sup> As the literature indicates, the use of a mixed-mode of data collection does not significantly affect the distribution of respondents' answers and can increase the return of responses (DeLeeuw, 2018) and reduce survey costs (Johnson, et al., 2018).

## **5. Structure of the dissertation**

The dissertation is composed of five chapters preceded by an introduction and accompanied by a conclusion, a bibliography, and lists of tables and figures. The outlined research procedure is directly reflected in the structure of the dissertation. The first three chapters are theoretical and conceptual in nature and address the first stage of the study. The second stage of the study is discussed in the fourth chapter, which is of a methodological nature, and in the fifth chapter, the results of the empirical study are presented.

Chapter one is a discussion on the nature of the value in management and quality studies, in particular - on customer value. In order to present the idea of customer value, the chapter refers to publications that derive from philosophy and economics. Next, the notion and characteristics of customer value in management are defined. The last part of the chapter presents the concept of value creation and its location within the customer value management process. Other processes that are relevant from the value management perspective such as co-creation, acquisition, appropriation, distribution, and destruction of customer value are also discussed.

The second chapter presents aspects of the logistics of e-commerce. The discussion begins by defining the essence and role of e-commerce and describes the types of businesses operating in e-commerce. Next, the role and importance of logistics for e-commerce are presented. For this purpose, the concept of logistics was introduced and the role of logistics in conventional commerce was described. Further, the role of logistics in e-commerce is presented, and selected models of logistics organization of e-commerce and models of e-commerce delivery to end consumers are discussed.

In the third chapter, the attempt at the conceptualization of the construct of logistics value for the customer in e-commerce is made. The chapter begins with a presentation of the concept of logistics value, which is the base for deriving the concept of logistics value for the customer in e-commerce. Further, the chapter presents the results of the conducted literature analysis, upon which, the dimensions of logistics value were proposed. Then, the further constructs in the form of dependent variables such as customer satisfaction, customer loyalty, and online retailers' performance are presented. In the last part of the chapter, a theoretical model of the influence of logistics value for customers in e-commerce on the performance of online retailers is proposed.

The fourth chapter is methodological in nature. The chapter presents the procedure applied in the second part of the study, which entails operationalization of the variables of the model, validation of the measurement scale, design of the measurement instrument, assumptions of the empirical study, and analysis of the collected empirical data. The chapter also describes the procedure of analysis and hypothesis testing using structural modeling. After presenting the research methodology, the fourth chapter outlines the approach to the operationalization of variables, describes the measurement instrument, and defines the assumptions of the empirical study conducted.

Chapter five presents the analysis and testing of the model of the influence of logistics customer value in e-commerce on the performance of online retailers. The first part of the chapter describes the results of the analysis of the collected empirical material, in the form of the characteristics of the research sample and the structure for the obtained responses. In the next part, the result of the factor analysis and the evaluation and testing of the measurement model are presented. Then, the structural model developed on the basis of the measurement model is presented. The model was used for testing the hypotheses. The chapter ends with a discussion and research conclusions.

The final part of the paper is the conclusion, which presents a summary of the research results. The conclusion presents the author's contribution to the development of the concept of logistics value for customers in management and quality studies and the implications to business practice. As part of the conclusion, research limitations and directions for further research are also described.

## **6. Results obtained and conclusions**

The concept of logistics value for the customer in e-commerce discussed in this dissertation is a relatively new research area. Most of the existing publications refer to the relationship between logistics service components and customer contentment, customer satisfaction, and customer loyalty. However, there is a lack of publications that attempt to conceptualize and operationalize the idea of logistics customer value in e-commerce and examine its impact on the performance of online retailers. As a result, there is a lack of methods and tools to measure the logistics value for the customer in e-commerce and to measure the impact of this value on the performance of online retailers.

The author has attempted to address the above-indicated research gaps. In order to do so and for completeness of the discussion, an introduction to the concept of customer value in management, the essence of e-commerce, and e-commerce logistics issues was provided in the first part of the paper. This theoretical introduction was used to conceptualize the notion of logistics value for the customer in e-commerce. As a result, dimensions of logistics value for the customer were proposed in the form of five theoretical constructs, being communication of delivery status, convenience of receipt, speed of delivery, reception impression, and convenience of return. Three further constructs were also identified; (1) customer satisfaction, which, according to the assumption made from the theory, allows observing whether value for the customer has been created; (2) customer loyalty, acting as an intermediary variable; (3) performance of online retailers.

As a result of the aforementioned conceptualization, in the author's opinion, the main objective of the dissertation which was the development of a model for the influence of logistics value for the customer in e-commerce on the performance of online retailers was achieved. The assumptions for this model as well as the research hypotheses were tested on a representative sample of businesses offering the online sale of goods.

All seven research hypotheses received statistically significant results in the conducted tests. For six hypotheses, the obtained direction of the influence was positive, that is, in line with the assumptions made in the paper. These hypotheses were accepted. In the case of hypothesis number 3, the obtained direction was the opposite of the initial assumption - i.e., negative. In this case, the hypothesis was rejected. A summary of the obtained results is presented in Table 1.

Based on the obtained results, it can be concluded that the dimensions creating logistics value for the customer in e-commerce are: communication of delivery status, convenience of receipt, reception impression, and convenience of return. These dimensions have a positive impact on customer satisfaction in e-commerce, and satisfaction then has a positive impact on customer loyalty, and customer loyalty positively influences the performance of online retailers. The results obtained in this regard are in line with the research taken by the author as a reference for the development of the model. On the other hand, an attempt to interpret the negative direction of the influence of speed of delivery on customer satisfaction in e-commerce is presented in section 5., for which the author assumed that the negative direction of the influence indirectly results from the reduction of the

indicators of the construct "speed of delivery" within the explorative factor analysis. In effect, the construct was formed exclusively by indicators that at the time of the study were services that had limited popularity and availability to the customers. Moreover, in the author's opinion, the significant factor that may explain the obtained results is the very high popularity of deliveries to self-service terminals among Polish customers. The dimensions of the delivery speed construct could also be assessed as being those that are less important to the customer, due to the fact that the proposed three indicators mainly referred to services that were not available as part of self-service terminal deliveries.

**Table 1: Evaluation of research hypotheses**

Hypothesis number	Content of the hypothesis	Result of testing	Notes
H1	Communication of delivery status positively affects customer satisfaction in e-commerce	Confirmed	Positive direction, statistically significant
H2	Convenience of receipt positively affects customer satisfaction in e-commerce	Confirmed	Positive direction, statistically significant
H3	Speed of delivery positively affects customer satisfaction in e-commerce	Not confirmed	Negative direction, statistically significant
H4	Reception impression positively affects customer satisfaction in e-commerce	Confirmed	Positive direction, statistically significant
H3	Convenience of return positively affects customer satisfaction in e-commerce	Confirmed	Positive direction, statistically significant
H6	Customer satisfaction positively affects customer loyalty in e-commerce	Confirmed	Positive direction, statistically significant
H7	Customer loyalty in e-commerce positively influences online retailer performance	Confirmed	Positive direction, statistically significant

Source: Own study

In the author's opinion, the thesis has addressed the problem of insufficient recognition with respect to which elements of logistics create customer value in e-commerce and the lack of knowledge regarding the impact of logistics value for the customer in e-commerce on the performance of online retailers. The study attempts to systematize and conceptualize ideas from an area relatively new to the Polish literature. The dissertation also expands on previous empirical research to include a new context, which is the logistics value for the customer in e-commerce and its impact on the performance of online retailers. This relationship is not yet well described in the literature and is an interesting subject for further research due to its simultaneous theoretical and practical nature.

As an applied value, the dissertation provides new knowledge about the factors that create logistics value for the customer and their implications. Awareness of those elements

can improve managerial decision-making in the field of e-commerce logistics. Logistics decision-makers in online retailers and order processing support providers (such as courier operators) should focus on all four of the elements of e-commerce logistics, because, as the results show, these factors have a positive impact on customer satisfaction, which, through customer loyalty, has a positive effect on performance.

It is worth mentioning that an interesting and important conclusion for business practice is also seen in the result obtained for the 3rd hypothesis, for which the direction of influence was opposite to the assumed outcome (it was the only negative). Also, an important recommendation for online retailers is the need to monitor changes in customer delivery models - including fast delivery services, as, according to the author, changes in this area seem to be progressing most dynamically.

## **7. Research limitations and further research directions**

The design of the study was planned in such a way as to achieve the objectives set out in the study and to verify the research hypotheses. However, due to the assumptions made in relation to the model and research methodology, the dissertation has certain content and methodological limitations. The author indicates these limitations in the dissertation and based on them, suggests directions for further research.

The study conducted within the dissertation is based on a model, which implies that it does not take all possible variables into account. In the developed model, the dimensions of logistics value for the customer in e-commerce were narrowed down to factors related to the delivery of products to customers and their return. The dissertation omits some pre-transaction and post-transaction elements of e-commerce logistics in customer service, factors related to purchase payment processing, and factors related to product features. This approach also omits some of the processes and entities within the complete e-commerce distribution channel. In future studies, it would, therefore, be valuable to include the above-indicated factors and to complement the study with the perspective of all entities. Another limitation of the study was the restriction of the studied entities to online sellers located in Poland. As a result, the study does not include those factors that create logistics value for the customer in the case of shopping via sellers located outside Poland. It would be interesting to study the value creation factors within the so-called cross-border e-commerce (transactions in which the buyer and the seller are located in different countries).

An additional limitation resulting from the intention of simplifying the model is the lack of any moderating variables in the relationship between logistics value for the customer and their level of satisfaction. Moderating variables explain when (under which conditions) a given relationship occurs. Moderating factors, which could bring additional exploratory value in further research, could be, for example, the type of products purchased by customers or the distribution logistics model adopted by the online retailer.

The main limitation resulting from the study method adopted in this paper is its static nature. The model adopted in the study is based on the results of a diagnostic survey, which presents the state of reality at a given moment. The behavior of online retailers and customers changes over time (Kawa, 2017b). Therefore, it seems reasonable to conduct further research on the factors that create logistics value for customers in e-commerce in order to identify whether and how the importance of individual logistics elements changes over time. This point seems particularly relevant given the prevailing SARS-CoV-2 virus pandemic at the time of writing, but the author believes that renewed research should be conducted after the pandemic has ended in order to avoid issues related to the interpretation of the results pointed out in the dissertation (e.g., government-imposed restrictions on trade operations that may change from week to week).

In summary, logistics value in e-commerce and its impact on online retailers' performance are relatively new research areas both from a cognitive and methodological perspective. This is primarily due to the fact that e-commerce is an area that is developing very dynamically. Therefore, logistics, without which e-commerce would be significantly limited, is also developing dynamically so, it seems reasonable to continue research to explore the problem of logistics value for the customer in e-commerce and its relationship with the performance of online retailers, and to improve research methods in this area. In particular, it seems interesting to continue research in the area indicated by the author within the limitations and directions of further research. In the author's opinion, these are directions still insufficiently recognized in the literature on the subject, but equally important from the research perspective.

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