

Logistics as a value in e-commerce and its influence on satisfaction in industries: a multilevel analysis

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Abstract

Purpose – The purpose of this paper is to identify the components of logistics value and examine their influence on customer satisfaction in e-commerce. This study investigates the moderation effect between those two variables using the overall service level in the different industries of e-commerce.

Design/methodology/approach – A total of 592 correctly filled questionnaires from telephone and web interviews (computer-assisted telephone interviews and computer-assisted web interviews) were scrutinized. Hierarchical linear modeling (as a part of a wider group of multilevel modeling studies) was used to verify the dependencies between variables from an organization and industry levels.

Findings – The logistics factors indicated and described in the paper differently affect the value for the customer. This value is subjective and dynamic. For this reason, the online seller should develop a system to create a sustainable value proposition. It is plausible due to the possibility of choosing the type of delivery, date of collection and change thereof, as well as that of returning the product. Because of all this, the customer decides on the way of the order execution and creates the value chain.

Research limitations/implications – The developed model is aimed at identifying universal relationships that create the customer satisfaction mechanism for the logistics value. However, this may result in other aspects of customer satisfaction being neglected. The authors are aware that the creation of value by a company in e-commerce must be approached in a systematic manner.

Practical implications – The results obtained and the representativeness of the surveyed sample of companies lead to the formulation of implications for business practice. The conclusions of the research definitely indicate a need to build awareness of logistics value and its influence on customer satisfaction through the service level in the industry. Because of the identified components of the logistics value and industry characteristics, managers of online retailers can better run their businesses, increase customer satisfaction, and thus improve their performance.

Originality/value – It is the first study that concerns e-commerce in individual industries, with particular emphasis on logistics and its impact on customer satisfaction.

Keywords Multilevel analysis, E-commerce, HLM, Logistics value, Industries

Paper type Research paper

1. Introduction

Today, e-commerce is treated as one of the most dynamic and important sectors of the economy, as well as one of the main factors leading to greater competitiveness (Joong-Kun Cho *et al.*, 2018; Singh and Srivastava, 2019; Wakil *et al.*, 2019). The dynamic development of e-commerce is driven not only by rapidly expanding internet access but also by growing mobility and popularity of portable devices.

Because of the internet, trade has become as easy and convenient as never before (Lin *et al.*, 2016). Its beneficiaries are both companies and customers. Almost each firm has the potential to become a successful trader (WTO, 2016). Companies are able to save on both fixed and variable costs, such as rent, labor and other overheads associated with a physical presence in shopping centers and brick-and-mortar

stores. It is particularly important in the case of cross-border trade because companies do not have to spend a lot of money on the international expansion (Giuffrida *et al.*, 2017). In turn, customers can have access to information about companies and their products at any time (Leung *et al.*, 2020). They can easily find offers, compare them and read other users' opinions (Kumar *et al.*, 2012). They may also purchase new products, which they did not previously use due to their unavailability in terms of location in distant places (e.g. goods from abroad), lack of time or a different lifestyle (Saridakis *et al.*, 2018).

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Moreover, online shopping allows customers to save money because they are closer to the manufacturers and bypass many intermediaries, such as wholesalers, distributors. Therefore, because of e-commerce, an additional value is created for the customers which is associated with a competitive price of the product, convenience in the form of 24 h access to e-stores and various methods of payment (Chen and Zhang, 2015). The value is delivered not only by the online store but also by many other entities, such as sales platforms, financial institutions (banks, online payment service providers) and logistics companies.

Just a few years ago, the internet was mainly used for business-to-business (B2B) co-operation. At present, e-commerce is dominated by business-to-consumer (B2C) transactions, where the product is ordered by individual customers and sold by businesses (Yu *et al.*, 2017). Serving such clients is much more difficult and requires special procedures. They often make one-off purchases, so their loyalty is relatively low and their expectations grow all the time.

If the product fails to arrive at the right time, is damaged or the driver's service is inadequate, the customer may not repurchase at the online store. Logistics, then, plays a crucial role in e-commerce (Moagar-Poladian *et al.*, 2017; Vakulenko *et al.*, 2019). Managers know well that logistics customer service is a very important issue. Therefore, they pay more and more attention to it. The delivery process to the end customer is relatively simple for them, as it is almost always outsourced to external companies (Delfmann *et al.*, 2002). For this purpose, courier, express and parcel services operators (CEP) are engaged. Other logistics processes of the online retailer (e-trailer), such as warehousing, picking and packaging, are a greater challenge.

E-commerce is becoming more and more demanding in terms of both innovative solutions and consumers' expectations. The logistics needs of this are varied due to growing diversity of products (e.g. clothes, consumer electronics, domestic appliances and building materials), due to the value, importance and size. Customers increasingly care about receiving information about the shipment in real-time, simplified and free returns of goods and flexible delivery options. Products meeting the same needs of the clients form an industry. Nature of the industry is one of the factors that can affect logistics expectations and requirements and the service level in the industry is related to customer satisfaction.

The literature draws attention to the industry and its characteristics in the context of e-commerce (Preissl, 2003). However, there have still been few studies that concern e-commerce in individual industries, with particular emphasis on logistics. It is an especially important issue because the nature of the industry is one of the factors that can potentially lead to differences and discrepancies in the use of e-commerce (Saridakis *et al.*, 2018). It is even claimed that the effectiveness of e-commerce depends on the characteristics of the industry, and the collective behavior of all companies in a given industry can reflect the behavior of the majority, as each industry has its own specificity and logistics strategies (Hu and Quan, 2003).

To analyze the relationships between variables from organization and industry levels we applied multi-level analysis method (Lee *et al.*, 2017). There are relatively few articles, in which such method is used in the context of e-commerce (Mithas *et al.*, 2006; Cho *et al.*, 2014; Venkatesan *et al.*, 2006; Wan *et al.*, 2016). To our best knowledge, there are no studies

that investigated the dependence between logistics value and customer satisfaction at the organization level and product and service characteristics at the industry level in e-commerce. The aim of this paper is to identify the components of logistics value and examine their influence on customer satisfaction in e-commerce. We investigate the moderation effect between those two variables using the overall service level in the different industries of e-commerce. 592 correctly filled questionnaires from telephone and web interviews (computer-assisted telephone interviews [CATI] and computer-assisted web interviews [CAWI]) were scrutinized. Hierarchical linear modeling (HLM) was used to verify the dependencies between variables from organization and industry levels. The geographical scope of our empirical research covered Poland.

2. Value

Value, as one of the philosophical categories, means something that is precious and desirable. It is the goal of human aspirations and refers both to ideas, persons, things, situations, phenomena and to their specific properties. The term of value in management studies was introduced by Drucker (1954). He claimed that it is essential for a business to meet the needs of the customer, who determines the value for which he/she is willing to pay. For this reason, value refers to the concept of "value for the customer" Zeithaml (1988), in turn, treats value as an evaluation of the usefulness of a product, resulting from the ratio of what was obtained to what was given.

The internet has become an important medium and tool in creating value. It has changed the catalog of value components, and their importance for the client. Because of the internet, as mentioned earlier, customers have more information about companies and their products. Non-economic benefits are of great importance. Customers look for products that are not available in brick-and-mortar stores. They accept certain non-financial costs, mainly related to the time of waiting for the product, the limited possibility of trying it out before the purchase, the risk of getting the wrong product, etc.

For this reason, logistics has become the basis for the activities of companies selling physical products via the internet. Without efficient logistics, in particular, without delivery of goods to the customer, implementation of the internet sales process would be very limited. At present, there is no doubt that logistics is a process, which affects value creation. According to Kilibarda *et al.* (2013), logistics is "the sphere of creating and increasing the value."

The concept of logistics value has a slightly shorter history than value itself. In 1995 the Council of Logistics Management published a paper entitled "Creating Logistics Value: Themes for the Future," whose authors, Novack *et al.* (1995), presented how logistics created or added value and how this value could be quantified.

Like value itself, logistics value also has many definitions. Most often, it boils down to a combination of quality, price and services provided to the customer, i.e. delivering what he or she wants and when he or she wants (Mentzer *et al.*, 1997).

3. Components of logistics value and satisfaction

Logistics value is a construct which consists of variables related to convenience (Kaswengi and Lambey-Checchin, 2019),

communication (Pal, 2017), experience (Yazdanparast *et al.*, 2010) and time (Yu, 2017).

The value of convenience refers to both the lack of the need for the customer to move around to purchase products and the simple and quick chance to select products anywhere, anytime and with any electronic device (Yazdanparast *et al.*, 2010; Kaswengi and Lambey-Checchin, 2019).

The value of communication is related to the way of contacting the customer. It is very important because, unlike traditional sales, e-commerce lacks direct contact between the seller and the buyer. Therefore, customers expect more frequent contact, which will provide them with information about their orders and quick answers to their questions (Lu, 2018).

The value of experience is, in turn, based on the customer's experience associated with the purchasing process carried out using the internet (Vakulenko *et al.*, 2019). It is connected with the use of the customer's emotions and refers to the lifestyle, fashion, trends, social affiliation. Experience concerns the purchasing process itself but also what happened before and after the transaction, for example, after returning the product. It is important to create an integrated ecosystem that enables customers to move seamlessly from touchpoint to touchpoint, thereby creating smooth transitions. (Tax *et al.*, 2013).

Due to the signaled lack of direct contact between the seller and the buyer, and the lack of immediate access to the purchased products, the time category is of great importance in shaping the customer value. Therefore, it is about the time spent finding the product and information about it, answering customers' questions and the time needed for the realization of the order, especially for the delivery of the product ordered (Joong-Kun Cho *et al.*, 2008).

Convenience in logistics value of e-commerce is related to the place of delivery and return of products. Time and flexibility are connected with delivery, too. In turn, communication in e-commerce logistics refers to delivery monitoring. These constructs are conceptualized later in this section.

3.1 Convenient place of delivery

A product ordered via the internet should be delivered to the place indicated by the customer. The possibility to choose the place of delivery or collection of the goods makes the customer influence the configuration of their value chain (Zhang, 2020). Currently, customers can receive products ordered over the internet in several ways: by delivery by a CEP operator to the address indicated by the customer, to the PUDO (pick up drop off) point, to the parcel locker, or self-collection at a bricks-and-mortar store or a different facility of the seller.

The most popular forms of delivery are courier and postal services. The biggest advantages of courier services are door-to-door delivery and short time. Neither the sender nor the recipient have to leave their office or home to use this service. A disadvantage of this solution is the price of the service which is the most expensive of all delivery forms. Moreover, couriers most often deliver shipments while the e-customers are at work. A solution to this problem is the "out of home" option, i.e. allowing customers to pick up and send shipments in specially designated places (Kawa, 2020). The most popular ones are PUDO points. These are places to which access is relatively easy, such as press lounges, shopping malls, gas stations and grocery stores. An advantage of the PUDO points is a lower

price than that of the door-to-door courier services. However, their disadvantage is the limitation of the service availability to the opening hours. Another example of the "out of home" option are parcel lockers, where customers can pick up and send their parcels themselves, usually at any time of the day or night. Deliveries in the PUDO and parcel lockers model are characterized by flexibility of the delivery place and date. This is an advantage for those customers who are more mobile and want to choose freely where and when to send or receive a shipment, yet a cost for those who have a long way to go.

3.2 Time and flexibility of delivery

The product must be delivered to the customer at the right time (Vakulenko *et al.*, 2019; Faugere and Montreuil, 2016). This is very important because in e-commerce the customer does not have immediate access to the product after purchasing it. Therefore, it is essential for the seller to determine the time of order processing, in particular the time of order preparation and delivery. More and more often, customers have a choice of different delivery times and thus can influence the total order processing time (Koufteros *et al.*, 2014).

The customer – user of a mobile device – does not like to wait too long. The delivery should, therefore, be as fast as possible – preferably within the next working day or even the same day. To date, same-day deliveries are dedicated and expensive services because most often they are connected with direct delivery from the sender to the receiver, omitting intermediate points.

3.3 Delivery monitoring

Products ordered via the internet are to be delivered to the customer indicated in the order as the recipient. It is extremely important that the customer provides not only the exact address to which the shop is to send the order but also additional contact details, such as a telephone number. If it is not possible to collect the package personally, an authorized person should be indicated.

The sellers should guarantee information about the progress of the order fulfillment and the place of delivery or collection of goods (delivery monitoring). The customers have access to the data about the order status (Zhang *et al.*, 2020). There are different forms of this access: by e-mail, a text message, the website or a web application. Information about the status is also provided by the other companies of the e-commerce ecosystems, such as logistics service providers, payment service providers and marketplaces (Zhang *et al.*, 2020). The information transmitted cannot be redundant. It shall be selective and tailored to the customer, in particular to her or his expectations. This increases the feeling of security and thus contributes to a repurchase from the same dealer (Janjevic and Winkenbach, 2020).

3.4 Convenience of return

Online shopping involves the risk that the customer will not like the product, it will not fit, or the purchaser will simply change their decision. Therefore, it is possible for the customer to return such a product. In many countries, this is due to state regulations (e.g. EU countries). Returning is not an enjoyable activity (XiaoYan *et al.*, 2012). They take extra time and the seller often has to pay for the shipment. Customers do not always know where and how to report a return, how to prepare the package, how a courier or where to take the package.

Therefore, it needs to be easy for the customer to return (Janjevic and Winkenbach, 2020; Dutta *et al.*, 2019).

Most often, they return a product because it is wrong, not because of the seller. If this process is cumbersome, it can cause additional frustration. A very simple return procedure can leave the customer with a positive experience that will make them happy to repurchase from the same retailer (McCollough *et al.*, 2020; Vakulenko *et al.*, 2019).

3.5 Satisfaction

Satisfaction is associated with the feeling of pleasure and contentment with something that comes when the customer receives something she or he wanted. Satisfaction is a response to the customer's needs (Olivier, 1999) and requirements (Gajewska *et al.*, 2019). Customer satisfaction is treated also as a state in which his expectations match his perception of the actual service received (Radziszewska, 2013).

Kotler (1994) understands satisfaction as the degree to which the perceived product features meet customer expectations. Satisfaction is therefore a graded feeling (Kumar and Petersen, 2006) and is measured (Gajewska *et al.*, 2019). The customer may be partially satisfied, for example, with some features of the product or service, whereas at the same time other features may not suit him/her at all. In e-commerce, satisfaction means contentment with the transaction and a sense of understanding of the customer's needs by the seller and other entities handling these transactions (Karahanna *et al.*, 2013). It is not only limited to the degree of satisfaction but is also a process that can change under various factors (Nisar and Prabhakar, 2017).

Customer satisfaction is very much influenced by customer service and their feelings connected with it, in particular listening to the customer and understanding their needs, keeping agreements and a given word, quick reactions, professionalism and expertise and honesty (Nisar and Prabhakar, 2017).

On the basis of the above considerations, we formulated the following hypothesis:

- H1.* The logistics value, consisting of a convenient place of delivery, time and flexibility of delivery, delivery monitoring and convenience of return, has a positive impact on customer satisfaction.

4. Industry differentiation

At the beginning of e-commerce most products bought online were relatively easy to handle in logistics (e.g. packed in cardboard or foil), resistant to transport conditions, and were not needed by the customer immediately. Today, customers can buy online a majority of products which are available in traditional stores. These products meet the different needs of customers. These are both small and large items whose logistical handling can be either simple or really complex. To facilitate the analysis, products that are substitutable for each other, but made using different technologies and materials, have been grouped. If they meet the same needs of the clients, then the companies that offer them form an industry.

Statista (online portal for statistics) distinguishes 5 main industries in e-commerce (fashion; electronics and media; food

and personal care; furniture and appliances; toys, hobby and DIY), which are further divided into 13 branches (apparel, footwear, bags and accessories, consumer electronics, books, movies, music and games, food and beverages, personal care, furniture and homeware, household appliances, toys and baby, sports and outdoor, hobby and stationery, DIY; garden and pet). The most popular products bought online are: clothing, shoes and accessories (34.2% turnover); consumer electronics, books, music and games (24.6%); toys, hobby and DIY (20.8%) (Statista, 2020) (Table 1).

The characteristics and specifications of these products have an impact on the e-commerce supply chain. The diversity of products, their different value, size, weight, storage and transport conditions, etc. lead to varied requirements, needs and conditions. Additionally, these are influenced by different payment services, cross-border selling, the number of products in the order and returns. In turn, products that are not available or more expensive in the local market are purchased abroad. Frequently used products, for example, food, are bought more often. On the other hand, clothes and shoes are usually returned. Returns have been explained in Section 3, that is why they will be omitted here and we will focus on describing other characteristics, i.e. payment services, cross-border selling, the number of products in an order.

4.1 Payments services

An important factor in the e-commerce ecosystem is an entity responsible for payments and financial issues (Dutta *et al.*, 2019; Kanungo, 2004). A lack of payment options which the customer is familiar with can also contribute to abandonment of the purchase. That is why e-trailers offer generally accepted forms of payment. One of the most popular methods of payment is a fast transfer over the internet, the so-called pay-by-link. E-customers are also very eager to use credit and payment cards.

Table 1 Online sales in industries in Poland

Industry	% of revenue
<i>Fashion</i>	34.2
<i>Apparel</i>	24.8
<i>Footwear</i>	6.1
<i>Bags and accessories</i>	3.3
<i>Electronics and media</i>	24.6
<i>Consumer electronics</i>	18.9
<i>Books, movies, music and games</i>	5.7
<i>Food and personal care</i>	8.7
<i>Food and beverages</i>	2.5
<i>Personal care</i>	6.3
<i>Furniture and appliances</i>	11.7
<i>Furniture and homeware</i>	7.4
<i>Household appliances</i>	4.3
<i>Toys, hobby and DIY</i>	20.8
<i>Toys and baby</i>	5.3
<i>Sports and outdoor</i>	2.3
<i>Hobby and stationery</i>	12.1
<i>DIY, garden and pet</i>	1.1

Source: Statista (2020)

E-commerce is seen as more risky than its traditional counterpart. Although payments by online transfer or credit card are no less secure than cash payments, they still do not enjoy much confidence among customers in many countries (e.g. Russia, Thailand, Indonesia and Poland). In such places, cash on delivery (COD) is a very popular financial method. Choosing COD as an option for buying products online by so many customers is associated with limited customer confidence in online shopping. Some CEP companies allow to pay on delivery by card or a different mobile payment method. However, the number of COD transactions is decreasing year on year.

4.2 Cross border e-commerce

The internet allows customers to purchase abroad, while e-trailers can sell products to customers from other countries. Such transactions are referred to as cross-border e-commerce. This is a way for e-trailers to increase sales but it is also a source of more potential competitors. On the one hand, customers benefit from access to a larger range of products and lower prices, and, on the other hand, they often have to pay more for a delivery and wait longer for the ordered product. Despite the dynamic development of cross-border e-commerce, communication in other languages, the form of payment, currency, legal and tax conditions, complicated and outdated border clearance procedures, as well as the delivery of products remain barriers to the free cross-border flow. In many countries (such as Poland), online selling in foreign markets still accounts for a small share of total e-commerce. The most important arguments in favor of buying products abroad are a lower price, the possibility to purchase products that are not available domestically (Kawa and Różycki, 2018).

4.3 Number of products in the order

As previously noted, online shopping is associated with a delivery that is either paid for or free of charge. The latter comes in two models:

- 1 it is free of charge regardless of the value of the order; and
- 2 it is payable depending on the value of the order (e.g. above a certain amount of money).

The second model encourages customers to put more items into their shopping cart. In addition, customers who buy from marketplaces or from a wide range of stores tend to order more products. Of course, a lot depends on the type of products being bought. If it is clothing or footwear, customers often order several pieces to try or check them. It does not concern electronics, which is usually better parameterized. Besides, it involves more money, so customers do not order an excessive number of such products.

A large number of products in an order affects the efficiency of the logistics processes and the customer service. Products should be delivered in exactly the same amount as the customer ordered. The goods must therefore be available from the seller or their partner. After acceptance, the order must be completed, packed and prepared for dispatch. Mistakes cannot be made. In traditional trade, these processes are mostly carried out by the customer in the shop. So, he or she has control over the order, and the goods are immediately available. Table 2 shows the characteristics of the individual e-commerce

industries. Those figures were adopted to HLM analysis presented in Section 7.

4.4 Industry specificity and satisfaction

The specificity of the industry and, in principle, the various products sold by companies have an impact on customer satisfaction (Gilbert and Veloutsou, 2006). For the product or service satisfaction ratings, it is not important whether the purchase has been made at a brick-and-mortar stores or on the internet. In the case of e-commerce, the product itself is more important. This is confirmed by the results of studies which show that the relationship between e-commerce characteristics and customer satisfaction can vary considerably depending on which product the customer buys (Dewett and Jones, 2001). The second important thing is the service associated with the product.

The characteristics of the industry (payment services, cross-border selling, number of products in the order, returns) affect customer satisfaction. This observation leads to another research hypothesis:

- H2. The overall level of customer service in the industry (concerning foreign sales, payments, returns, number of products in the order) is positively related to customer satisfaction.

As we have hypothesized before, the logistics value positively influences customer satisfaction; it may also be assumed that this impact can be enhanced by the level of customer service in the industry. Therefore, a research hypothesis has been put forward, which is as follows (Figure 1):

- H3. The overall level of customer service in the industry moderates the relationship between the logistics value (convenient place of delivery, time and flexibility of delivery, delivery monitoring and convenience of return) and customer satisfaction.

5. Hierarchical linear modeling in management studies

Research in management studies often involves hierarchical or nested data structures with strong group effects. In such situations, the researcher has to deal with a lack of independence of observation, required in traditional regression analyses, leading to wrong conclusions from the research analysis. The solution to such situations is to use multi-level analysis methods, of which HLM can be considered most popular (Raudenbush and Bryk, 2002). This method, although known in social sciences for at least thirty years, is relatively rarely used in management research (Meschnig *et al.*, 2018).

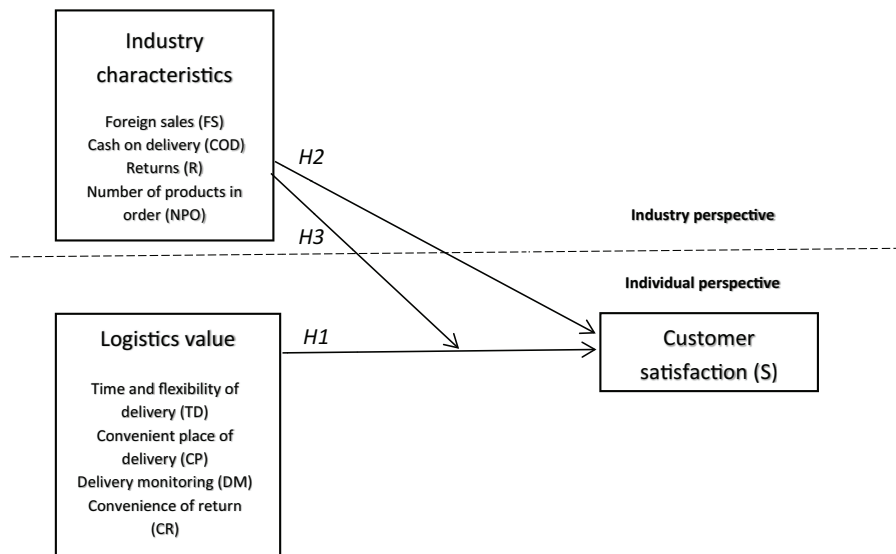
With the use of HLM, one can simultaneously study relations within a given level of hierarchy and the relations between them (Meschnig *et al.*, 2018). This methodological approach allows researchers to analyze the relationships between variables on at least two different levels of analysis (Lee *et al.*, 2017). For example, it is possible to analyze the importance of several factors influencing customer satisfaction, taking into account not only the variables at the company level

Table 2 Characteristics of industries in e-commerce in Poland

Industry	Cross border selling (%)	COD (%)	No. of products in the order	Returns (%)
Apparel	6.00	20.00	2.30	7.00
Footwear	8.00	18.00	1.50	10.00
Bags and accessories	4.00	19.00	1.60	4.00
Consumer electronics	4.00	23.00	2.60	6.00
Books, movies, music and games	0.30	30.00	2.30	2.00
Food and beverages	2.00	23.00	5.80	2.00
Personal care	4.00	28.00	4.30	2.00
Furniture and homeware	2.00	27.00	2.00	1.65
Household appliances	4.00	20.50	2.40	2.75
Toys and baby	0.30	23.00	2.00	2.65
Sports and outdoor	0.20	30.00	1.30	1.50
Hobby and stationery	11.00	14.40	3.20	1.40
DIY, garden and pet	2.90	30.00	3.20	2.30

Sources: Own elaboration based on [Ecommercewiki \(2019\)](#), [GS1 \(2020\)](#), [Statista \(2020\)](#)

Figure 1 Model of logistics value and satisfaction in multilevel perspective



but also those at other levels of analysis (e.g. strategic groups, industries) (Dang and Lin, 2017). In many cases, a grouped data structure is in itself a source of interesting research questions.

Due to the aforementioned rarity of studies with the use of HLM in management studies, there are relatively few articles, in which the HLM method is used to investigate relationships between variables. For example, a search using the keywords “HLM” and “management” in the Emerald database reveals 940 articles, Scencedirect (Elsevier) – 2051, Taylor and Francis – 1593.

There are even fewer articles on the use of HLM in e-commerce research, and those related to e-commerce and logistics are extremely scarce. Moreover, in the context of e-commerce, these are the customers who are studied – their behavior, feelings, while the sellers themselves are examined relatively rarely. For example, Mithas et al. (2006) researched the effect of website design on customer loyalty. In turn,

Cho et al. (2014) studied the influence of wine attributes on the perceived risk and online wine repurchase intention. Information and service quality are important here. Another example is the investigation aiming at examining the interactions among market characteristics and online pricing strategies (Venkatesan et al., 2006; Antipov, 2014). HLM was applied to analyze the data structure and find the dependencies between logistics and loyalty in e-commerce using the positions of the value chain members (Kawa and Światowiec-Szczepańska, 2020).

The most thematically close to our research is the article by Wan et al. (2016), in which the authors investigated the dependence between the product categories at the retail store level and the customers’ satisfaction at the individual transaction level. The product categories, however, only concern their number and do not cover industry aspects. Moreover, satisfaction is a moderating factor between the product categories and the repurchase intention.

6. Methodology

6.1 Research stages

The results presented in the article are part of a multistage research procedure. The first stage was an in-depth literature analysis. On its basis, a scenario for the second phase of the research was prepared, which was based on a focus group interview (FGI). The participants for the study were selected in a purposeful way. The main criterion was to ensure the greatest possible diversity of participants in terms of experience in selling via the internet. In addition, each participant in the interview had to conduct selling activity on the internet for at least one year as a necessary condition. The interview was treated as a tool for exploring the research field. Conclusions from the discussion were used to build a tool in the form of a questionnaire. The third stage of the research, the results of which are presented in this article, was based on the quantitative method.

6.2 Data gathering

Both CATI and CAWI were applied to data gathering in the third stage of the research. The database of e-trailers in Poland served as the sample. Data from the Region database kept by the Central Statistical Office in Poland and commercial databases, such as DBMS, Bisnode was used. Non-random purposeful sampling was applied. Approximately, 13.7 thousand respondents were invited to take part in this research – 3 thousand from CATI and 10.7 thousand from CAWI. This represents about 44% of the total population of online shops in Poland (the total number of online shops equalled approximately 31 thousand in 2018). A restrictive condition, as in the FGI, was that each of the participants in the survey had to meet the requirement of selling online for at least one year. A total of 592 correctly filled questionnaires was obtained – 200 records from CATI and 392 interviews using CAWI. This sample is sufficient to draw conclusions for the entire population of online shops in Poland. Assuming that the confidence level is 95% and the response distribution is 50%, an acceptable margin of error of 3.99% is obtained (Raosoft, 2020). The study was conducted between November 2017 and May 2018 by an external company – an expert in organizing research and data gathering.

Table 3 shows the share of the online sales according to our sample. The structure of the sample is proportional to the general population presented in Table 1.

6.3 Measures

The logistics value and satisfaction model is shown in Figure 1 consists of five constructs (four for logistics value and one for satisfaction), which are latent variables. Due to the deficit of empirical studies, signaled previously, in the field of logistics value in e-commerce, the indicators of these variables have to be prepared. Based on deep literature review and results from FGI, observable indicators, which have been included in the questionnaire in the form of statements, were developed for each of the latent variables. These statements have been evaluated by the respondents with the use of a five-point Likert scale.

With the use of the exploratory factor analysis (EFA) the indicators with the highest loading values have been found.

Table 3 Online sales in studied sample

Industry	% of revenue
<i>Fashion</i>	32.10
Apparel	22.10
Footwear	6.90
Bags and accessories	3.10
<i>Electronics and media</i>	26.10
Consumer electronics	20.20
Books, movies, music and games	5.90
<i>Food and personal care</i>	9.10
Food and beverages	2.30
Personal care	6.80
<i>Furniture and appliances</i>	12.30
Furniture and homeware	8.20
Household appliances	4.10
Toys, hobby and DIY	20.40
<i>Toys and baby</i>	5.10
Sports and outdoor	2.10
Hobby and stationery	11.30
DIY, garden and pet	1.90

This has caused, on the one hand, reduction of the indicators and, on the other hand, better statistical adjustment of the factors.

EFA (using varimax rotation) showed that items related to logistics value were condensed into four multi-item factors, namely *delivery monitoring*, *convenient place of delivery*, *convenience of return* and *time and flexibility of delivery* with eigenvalues greater than one, which together accounted for 64.2% of the variance in the data. Factor loading of each item on each variable, as well as commonalities of all items, exceeded recommended threshold of 0.50. Table 4 presents the results of a principal components factor analysis after varimax rotation.

The reliability analysis by the Cronbach's α method has been used for this purpose. All Cronbach's α were above 0.74 and the Cronbach's α of the total logistics value scale was 0.79, indicating satisfactory internal consistency of the logistics value variable (Table 5).

It is worth notice that we studied our model from the seller perspective. The respondent was to look at the logistics value and satisfaction and evaluated them through the final customer's "eyes." This approach is in line with what is presented in the literature (Goff *et al.*, 1997; Lin, 2007; Kawa and Światowicz-Szczepańska, 2020). To avoid the risk of common method bias, we applied procedural remedies (Podsakoff *et al.*, 2003). First, we checked the validity of the measurement tool, examining the unrotated factor solution for EFA and the Harman's single-factor test (Sharma *et al.*, 2009). The results of the analyses confirmed the lack of bias risk. Second, we have placed particular emphasis on the correct preparation of the questionnaire. Our constructs were measured by separate parts of the questionnaire (counterbalancing question order). We improved iteratively scale items by simplifying the language, resigning from reverse questions, avoiding vague, complex and double-barreled statements. Moreover, we ensured full anonymity of our respondents

Table 4 Varimax rotated factor pattern

Items	Delivery monitoring (Factor 1)	Convenient place of delivery (Factor 2)	Convenience of return (Factor 3)	Time and flexibility of delivery (Factor 4)	Communalities
DM1	<i>0.817^a</i>	0.203	0.156	0.041	0.681
DM2	<i>0.811</i>	0.254	0.113	0.092	0.667
DM3	<i>0.801</i>	0.116	0.176	0.198	0.506
DM4	<i>0.779</i>	−0.022	0.246	0.118	0.527
CP1	0.020	<i>0.808</i>	0.08	0.146	0.713
CP2	0.193	<i>0.769</i>	0.187	−0.055	0.703
CP3	0.131	<i>0.673</i>	0.078	0.17	0.58
CP4	0.129	<i>0.621</i>	0.012	0.153	0.593
CR1	0.133	0.226	<i>0.803</i>	0.022	0.735
CR2	0.387	0.027	<i>0.742</i>	0.047	0.744
CR3	0.270	0.022	<i>0.680</i>	0.210	0.725
CR4	0.027	0.167	<i>0.648</i>	0.380	0.681
TD1	0.086	0.090	0.109	<i>0.899</i>	0.835
TD2	0.103	0.162	0.167	<i>0.843</i>	0.776
TD3	0.366	0.250	0.224	<i>0.741</i>	0.539
TD4	0.043	0.398	0.165	<i>0.636</i>	0.572
Eigenvalue	5.626	1.790	1.638	1.222	
Percent of variance	35.16	11.19	10.24	7.64	
Cumulative percent of variance	35.16	46.35	56.59	64.23	

Note: ^aItalic print indicates the largest factor loading for each factor

7. Hierarchical linear modeling analysis and results

Table 6 shows the means, standard deviations and Pearson correlations of all variables in this study. The procedures of HLM method can be performed through five-step models, including unconstrained (null) model, random intercepts model, means as outcomes model, intercepted-as-outcomes and random intercepts and slopes model (Hofmann, 1997). Table 7 shows the successive phases of hierarchical modeling.

The first step of HLM refers to unconstrained model (null model), which does not contain any predictor. It decomposes the variance of the dependent variable into intra- and intergroup variance to test whether there are any differences at the group level on the dependent variable. Regression equations in particular groups are devoid of slope coefficients and have only a fixed value. This means that in the null model the result of the examined sellers can be predicted only on the basis of the average value of the dependent variable in the group (industry) to which the person belongs. The equations for unconstrained model are as follows:

$$\text{Level 1 : (Satisfaction)} = \beta_{0j} + r_{ij} \quad (1)$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + u_{0j} \quad (2)$$

The results indicate that there is a variability in satisfaction at the industry level ($(\chi^2) = 35.07$, $df = 12$, $p < 0.001$), representing the necessity for using the HLM analysis. The decomposition of variance allows estimating the percentages of variance in satisfaction that resides between industries (Hoffman, 1997). To calculate it, the intra-class correlation (ICC) is computed. The values in Table 7 indicate that the ICC was 0.058 (based on the formula $\tau_{00}/(\tau_{00} + \sigma^2) =$

$0.02916/(0.02916 + 0.47825)$), which shows that 5.8% of satisfaction variance is generated only by differences related to the seller's industry.

The next stage of hierarchical data analysis is random intercepts model. It presents changes in the components of variance after the introduction of level-1 predictors – these are: delivery monitoring (DM), convenience of return (CR), time and flexibility of delivery (TD) and convenient place of delivery (CP). The equations for random intercepts model are as follows:

$$\begin{aligned} \text{Level 1 : (Satisfaction)} &= \beta_{0j} + \beta_{1j}(\text{Delivery monitoring}) \\ &+ \beta_{2j}(\text{Convenience of return}) \\ &+ \beta_{3j}(\text{Time and flexibility of delivery}) \\ &+ \beta_{4j}(\text{Convenient place of delivery}) + r_{ij} \end{aligned} \quad (3)$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + u_{0j} \quad (4)$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (5)$$

$$\beta_{2j} = \gamma_{20} + u_{2j} \quad (6)$$

$$\beta_{3j} = \gamma_{30} + u_{3j} \quad (7)$$

$$\beta_{4j} = \gamma_{40} + u_{4j} \quad (8)$$

The results of the random intercepts model in Table 7 show that satisfaction is positively influenced by all predictors. The

Table 5 Constructs, items and scales of logistics value and satisfaction

1 Delivery monitoring (DM). Cronbach's alpha = 0.88

- DM1. Customers buy from online sellers who offer tracking shipments
- DM2. Customers buy from online sellers who inform about the status of the order
- DM3. Customers buy from online sellers who cooperate with couriers informing about the time of delivery
- DM4. Customers buy from online retailers cooperating with couriers who are on time

2 Convenient place of delivery (CP). Cronbach's alpha = 0.74

- CP1. Customers buy from online sellers who offer deliveries to PUDO (pick up drop off) points (e.g. a traffic kiosk, gas station)
- CP2. Customers buy from online sellers who offer deliveries to self-service terminals (e.g. parcel locker)
- CP3. Customers buy from online sellers who offer pickup at their branches
- CP4. Customers buy from online sellers who offer postal deliveries

3 Convenience of return (CR). Cronbach's alpha = 0.81

- CR1. Customers buy from online sellers who offer free return of products
- CR2. Customers buy from online sellers who have an easy return procedure
- CR3. Customers buy from online sellers who offer the possibility of returning products over 14 days
- CR4. Customers buy from online sellers who offer return of used products

4 Time and flexibility of delivery (TD). Cronbach's alpha = 0.83

- TD1. Customers buy from online sellers who offer delivery of products within 2 hours
- TD2. Customers buy from online retailers who offer delivery of products on the same business day
- TD1, TD3. Customers buy from online retailers who offer the opportunity to choose delivery times
- TD4. Customers buy from online retailers who offer the option of delivery on non-working days

5 Satisfaction (S). Cronbach's alpha = 0.78

- S1. Customers are satisfied with their purchases
- S2. Customers will buy again at our shop in the near future
- S3. Customers feel that we understand their needs
- S4. Customers will recommend buying at our shop to their nearest and dearest

greatest influence on satisfaction have *DM* ($\gamma = 0.25, p < 0.001$) and *TFD* ($\gamma = 0.23, p < 0.001$). Slightly less impact, but still statistically significant have *Convenience of return* ($\gamma = 0.13, p < 0.05$) and *CP* ($\gamma = 0.12, p < 0.05$). This means that, logistics value, consisting of delivery monitoring, time and flexibility of delivery, a convenient place of delivery, convenience of return, has a positive impact on customer satisfaction. *H1* was therefore supported. Furthermore, the inclusion of the predictors of the dependent variable results in the reduction of intragroup variance – the comparison of the value σ^2 indicates its noticeable decrease ($0.393 < 0.478$). On the basis of differences between estimators σ^2 in the unconstrained model and random intercepts model, it can be concluded that predictors from level-1 explain 17.8% of satisfaction variance [$R^2_{\text{level-1 model}} = (1 - (0.393/0.478)) \times 100\%$]. HLM estimation of variance components is shown in Table 8. It also turns out that Level-1 predictors have some influence on the variance of group constants (τ_{00}). It fell from 0.02961 to 0.02796, so it can be concluded that the predictors from Level-1 explain 6.8% of the intergroup variance of satisfaction. The surveyed industries differ in the average intensity of satisfaction, and these differences are systematically related to the level of predictors from the individual level [$(1 - (0.02761/0.02961)) \times 100\% = 6.8\%$].

Random intercepts model concludes the stage of explaining the variance on an individual level (σ^2). The next step of HLM is to test the relationship between the independent variables at group level and the dependent variable. The subject of interest are components of the existing variance at the group level – τ_{00} and τ_{11} . In Means-as-outcomes model *Foreign sales (FS)*, *Cash on delivery (COD)*, *Returns (R)* and *Number of products in order (NPO)* were included in the analysis of predictors from Level-2. The equations for means-as-outcomes model are as follows:

$$\text{Level 1 : (Satisfaction)} = \beta_{0j} + r_{ij} \tag{9}$$

$$\begin{aligned} \text{Level 2 : } \beta_{0j} = & \gamma_{00} + \gamma_{01} (\text{Foreign sales}) + \gamma_{02} (\text{Cash on delivery}) \\ & + \gamma_{03} (\text{Returns}) + \gamma_{04} (\text{Number of products in order}) \\ & + u_{0j} \end{aligned} \tag{10}$$

According to the procedure of hierarchical models, the variables from the macro-level explain the intergroup variance (constant values) τ_{00} , which in this case is the

Table 6 Mean, standard deviation and correlations among variables

	Min.	Max.	Mean	SD	1	2	3	4	5	6	7	8
1. Delivery monitoring (DM)	1	5	4.02	0.89								
2. Convenience of return (CR)	1	5	3.57	0.86	0.48**							
3. Time and flexibility of delivery (TD)	1	5	3.15	1.05	0.39**	0.51**						
4. Convenient place of delivery (CP)	1	5	3.62	0.81	0.34**	0.32**	0.39**					
5. Foreign sales (FS)	0.02	0.11	0.04	0.03	-0.05	-0.06	-0.01	-0.06				
6. Cash on delivery (COD)	0.14	0.3	0.24	0.05	0.12*	0.13*	0.05	0.03	0.52**			
7. Returns (R)	0.01	0.1	0.13	0.02	0.05	0.11*	0.12*	0.11*	0.23**	0.33**		
8. Number of products in order (NPO)	1	6	2.78	1.12	0.16**	0.13*	0.01	0.04	0.15**	0.01	0.28**	
9. Satisfaction (S)	1	5	4.01	0.70	0.27**	0.09*	0.14**	0.12**	0.10*	0.09*	0.09*	0.13**

Notes: n = 592; **p < 0.01, *p < 0.05

Table 7 Results of HLM analysis

Effect	Model	M1: Null model (one-way ANOVA)	M2: random coefficients regression model	M3: means-as- outcomes model	M4: intercepts-as- outcomes model	M5: intercepts-and- slopes-as-outcomes
Fixed effect						
Level 1 variables						
γ_{00}		4.001***	4.017***	4.000***	4.011***	4.006***
DM γ_{10}			0.246***		0.256***	0.239***
CR γ_{20}			0.133**		0.126**	0.116**
TD γ_{30}			0.225***		0.223***	0.222***
CP γ_{40}			0.119**		0.117**	0.122**
Level 2 variables						
FS γ_{01}				0.014	0.011	0.012
COD γ_{02}				0.105**	0.103**	0.106**
R γ_{03}				0.224***	0.219***	0.224***
NPO γ_{04}				0.221***	0.234***	0.119***
Cross-level interaction						
FS $\gamma_{01} \times$ DM γ_{10}						0.024
COD $\gamma_{02} \times$ DM γ_{10}						0.115**
R $\gamma_{03} \times$ DM γ_{10}						0.135**
NPO $\gamma_{04} \times$ DM γ_{10}						0.155**
FS $\gamma_{01} \times$ CR γ_{20}						0.159**
COD $\gamma_{02} \times$ CR γ_{20}						0.135**
Returns $\gamma_{03} \times$ CR γ_{20}						0.000
NPO $\gamma_{04} \times$ CR γ_{20}						0.149**
FS $\gamma_{01} \times$ TD γ_{30}						0.011
COD $\gamma_{02} \times$ TD γ_{30}						0.113**
R $\gamma_{03} \times$ TD γ_{30}						0.113**
NPO $\gamma_{04} \times$ TD γ_{30}						0.121**
FS $\gamma_{01} \times$ CP γ_{40}						0.003
Cod $\gamma_{02} \times$ CP γ_{40}						0.112**
R $\gamma_{03} \times$ CP γ_{40}						0.114**
NPO $\gamma_{04} \times$ CP γ_{40}						0.222**
Random effect						
σ^2		0.47825	0.39310	0.47792	0.39277	0.38912
τ_{00}		0.02916***	0.02796***	0.02150***	0.02295***	0.02401***
τ_{11}					0.01806	0.01147
Deviance		1,258.1	1,173.52	1,277.12	1,140.83	1,110.81

Notes: ***Indicates $p < 0.001$; **indicates $p < 0.05$; *indicates $p < 0.1$; S – customer satisfaction; DM – Delivery monitoring; CR - Convenience of return; TD- Time and flexibility of delivery; CP- Convenient place of delivery; FS – foreign sales; COD – cash on delivery; R – returns; NPO – Number of products in order; σ^2 = Variance in the level-1 residual (i.e. variance in r_{ij}); τ_{00} = Variance in the level-2 residuals (i.e., variance in U_{0j}); τ_{11} = Variance in the level-2 residuals (i.e. variance in U_{1j})

Table 8 HLM estimation of variance components of satisfaction

Variance components	Satisfaction (%)	Equations
Percentage of total variance explained by industries (Model 1)	5.8	$ICC = \tau_{00}/(\tau_{00} + \sigma^2) = 0.02916/(0.02916 + 0.47825) \times 100\%$
Percentage of total variance explained by logistics value variables (individual-level variables) (Model 2)	17.8	$R^2_{\text{level-1 model}} = (0.478 - 0.393)/0.478 \times 100\%$
Percentage of total variance (intergroup) explained by level 2 variables (Model 3)	26.3	$R^2_{\text{level-2 intercept model}} = ((0.02916 - 0.0215)/0.02916) \times 100\%$
Percentage of total variance explained by interaction effects (Model 5)	36.5	$R^2_{\text{level-2 slope model}} = ((0.01806 - 0.01147)/0.01806) \times 100\%$

result of differences in average satisfaction in particular industries. Means-as-outcomes model shows that the predictors from Level-2 affect the individual's perceived satisfaction, except *Foreign sales* (constructs, items and scales of logistics value and satisfaction). On the basis of differences between estimators τ_{00} in the unconstrained model and means-as-outcomes model, it can be concluded that predictors from Level-2 explain 26.3% of satisfaction

variance [$R^2_{\text{level-2 intercept model}} = ((0.02916 - 0.0215) / 0.02916) \times 100\%$] (Table 8).

The fourth step of HLM is to test whether variance in the intercept term is significantly related to Level-2 predictors. For this purpose, the intercepts-as-outcomes model is used which is also a direct test for *H2*. The equations for intercepts-as-outcomes model are as follows:

$$\begin{aligned} \text{Level 1 : (Satisfaction)} &= \beta_{0j} + \beta_{1j}(\text{Delivery monitoring}) + \beta_{2j}(\text{Convenience of return}) + \beta_{3j}(\text{Time and flexibility of delivery}) \\ &+ \beta_{4j}(\text{Convenient place of delivery}) + r_{ij} \end{aligned} \quad (11)$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Foreign sales}) + \gamma_{02}(\text{Cash on delivery}) + \gamma_{03}(\text{Returns}) + \gamma_{04}(\text{Number of products in order}) + u_{0j} \quad (12)$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (13)$$

$$\beta_{2j} = \gamma_{20} + u_{2j} \quad (14)$$

$$\beta_{3j} = \gamma_{30} + u_{3j} \quad (15)$$

$$\beta_{4j} = \gamma_{40} + u_{4j} \quad (16)$$

The results in Table 7 indicate that all predictors, except *Foreign sales*, have a significant impact on the Level 1 output variable (i.e. satisfaction). It may therefore be concluded that *H2* is partially supported. The slope coefficient variance τ_{11} estimated in Model 4 is 0.01806.

Models 4 and 5 test the research hypothesis that the positive relationship between the elements of logistics value and satisfaction will be strongest in industries with high overall service levels. Therefore, the next stage of modeling concerns the variance of coefficients β , representing interactive effects. To test the interaction hypothesis, in

Model 5 (intercepts-and-slopes-as-outcomes model) random predictive effects from Level-1 were included in the hierarchical analysis, which allowed estimating the slope parameters of the regression line (β -factor) separately for each industry and estimating group variance of β coefficients (τ_{11}). As we search for factors that can explain the variance of regression slope parameters estimated separately for each industry, they must be an intrinsic property of the industries and not of the respondents. In this situation, according to the *H3*, we check whether these moderators can be the service characteristics of each industry (Level-2 predictors). It is worth noting that this scheme is very similar to testing the interaction effect in classical regression analysis. The only difference is that in hierarchical analysis we are dealing with inter-level interaction (variables from the group level influence variables measured at individual level). Therefore, a final step of HLM is to test for cross-level interactions between the independent variables at an individual level and a group level. The equations for random intercepts and slopes model are as follows:

$$\begin{aligned} \text{Level 1 : (Satisfaction)} &= \beta_{0j} + \beta_{1j}(\text{Delivery monitoring}) + \beta_{2j}(\text{Convenience of return}) + \beta_{3j}(\text{Time and flexibility of delivery}) \\ &+ \beta_{4j}(\text{Convenient place of delivery}) + r_{ij} \end{aligned} \quad (17)$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Foreign sales}) + \gamma_{02}(\text{Cash on delivery}) + \gamma_{03}(\text{Returns}) + \gamma_{04}(\text{Number of products in order}) + u_{0j} \quad (18)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Foreign sales}) + \gamma_{12}(\text{Cash on delivery}) + \gamma_{13}(\text{Returns}) + \gamma_{14}(\text{Number of products in order}) + u_{1j} \quad (19)$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21} (\text{Foreign sales}) + \gamma_{22} (\text{Cash on delivery}) + \gamma_{23} (\text{Returns}) + \gamma_{24} (\text{Number of products in order}) + u_{2j} \quad (20)$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31} (\text{Foreign sales}) + \gamma_{32} (\text{Cash on delivery}) + \gamma_{33} (\text{Returns}) + \gamma_{34} (\text{Number of products in order}) + u_{3j} \quad (21)$$

$$\beta_{4j} = \gamma_{40} + \gamma_{41} (\text{Foreign sales}) + \gamma_{42} (\text{Cash on delivery}) + \gamma_{43} (\text{Returns}) + \gamma_{44} (\text{Number of products in order}) + u_{4j} \quad (22)$$

Table 7 shows the results of random intercepts and slopes model. This model provides a direct test of *H3*. The results indicate that the most interaction effects included in Model 5 are statistically significant. The non-statistical significance is shown by the interactions of one of the Level-2 variables, namely, *Foreign sales*, which indicates that this variable does not play a mediating role in the relationship between perceived logistics value and customer satisfaction. However, apart from this exception, it can be stated that the impact of the general service level explains the variance of β -factors. Using the value of τ_{11} from the Intercepts-as-outcomes model (i.e. the total between-group variance in β_{1j}) and the value of τ_{11} from the intercepts-and-slopes-as-outcomes model, one can obtain R^2 for Level-2 slope model (interaction term between logistics value and satisfaction). It has explained 36.5% of total variance [$R^2_{\text{level-2 slope model}} = ((0.01806 - 0.01147) / 0.01806) \times 100\%$] (Table 7). Thus, the *H3* was partially confirmed. Most of the elements characterizing the general level of service in the industry showed a significant moderating effect on the components of perceived logistics values and satisfaction.

8. Discussion

In accordance with *H1*, at an individual level, all elements of logistics value showed a significantly positive effect on customer satisfaction. Given that, the respondents were e-commerce sellers, this indicates their consistent assessment of the importance of particular elements of logistics value. It is very important because e-commerce research often emphasizes that delivering the right value to the customer increases his/her satisfaction, which, in turn, can translate into customer loyalty and, further, into repurchasing (Chiou and Pan, 2009; Chiu et al., 2009). A good understanding of the expected value for the customer by e-commerce stores is the basis for an appropriate development of this sector.

In our study, logistics value consists of a convenient place of delivery, time and flexibility of delivery, delivery monitoring and convenience of return. The possibility to choose the place of delivery or pickup of the shipments makes the customer influence the configuration of his/her value chain and thus his/her satisfaction. Our research shows that if an e-trailer wants to be successful, customers have to be offered various forms of delivery and pickup of the products ordered. More and more often, customers are interested in a kind of delivery different

from the courier because it is the most expensive of all forms of delivery and requires waiting for the courier in a specific place. Customers seem to expect to be able to receive and send shipments at the PUDO points or parcel lockers.

The order fulfilment time is one of the most important factors encouraging to make purchases over the internet. This time runs from the moment the seller confirms the order until the moment the goods are received by the customer. It is influenced by several processes –picking, packing, shipping and delivering. The last one is the longest and largely independent of the seller, as it is mostly performed by external logistics companies. Thus, the customer relies on the seller's promise of the order fulfilment time, and the seller, in turn, on his/her subcontractor. If this time is extended, it may reduce the subjectively perceived benefits of online shopping. The customer expects an increasingly faster delivery of products on the same working day or even within 2 h. Moreover, because of the option of delivery on non-working days and the opportunity to choose delivery times customer satisfaction increases.

The flow of things and information about them is the basis of e-commerce logistics. Up-to-date and accurate information is a very important value factor for customers in e-commerce. Passing information on is related to the availability of goods, time of order fulfilment and place of delivery or pick-up. Our research shows that delivery monitoring has the greatest influence on customer satisfaction. Therefore, sellers who want to be successful in e-commerce must provide information about the progress of the order and the place of delivery or pickup.

Returns in e-commerce are not usually pleasant for customers. They take time and can be stressful for some people. For these reasons, consumer return should be made easier for the customer. Our research indicates that convenience of return influences customer satisfaction, free return of products, easy return procedure and returning products over 14 days leave the customer with a positive experience that will make them want to return to the same seller (XiaoYan, 2012).

The results of the analysis supported our other research hypotheses. Although *H2* and *H3*, assuming the impact of the overall level of service in the industries on customer satisfaction and the relationship between perceived logistics value and satisfaction, are only partially supported. The reason for this is the insignificant statistical impact of one of the variables

characterizing the industries, which is foreign sales in e-commerce. This situation shows the need to look for better objective measures of customer service. Our aim was to use relatively hard data concerning the level of service in e-commerce in particular industries. The other variables concerning the industries are statistically significant correlated with customer satisfaction. So, payments, returns, number of products in the order influences customer satisfaction.

An important result of our research is to confirm the importance of industries as a basis for differentiating perceived logistics value and satisfaction. This means that the type of product and the need to be met have an impact on the logistics value achieved. In general, the higher the level of service in the industry, the higher the impact of logistics value on customer satisfaction can be expected.

9. Implications

9.1 Theoretical implications

In many companies, logistics is still treated only as a source of costs and an instrument to support other business areas. However, this is different in e-commerce, where its role is much more important. It is reasonable to argue that without logistics and its solutions, e-commerce would function to a very limited extent. Today, logistics and its processes and tools are a prerequisite for effective online sales. However, those companies that implement new customer-specific logistics solutions achieve a competitive advantage. Logistics not only supports e-commerce but also opens up new opportunities for it.

The logistics factors indicated and described in the article differently affect the value for the customer. This value is subjective and dynamic. For this reason, the online seller should develop a system to create a sustainable value proposition. It is plausible due to the possibility of choosing the type of delivery, date of collection and change thereof, as well as that of returning the product. Thanks to all this, the customer decides on the way of the order execution and creates the value chain.

The research has shown that the logistics value, consisting of a convenient place of delivery, time and flexibility of delivery, delivery monitoring and convenience of return, impacts customer satisfaction positively. Moreover, the industry in which a seller operates differentiates the customer satisfaction construct. The overall service level in the industry positively influences customer satisfaction. In addition, the relationship between the logistics value and customer satisfaction is stronger when transactions are made in industries with higher service levels. These results are theoretical contributions in the area of logistics value and e-commerce. Moreover, to our best knowledge, our study is the first substantiation of the relationships between variables from organization and industry levels in e-commerce.

9.2 Managerial implications

The results obtained and the representativeness of the surveyed sample of companies lead to the formulation of implications for business practice. Our study allows to benefit by managers of logistics e-commerce by improving their understanding of the expected value for the customer. The conclusions of the

research definitely indicate a need to build awareness of logistics value and its influence on customer satisfaction through the service level in the industry. Because of the identified components of the logistics value and industry characteristics, managers of online retailers can better increase customer satisfaction and thus improve their performance. Moreover, the results provide managers with insights into the overall level of customer service in the industry that should be considered when they are going to sell new products.

10. Limitations and further research

We distinguished two kinds of research limitations in our study – methodological and substantive. The methodological limitations the very essence of the model which simplifies the economic reality and thus reduces the complex factual situation. In the developed model, certain elements, which, in the authors' opinion, were most important, were identified. The relationships between these elements expressed in the form of hypotheses were presented. The aim was to understand and explain the mechanisms and structure of the logistics value. However, the examined object consists of variables that are not directly observable. These variables are reflected in the literature, but their measurement is not clear. This was connected with the necessity to develop indicators measuring specific variables. However, there is a risk that some of them may have been blurred. Another methodological limitation is that we studied the customer satisfaction from the seller perspective. The simultaneous examination of two groups may be the subject of further research, but this requires access to the specific customers of the seller in question, which may be very difficult to implement on a larger scale.

The substantive limitation is that the developed model is aimed at identifying universal relationships which create the customer satisfaction mechanism for the logistics value. However, this may result in other aspects of customer satisfaction being neglected. We are aware that the creation of value by a company in e-commerce must be approached in a systematic manner. On the one hand, without marketing and sales support, it is difficult to identify the customers' needs and prepare an offer for them, and on the other hand, negligence in the field of logistics eliminates the efforts made in these areas of business. Moreover, value is created and delivered not only by online stores but by many other entities, such as marketplaces, financial institutions, logistics companies, warehouse service providers, companies dealing with website positioning. In the process of value creation, all entities involved in creating value in e-commerce should be considered. Taking these observations into account may be the subject of future research, which would increase the substantive value of the model.

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