

# STUDY OF THE LOGISTICS FACTORS THAT INFLUENCE THE DEVELOPMENT OF E-COMMERCE SERVICES IN THE CUSTOMER'S OPINION

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**Abstract:**

Recent years have seen a dynamic growth of ecommerce. This links to technological developments, an increase in the number of people who have access to and actively use the Internet, and the use of mobile devices.

The aim of the paper is to present the results of a questionnaire survey of the factors behind the development of e-commerce services. In an analysis of the factors behind the development of e-commerce services, note should be made of the customer's needs which will be the core of their opinions. The paper analyses factors of development of e-commerce services such as: frequency of internet shopping, logistic aspects of e-commerce services, and the criteria for the evaluation of quality of e-commerce services based on customer satisfaction. The five aspects of logistics in ecommerce taken into consideration included reliability of the supply, completeness of the supply, shipping price, delivery time, and the choice of courier company. Besides, the paper defines the interdependence between the frequency of internet shopping and the logistic aspects of e-commerce. A hierarchy is also established of the degree of satisfaction as regards the quality criteria of e-commerce services.

The analysis covers data from a questionnaire survey of 100 customers using ecommerce in Poland. The respondents were customers using e-commerce services aged between 20 and 24. The questionnaire was based on a five-point Likert-type scale of between 1 and 5. The survey was qualitative and nationwide. The analysis was done using the Statistica 10 software. The Pearson correlation was chosen from amongst the methods available to determine the impact between the surveyed variables.

Firms that provide e-commerce services aim to fulfil the ever increasing needs and expectations of their customers. They attach a lot of importance to the quality of customer service which is demonstrated by the high scores awarded by the respondents.

**Key words:**

e-commerce, customer satisfaction, logistics aspects, customer

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## 1. Introduction

E-commerce is characterized by technology driven, business model innovation and quick scale expansion. It has dramatically improved operations efficiency and led to the productivity growth (Yang et al., 2017).

Recent years have seen a dynamic growth of e-commerce. This links to technological developments, an increase in the number of people who have access to and actively use the Internet, and the use of mobile devices. Several years ago, internet shopping did not provide a considerable contribution to e-commerce and its market share was small. People treated virtual transactions with distrust. Besides, they had very little knowledge of the mechanisms which governed this unusual method of sales. Over the years, however, the situation has changed dramatically. The potential of the virtual web has been noticed with its unlimited possibilities to reach potential consumers (Gajewska, 2009).

E-commerce is the future trend of business style. It brings many benefits for both companies and consumers (Tseng and You, 2005):

- E-commerce expands the market area from regional to global;
- E-commerce uses electronic techniques instead of traditional paper works, which promotes the industries' efficiency and competitiveness;
- The number of trips is increased. On the other hand, the average load of single trip is reduced, which means it needs higher carriage if using the same means of transportation;
- E-commerce will impact on transport system due to the increased trips;
- E-commerce might reduce the number of warehouses and the stock cost. Therefore, the prices could be lowered.

The differences between the transport patterns of traditional trade and e-commerce are presented in Fig. 1. A healthy and successful e-commerce environment is determined by the optimal logistics operation.

The dynamic development of e-commerce and good prospects for the future trigger great interest in the e-commerce market on the part of logistic operators, especially in the CEP (courier express parcel) area. Logistics is also often mentioned as one of the main

sources of competitive advantage for the e-commerce industry (Kozerska, 2014; Ambroziak and Tkaczyk, 2015).

Identification of logistics as a category to which the e-undertaking should pay particular attention confirms the great role of logistics in online sales. Optimisation of logistic processes, that is all elements which have made up the shape of today's e-commerce are put on a par with management and marketing. Logistics is mainly associated with transport whilst the components of logistics which are relevant for e-commerce include also all processes relating to the warehousing and supplies, document flow, processing of payments and resource planning (Filina-Dawidowicz et al., 2015).

A study of companies from the retail e-commerce industry shows that the high season – with an increased number of orders is respectively in April – June and November – December, the second period being related to the peak holiday season (Żurek, 2015).

Logistics plays a very important role in ensuring customer loyalty. The factors related to logistics are experienced by customers after making payments, and are often grouped as one of the post-purchase factors (Esper et al., 2003; Agatz et al., 2008; Zimon, 2015; Orymowska and Sobkowicz, 2017) and logistics capability is positively associated with firm performance in the computer and consumer electronics retailing industry (Joong-Kun Cho et al., 2008). Much has been written about the „last mile” of internet supply chains (Esper et al., 2003; Kull et al., 2007; Lee and Whang, 2001; Yang et al., 2009). Failure of many dot com enterprises is generally attributed to their inability to fulfil their online promise due to late arrival (or non-arrival) of the product, accuracy of the order and/or due to damaged products.

Based on the research carried out in May 2016 in the field of e-commerce market analysis by Gemius lower delivery costs, faster delivery of goods or a wider range of higher quality products are elements that are much more often indicated by researchers in the age group between 15 and 24 years compared to researchers from other age groups. Lower product prices and discounts for online shoppers are particularly important for people aged 25-34 (Gemius dla e-Commerce Polska, 2016).

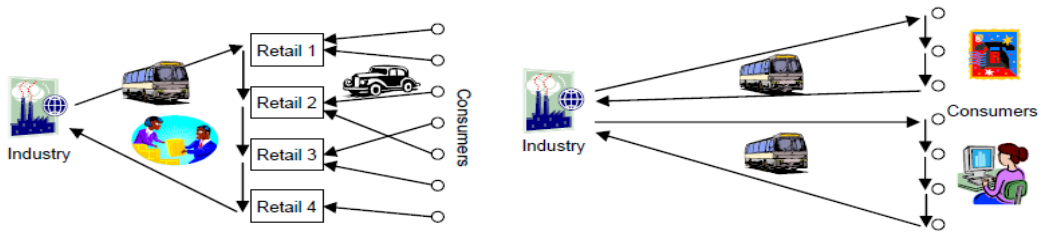


Fig. 1. The differences between the transport pattern of traditional trade and e-commerce (Tseng and You, 2005)

Factors that affect the functioning of the online store are many. A large part of them is connected with logistics. According to research conducted by Stuzniak on the basis of 65 Polish companies from the sector of small and medium enterprises in the e-commerce area, the most important factors affecting logistics are: timeliness and effectiveness of deliveries, types of payment, transport cost, offer (vertical, horizontal), forms of delivery (Stuzniak, 2016).

Inasmuch as successful administration and implementation of e-commerce call for a meticulous plan, hence, the available resources should be used optimally, needs should be identified and analysed, customers' expectations should be respected, mutual benefits should be realized and the latest knowledge and technologies should be applied (Grandón, Nasco, & Mykytyn, 2011).

In this part of the study, through the brief analysis of research, influential factors and parameters of e-commerce success were identified.

## 2. Characteristics of factors behind the development of e-commerce services

In an analysis of the factors behind the development of e-commerce services, note should be made of the customer's needs which will be the core of their opinions. The paper analyses in the first place the logistic aspects of the evaluation of e-commerce service quality. The analysis covers 5 characteristics relevant from the customer's viewpoint to evaluating e-commerce services. The table 1 identifies the particular logistic aspects: reliability of the supply, completeness of the supply, shipping price, delivery time, and the choice of courier company.

Choshin and Ghaffari (2017) investigated the impact of effective factors on the success of e-commerce in small and medium-sized companies (Choshin and

Ghaffari, 2017). Using a questionnaire and statistical techniques, they proposed a conceptual model so that they could investigate and analyse the impact of e-commerce on Taiwanese companies. In their research, they adopted the following hypothesis H1: there is a significant relationship between customer satisfaction and success in e-commerce. The results related to the obtained t-value and path coefficient revealed that customer satisfaction and attention to customer's behaviour are regarded as one remarkable factor in e-commerce. Customer satisfaction included the security of personal information, customer's trust, ease of access to information and the elimination of time and location limitations. According to the authors, results, i.e.  $\beta=0,40$ ,  $t=4,024$ ,  $p<0,001$ , the first hypothesis was confirmed (Choshin and Ghaffari, 2017).

Table 1. Logistic aspects of the evaluation e-commerce service quality

| Aspects                    | Description   |
|----------------------------|---|
| Reliability of the supply  | Reliability means that the supply will be made to schedule, without any damage to the shipment, the invoices will be duly made, with no errors, the supply will get to the right place, and the product range and number will be in compliance with the order (Kempny, 2007)  |
| Completeness of the supply | This is the supplier's capacity to provide the products to the full specification ordered, and execute the supply in line with the order (Kempny, 2007)   |
| Shipping price             | The shipping price is one of the basic categories which determine the processes going on in the market. The price is the value expressed in monetary units, which the purchaser undertakes to pay to the entrepreneur for the goods or services (Filipiak and Panasiuk, 2008) |
| Delivery Time              | It specifies the number of deliveries during a given time (in a day, over 24 hours, a week, a month) (Kempny, 2007)   |

The following 16 components were taken into account in the paper from the viewpoint of evaluating customer satisfaction as a major factor behind e-commerce success:

- 1) The website is easy to understand and clear,
- 2) The complaint processing time is satisfactory,
- 3) Customer service raises no objections,
- 4) The customer is provided with information about delays, changes in the supply,
- 5) Price matches the quality,
- 6) Timeliness of delivery,
- 7) Conformity of the services with the offer,
- 8) Ease of access to the service,
- 9) Individual approach to the customer,
- 10) The company's staff have the required competences,
- 11) Convenient time for replies to the request for proposals,
- 12) Professional and problem-free assistance,
- 13) Communication of information on the timeliness of the service,
- 14) Quick and efficient customer service,
- 15) Quick response to the customer's inquiries and needs,
- 16) Responding and encouraging advertisement.

### 3. Material and research methods

The aim of the paper is to present the results of the questionnaire survey and determine the relationship between the frequency of internet shopping and the logistic aspects of e-commerce. In this research, for measuring the factors of e-commerce services development, a questionnaire was used as the main data collection tool. The questionnaire was based on a five-point Likert-type scale of between 1 and 5, where 1 = completely disagree, 3 = neither agree nor disagree, and 5 = completely agree. The respondents were customers using e-commerce services aged between 20 and 24. The request for participation was made between the 1<sup>st</sup> January 1 and the 1<sup>st</sup> February 1, 2017 and the participation in this research was voluntary. The total population in this survey included 100 people. The survey was qualitative and nationwide. Surveys were conducted in Poland. In the future, it is possible to extend the research among other countries, eg Germany, the Czech Republic or Slovakia. The respondents rated companies from the sector of small and medium enterprises specializing in the provision of e-commerce services. In further research, the author intends to develop analyses of

the quality assessment of the services provided in a selected group of service providers in comparison to the opinions of customers who are the recipients of the above services. Table 2 shows the demographic characteristics of the survey participants. The samples selected for this study are the male and female genders. In term of gender, the distribution of the sample was 57% for the female and 43% for the male respondents.

Table 2. The demographic characteristics of the sample

|                    | Characteristics of e-commerce service customers | Frequency/Percentage |
|--------------------|---|----------------------|
| Gender             | Female  | 57                   |
|                    | Male  | 43                   |
|                    | <b>Total</b>                                    | <b>100</b>           |
| Age                | Under 20  | 9                    |
|                    | 21-25   | 62                   |
|                    | 25-30   | 4                    |
|                    | 35-40   | 8                    |
|                    | Over 40   | 17                   |
|                    | <b>Total</b>                                    | <b>100</b>           |
| Place of residence | City below 50,000 residents                     | 17                   |
|                    | City with 50 up to 200,000 residents            | 10                   |
|                    | City with over 200,000 residents                | 20                   |
|                    | Village   | 53                   |
|                    | <b>Total</b>                                    | <b>100</b>           |
| Education          | Vocational                                      | 2                    |
|                    | Secondary (students)                            | 43                   |
|                    | Bachelor's /engineering education               | 27                   |
|                    | Higher  | 24                   |
|                    | Other   | 4                    |
|                    | <b>Total</b>                                    | <b>100</b>           |

Five selected logistic criteria were adopted for the analysis, according to the authors as key from the point of view of the quality of the e-commerce service. Then, their impact on the frequency of purchases by internet in the opinion of customers was examined. The five aspects of logistics in e-commerce taken into consideration included reliability of the supply, completeness of the supply, shipping price, delivery time, and the choice of courier company. The interrelationship between the analysed characteristics was determined by statistical analysis

with the use of the Statistica 10 software. The Pearson correlation was chosen from amongst the methods available to determine the impact between the surveyed variables. If the value p for the correlation index is less than 0.05, there exists a statistically significant correlation between two variables; otherwise no such relationship exists. If, on the other hand, the absolute value of the correlation index is less than 0.3 the correlation is weak, whilst it is moderate for between 0.3 and 0.5, and strong for above 0.5.

The research procedure is presented in Fig. 2.

#### 4. Factors affecting the development of e-commerce services – research results and discussion

##### 4.1. Frequency of internet shopping depending on the logistic aspects of e-commerce services – statistical analysis

In terms of gender, the questionnaire survey demonstrated that in the sample women (57%) were more frequent to do internet shopping than men (43%). Figure 3 presents the frequency of internet shopping by gender.

First of all, the frequency of purchases by internet among the surveyed group of respondents was assessed. For this purpose, a scale from 1 to 5 was adopted, with 1 being very rare, 2 rare, 3 medium, 4 often and 5 - very often online shopping. The results obtained are given in figure 4.

Conducted research has shown that respondents average online purchases often (35 respondents) and often (27 respondents).

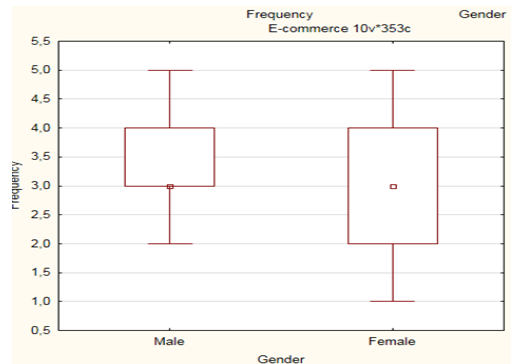


Fig. 3. Frequency of internet shopping by gender

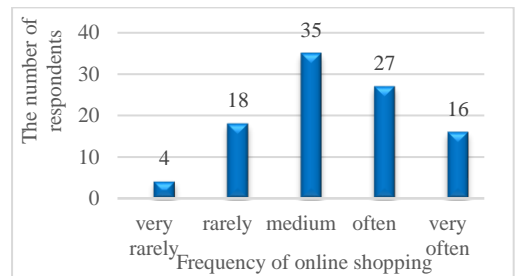


Fig. 4. Frequency of online shopping

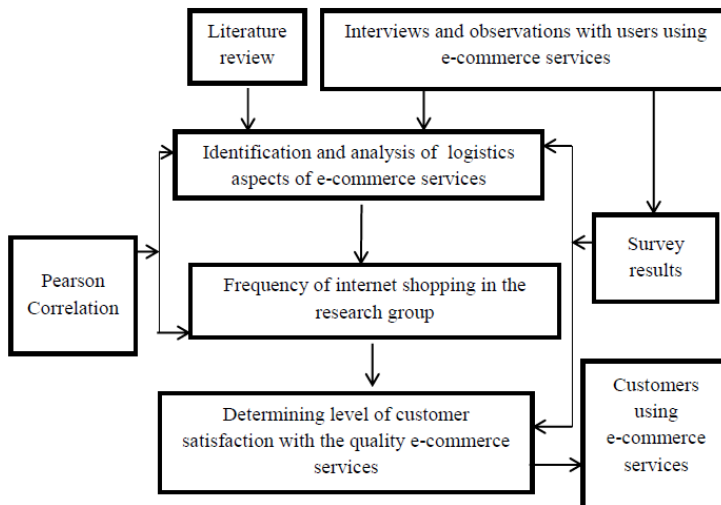


Fig. 2. Research procedure

The quality of e-commerce services was evaluated following the importance, in customers' opinions, of the logistic aspects of internet shopping. The 5-point Likert scale of 0 to 5 was adopted where 0 means no significance, 1 – little significance, 2 – very little, 3 – average, 4 – big, and 5 – very big significance for the customer. The results are presented in Fig. 5.

The survey demonstrates that in the respondents' opinion, it is the completeness of the supply that matters the most in internet shopping (4.48 pts.) followed by the reliability of the supply (4.32 pts.). The choice of the courier company to make the delivery, on the other hand, is the least important (2.48 pts.). This indicates that making internet shopping, customers expect timely delivery, with no delays and unexpected replacements.

Table 3 presents a description of the statistics and the correlation (r) \* of the logistic aspects in the area of e-commerce (research sample N=100). In turn, Figs. 1-5 show graphic relationships between the frequency of internet shopping and the reliability of

the supply, completeness of the supply, shipping price, delivery time and choice of courier company.

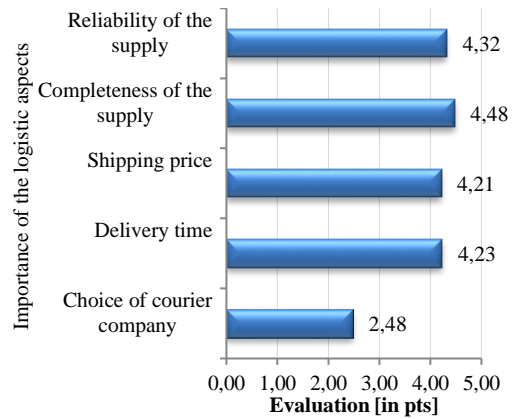


Fig. 5. Average evaluation of logistic aspects services e-commerce [in pts.]

Table 3. Statistical analysis of the logistic aspects in the field of e-commerce

|                                   | Reliability of the supply | Completeness of the supply | Shipping price | Delivery time | Choice of courier company |
|-----------------------------------|---------------------------|----------------------------|----------------|---------------|---------------------------|
| <b>Reliability of the supply</b>  | 1                         | 0.750                      | 0.564          | 0.608         | 0.246                     |
| <b>Completeness of the supply</b> | 0.750                     | 1                          | 0.691          | 0.720         | 0.239                     |
| <b>Shipping price</b>             | 0.564                     | 0.691                      | 1              | 0.738         | 0.201                     |
| <b>Delivery Time</b>              | 0.608                     | 0.720                      | 0.738          | 1             | 0.380                     |
| <b>Choice of courier company</b>  | 0.246                     | 0.239                      | 0.201          | 0.380         | 1                         |
| <b>Average</b>                    | 4.320                     | 4.480                      | 4.210          | 4.230         | 2.470                     |
| <b>Standard deviation</b>         | 1.162                     | 1.049                      | 1.112          | 1.108         | 1.585                     |

\*Correlation indices are significant with  $p < 0.05$

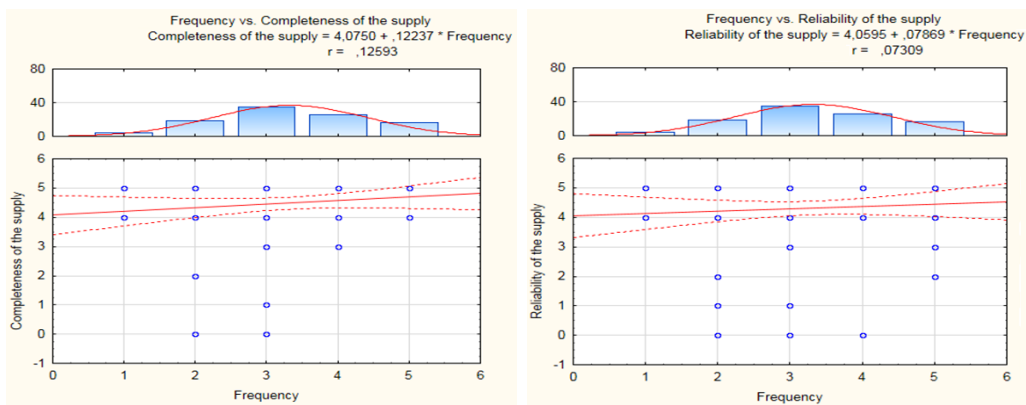


Fig. 6. The frequency dependence of making purchases online over the reliability of the supply and the completeness of the supply

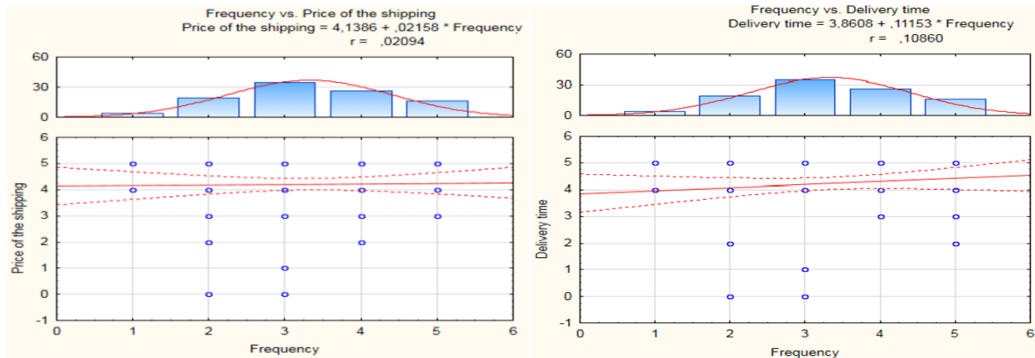


Fig. 7. The frequency dependence of making purchases online over the price of shipping and the delivery time

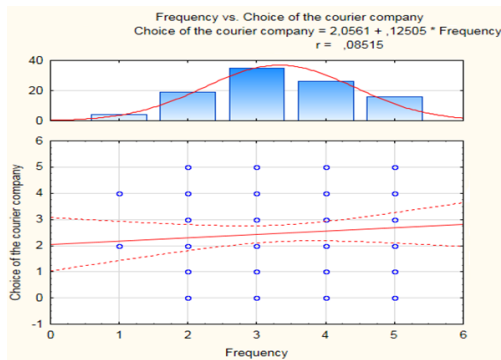


Fig. 8. The frequency dependence of making purchases online over the choice of the courier company

The statistical analyses demonstrate the lack of correlation between the variables. The scatter diagrams (Figs. 6-8) show that the frequency of internet shopping does not have a statistical influence on the logistic aspects such as: reliability of the supply, completeness of the supply, shipping price, delivery time, choice of courier company. This is demonstrated by the correlation index in the range of  $<0.07; 0.12>$ . The results may be due to the characteristics of the research sample. Most of the respondents were people between 21 and 25 years of age (62%) living in the countryside (53 %) and with secondary-level education (43%). The average frequency of internet shopping in the surveyed population was 3.3. It means that the surveyed group used ecommerce services with average frequency.

## 4.2. Customer satisfaction with the quality of e-commerce services

The 16 criteria included in the analysis which determine the customer's satisfaction with the quality of e-commerce services are sub-grouped for simplification as follows:

1. Service quality
2. Customer service

Figures 9 and 10 present a summary of respondents' average ratings regarding the level of satisfaction with e-commerce services. What service should be offered in the opinion of clients. The scale of grades from 1 to 5 was adopted, where 1 means completely disagree, 2 - rather disagree, 3 - agree, 4 - agree rather, 5 - totally agree.

The results of the questionnaire survey of customer service quality are presented in Fig. 9. The respondents ranked the highest the criterion of compliance of the services with the offer (3.92 pts.) and ease of access to the service (3.83 pts.). Lower down were criteria such as: price matching quality (3.75 pkt.), communication of information on service timeliness (3.73 pts.) and timeliness of delivery (3.70 pkt.). It is to be noted that all of the criteria under analysis were graded near to 4 which stands for a high level of satisfaction with service quality. In the customers' opinion, of key significance is the timeliness of delivery to which they attach the greatest importance. Hence, it is prudently ranked below the average figure.

The group of customer service criteria includes 11 aspects. The results are presented in Fig. 10.

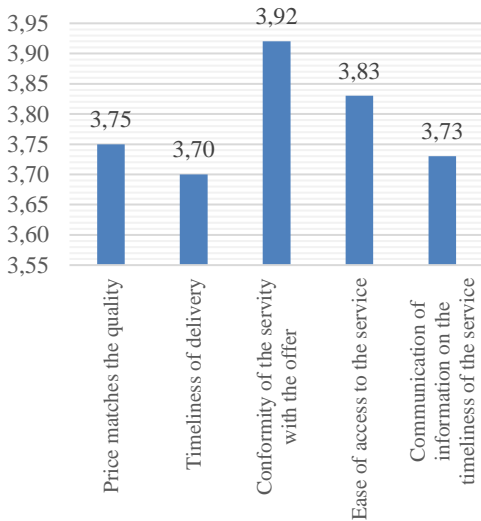


Fig. 9. Level of quality criteria for e-commerce services [in pts]

Amongst the 11 criteria of customer service quality under analysis, the respondents ranked efficient and quick customer service and the website as being easy

to understand and clear the highest, at 3.87 and 3.81 pts. respectively. Quick response to the customer's needs and customer service was ranked a bit lower but still high (3.71 and 3.75 pts. respectively). In turn, the quality criteria the users of e-commerce services are the least satisfied with include 7 aspects the last being individual approach to the customer (3.38 pts.). It can therefore be concluded that businesses offering e-commerce services aim to fulfil the customer's ever increasing needs and expectations. They attach a lot of importance to the quality of customer service which is demonstrated by the high scores awarded by the respondents.

## 5. Conclusion

E-commerce will open entirely new opportunities for actors in the logistics field. Logistics and distribution will need to function more effectively and efficiently in all respects because this will be crucial for the success of the companies involved. This implies that companies, and especially logistics companies, must identify and create new effective logistics solutions in order to complete in the marketplace (Hultkrantz and Lumsden, 2011).



Fig. 10. Level of evaluation of the customer service quality [in pts]



The paper analyses factors of development of e-commerce services such as: frequency of internet shopping, logistic aspects of e-commerce services, and the criteria for the evaluation of quality of e-commerce services based on customer satisfaction. The statistical analyses demonstrate the lack of a correlation between the variables. The 1-5 scatter diagrams show that the frequency of internet shopping does not have a statistical influence on the logistic aspects such as: reliability of the supply, completeness of the supply, shipping price, delivery time or the choice of courier company. This is demonstrated by the correlation index in the range of  $\langle 0.07; 0.12 \rangle$ . Moreover, it was demonstrated that the criterion of conformity between the service and the offer was valued the highest (3.92 points) whilst individual approach to the customer is deemed to be the criterion with regard to which the customer satisfaction level is the lowest (3.38 pts.). It can therefore be concluded that businesses undertakings which offer e-commerce services aim to fulfil ever increasing needs and expectations of the customer. They attach a lot of importance to the quality of customer service which is demonstrated by the high scores awarded by the respondents.

The data obtained from the surveys carried out in terms of the level of customer satisfaction on selected logistic aspects may be helpful for enterprises providing e-commerce services to improve services. They inform that for the client, logistic categories such as timeliness of deliveries and completeness of deliveries are very important factors of service quality assessment.

#### **Limitations of the study**

One of the main limitations of the study was that participants of this the studies were selected in the prevailing dominance of only one age group, namely 21-25. As a result, the adopted group mostly had secondary education. An attempt to research participants of the study from different age groups would be more optimal, but it would require more time and money. Therefore, it is recommended that future studies include respondents with more than one age group. In the future, it is possible to extend the research among other countries, eg. Germany, the Czech Republic or Slovakia. In addition, another limitation of the study is data collected during a specified time interval. The surveys were of a qualitative nature, were nationwide and were conducted

in January 2017. Therefore, you can maintain causal relationships that can change over time.

In addition, according to the authors, the key logistic aspects of the assessment of the quality of e-commerce services were adopted to identify 5 logistic, eg. customer service, error-free deliveries, innovative solutions, computerization and others. In future studies, you can develop analyses with additional aspects. It is also planned to develop a universal model of service quality assessment in the area of e-commerce.

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