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THE ROLE OF THE QUALITY OF ONLINE BANKING SERVICES IN THE SHAPING OF CONSUMER LOYALTY. PROOF WITH THE USE OF CLASSIFICATION TREES

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Abstract: The purpose of this paper was to prove the role of the quality of online banking services in the shaping of consumer loyalty. Data specifying (1) consumer characteristics, (2) type and manner of using services and (3) levels of partial service quality assessments were analysed. Empirical research was carried out on a sample of 384 consumers, and the results were processed by performing a multidimensional exploratory analysis with the use of classification trees and the CTree algorithm. As a result, it was proven that for the identified types of loyalty, both cognitive and active-conative loyalty, the only statistically important predictors of consumer loyalty are some indicators of partial service qualities (6 in the first model and 4 in the second model). In this way, the rank of the quality in shaping of consumer behaviours in a digital economy was empirically proven.

Keywords: quality, online banking services, customer loyalty, classification trees, multi-dimensional exploratory techniques.

1. Introduction

Development of modern global economy triggered by technological progress, liberalisation of trade, reduction of transport costs and production automation changes the model of the functioning of enterprises. Dematerialisation of production and a decrease of human engagement in the number of processes are the key phenomena in this area. The result of dematerialisation of production is the development of the services sector, which leads to a relative reduction of the meaning of the industry in the creation of the national wealth (Ulbrych, 2016). The services sector is the largest and most important sector in the economies of all highly-developed countries.

Thanks to the "quality movement", which began in the beginning of the thirties of the twentieth century, quality, at first treated as a technical and peripheral function of an organisation, was included in the main stream of thinking at all management levels (Juran, 1974; Crosby, 1979; Garvin, 1984; Deming, 1986). As noticed by R. Zalewski (2013), in the first models of the development strategies of the enterprises, the preferences of the customers within the quality of the products have already been taken under consideration (Ansoff, 1965). What is more, at the end of the eighties of the twentieth century, quality was considered as a strategic resource (Porter, 1980). It was noticed that high quality products may improve the perception of an organisation by the customers (Deming, 1986), as well as it may influence the increase of the shares owned by a given enterprise in the market (Buzzell and Wieresma, 1981).

Currently, it is suggested that intangible assets, such as image, quality, customers satisfaction, are the most necessary resources for gaining customer loyalty and, consequentially, a competitive advantage (Chien and Tsai, 2012; Teece, 2007). This leads to the following question: do resources of this kind significantly influence the functioning of enterprises, and what is the nature of this influence?

In general, many authors claim that the assurance of a high level of quality indisputably results in a high level of customer loyalty (Parasuraman, Zeithaml and Malhotra, 2005; Kall, Kłeczek and Sagan, 2013; Aishatu and Lim, 2017). Taking this into consideration, proving the role of the quality of online banking in the shaping of the loyalty of the customers taking advantage of it was the purpose of this study. In connection with the above, the following hypothesis has been posed:

H_0: *Variables measuring partial qualities of online banking services are the most important predicators of customer loyalty taking advantage of these services.*

The above hypothesis has been verified with the use of classification trees.

2. The meaning of the quality of services on the Internet

The Internet has been changing the shopping habits and behaviours of customers for over twenty years (Molla and Linker, 2001; Zehir and Narcikara, 2016). The hyper-informativeness of the Internet significantly increases the expectations of customers in respect to the quality of services (Azolla and Robina, 2005; Pater and Usabuwera, 2010). One of the three main purposes of the influences of new technologies on the banking services market, next to the flexibility in defining new products and reduction of the costs of litigation and transaction costs, is the increase of the quality of provided services (Flejterski, 2005).

Progress within the scope of ICT has created great possibilities for the offering of services provided in a self-service manner and based on technology (Dabholkar, 2000), including banking (Akinyele and Olorunleke, 2010; Ariff et al., 2012). They change the manner of the

functioning of enterprises and their interaction with customers, and at the same time, they generate the need for thorough scientific research and practical solutions within the scope of electronic provision of services. Electronic services are a specific type of activity, and they constitute the core of an information society and electronic economy. Their effective provision becomes a meaningful determinant of either the success or failure of an organisation in electronic markets (Yang, 2001), as well as of providing customers with high quality within an automated and interactive flow of information. This concerns, in particular, the worldwide financial system, which undergoes changes within deregulation, increased competitiveness, development of IT systems and human resources (Flejterski, 2005). All these elements influence the manner of provision of financial services, in particular, banking services.

Electronic banking services, including online banking, constitute an important group among electronic services (Borcuch, 2014). Intense technological changes taking place in the recent decade of the twentieth century brought about great interest in new possibilities of acting, and the establishment of an information society has begun to stimulate the application of new quality and the scope of services. The traditional model of the functioning of banks has lost its significance. Banks have started searching for chances and have taken up new challenges, and as a consequence, they have proposed solutions based on the achievements of the latest technological knowledge and IT infrastructure.

Many authors share the opinion that the quality of e-services is a diversifying factor that becomes critical for survival in the electronic business environment (Cox and Dale, 2001; Yang, Peterson and Cai, 2003; Amin, 2016). For this reason, this topic is discussed in this paper.

3. The meaning of the loyalty of customers on the Internet

The loyalty of customers is perceived as the key determinant of the success of an organisation on the market and one of the most important challenges of management (Lam and Burton, 2006; Eakuru and Mat, 2008; Reichheld and Schefter, 2000). Additionally, the functioning within the Internet environment brings about a lot of uncertainty for enterprises connected with the loyalty of customers. Easy access to information, reliance on the opinions of the users on the Internet, the possibility of immediate comparison of prices and characteristics of products and services evoke a low degree of loyalty from customers, and its increase is indispensable (Reichheld and Schefter, 2000; Floh and Treiblmeier, 2006). In a virtual environment, the problem of the loyalty of customers has particular meaning, as they are better informed, they have more choice, and the possibility to directly compare offers and stronger control over the sales process and Internet competition is just “one click away” (Cheng and Zhang, 2015).

There are many ways of perceiving loyalty. Loyalty understood from the behavioural perspective is today substituted by loyalty understood as posture and customer attitude, which determines behaviour (Oliver, 1997). Not only is a customer's behaviour important here, but also the motivation which triggers this behaviour. This approach has been introduced in order to distinguish customers who are loyal only because of duress, inertia or lack of any alternative.

Researchers (Allen and Rao, 2000) define two basic types of loyalty as:

1. *Cognitive* loyalty: concerning preferences and objective assessment of an offer, as well as compliance of the brand image with the value-system of the customer. On the basis of the trust to a given brand and its attributes (such as price, customer service), the customer prefers this brand to the other. As a rule, he makes decisions on the basis of indirect information or his previous experience. This kind of loyalty is rather superficial.
2. *Affective* loyalty: connected with the feelings, affections, mood and emotional engagement, as well as attraction. This is a stronger form of loyalty, which is more difficult to be broken as at this level, as it engages the feelings and preferences of the customer.

Subsequesnt authors (Oliver, 1999; Banahene, Ahudey and Asamoah, 2017) base on this upon the K. Dicka and A. Basu models (1994) and add two more loyalty phases:

1. *Conative* loyalty: i.e. intentional loyalty resulting from deep confidence and the authors mean the striving for the repeated purchase. A customer attracted by a given company many times becomes sure that it is worth staying with, and he/she demonstrates this attachment by the will of repeated purchase; however, it is not always supported by these actions.
2. *Action* loyalty: active, real loyalty covering a conscious overcoming of difficulties in order to repeat the purchase. This is a loyalty which changes the motivation from the previous phase into the readiness to act. The customer is much more prone to overcome difficulties which may occur, for example, in the activities taken up by the competition aiming to win over the customer.

It is obvious that loyalty is a multi-faceted and multidimensional construct, and such an assumption was made in this empirical study.

4. Remarks on the method

The study covered 384 active customers using online banking services. A printed questionnaire was applied. The study was carried out in the period from 4 to 30 April 2018.

The empirical study involved 47 observable variables, 33 loyalty predicators and 14 loyalty indicators, including:

- 4 variables specifying the characteristics of the customer (K1 – gender, K2 – age, K3 – education, K4 – income),
- 7 variables specifying the manner of the use of online banking services (U1 – type of a bank, U2 – period of using the services, U3 – channel by which the customer obtained the information about the bank offer, U4 – the most frequently made operations, U5 – the manner of taking advantage of the services, U6 – frequency of taking advantage of the services, U7 – taking advantage of the services provided by different banks),
- 22 variables measuring the level of the quality of services (quality realisation). These variables were taken from the adopted E-S-QUAL questionnaire for the core of a service (Parasuraman, Zeithaml and Malhotra, 2005),
- 14 variables measuring the level of the loyalty of customers, adopted from the work of S. Banahene and co-authors (2017), but with the extended dimension of conative loyalty (Agapito, Valle and Mendes, 2013; Manzuma-Ndaaba et al., 2016). Motivation loyalty was measured in accordance with the recently dominating approach (Morchett, Swoboda and Foscht, 2005; Lotko, Lotko and Korneta, 2018).

The list of the quality and loyalty indicators is presented in Table 1.

Identification of the dependency between the quality of the services and the loyalty of customers is a complex area of study. It is connected with a concealed, directly non-observable and multidimensional character of measured phenomena and the complex dependencies between them. This is why it is worth reaching for multidimensional exploration statistical methods. Therefore, in order to choose the best predictors of the segmentation of customers, analysis with the use of classification trees was carried out. They belong to the group of multidimensional exploration (hierarchal) techniques. They are used to determine the appurtenance of cases or objects compared to the classes of the quality dependent variable on the basis of the measurement of one or more explanatory variables (predictors). The aim of creating the model is the establishment of subsets that are the most homogenous from the point of view of the value of the dependent variable. Currently, classification trees are acknowledged among researchers and are one of the most popular methods of data analysis (Łapczyński, 2003; Gatnar, 2008). This analysis was carried out with the use of the *Conditional Inference Trees* (CTree) algorithm, established by H. Strasser and C. Weber (1999). It is relatively unknown and deserves attention, as it is an effective data classification method (Sarda-Espinosa, Subbiah and Bartz-Beielstein, 2017). The selection of the above-mentioned algorithm resulted from the number and type of analysed variables.

Table 1.
List of the quality and loyalty indicators

J1	I can find everything I need on the website of the bank.	L1	I prefer using the services provided by this bank.
J2	I can easily navigate the bank's website.	L2	I think that this bank provides the best services at the moment.
J3	I can make fast transactions on the bank's website.	L3	I prefer being a customer of this bank compared to others.
J4	Information placed on the bank's website is well organised.	L4	I use the services of this bank because I really like it.
J5	The bank's website is fast loading.	L5	I am satisfied with using the services of this bank compared to any other.
J6	The bank's website is easy to use.	L6	I like this bank more than any other.
J7	I can access the bank's website quickly.	L7	I am attached more to this bank than to any other.
J8	The bank's website is well organised.	L8	I am more interested in this bank than in any other.
J9	The bank's website is always accessible.	L9	I am planning to continue using the services provided by this bank.
J10	The bank's website is activated immediately.	L10	I am planning to buy other services provided by this bank.
J11	The bank's website does not crash.	L11	I am planning to recommend the services provided by this bank.
J12	The bank's website does not block me after entering data.	L12	I recommend this bank when asked.
J13	The bank provides all promised information via its website.	L13	I am distributing positive opinions about this bank among my friends.
J14	Services on the bank's website are available at the proper time.	L14	When planning the purchase of any banking services, I consider this bank as my first choice.
J15	Services ordered on the bank's website are provided quickly.		
J16	I obtain confirmation of provided services from the bank's website.		
J17	Services offered on the bank's website are the same as the ones promised by the bank.		
J18	The offer of the services on the website inspires trust.		
J19	Promises concerning the provision of the services on the bank's website are precise.		
J20	Information about my behaviour on the bank's website is protected.		
J21	The bank's website does not reveal my personal data to other parties.		
J22	The bank's website protects information concerning my bank cards.		

Source: Authors' own study.

5. Analysis and discussion of the results

In order to carry out an empirical verification of the posed hypothesis, the first step consisted in the identification of the dimensions of the loyalty of customers. The next step was to gauge

the loyalty predicators with the use of classification trees. This approach towards the measurement of customer loyalty was suggested by P. Korneta (2017). The idea of the conceptual model is presented in Figure 1.

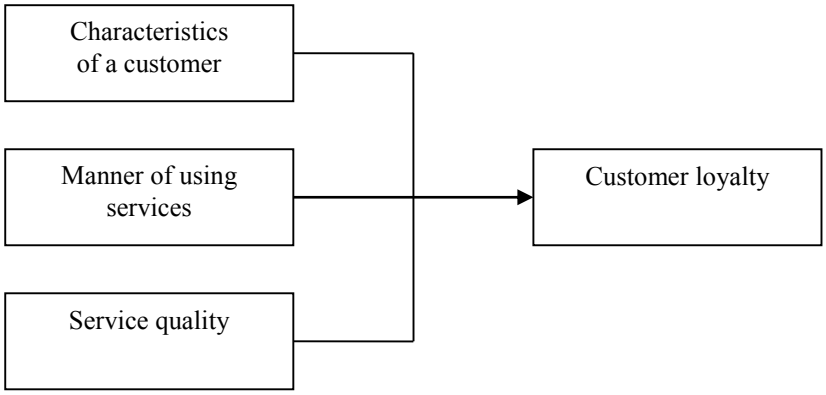

Figure 1. Conceptual model of the predication of customer loyalty. Source: Authors' own study.

As a result of the carried out factor analysis, it was proven that the loyalty of customers of the studied services is a two-dimensional construct which covers:

1. Cognitivity (dimension loaded by 5 indicators, explaining 59.8% of the variations of variables).
2. Activity and conativity (dimension also loaded by 5 indicators, explaining 9.7% of the variations).

The taxonomy of the types of loyalty obtained as a result of the application of exploration factor analysis is the closest to the division of loyalty into cognitive and conative loyalty, as proposed by D. Allen and T. Rao (2000), and to the cognitive-affective-conative model, first suggested by K. Basu and A. Dick (1994) and lateer confirmed by D. Agapito, P. Valle and J. Mendes (2013); however, it is not completely convergent with them.

Subsequently, in order to select the best predicators of the segmentation of customers, we carried out the analysis with the use of classification trees. This allowed us to realise which variables participate in the classification of customers in the most significant manner. The analysis was carried out separately for both discovered types of customer loyalty. The set of data was divided into two groups: training data and testing data, in a proportion of 70% and 30%, respectively. The testing set was used to check the effectiveness of classification. The *Average Squared Error* (ASE) was applied in the model assessment. Due to a small size of both obtained trees, a cutting was not applied. The *Average Squared Error* (ASE) was applied in the model assessment. The adopted materiality level was $p = 0.05$. The classification tree for cognitive loyalty is presented in Figure 2, and for active-conative loyalty, in Figure 3.

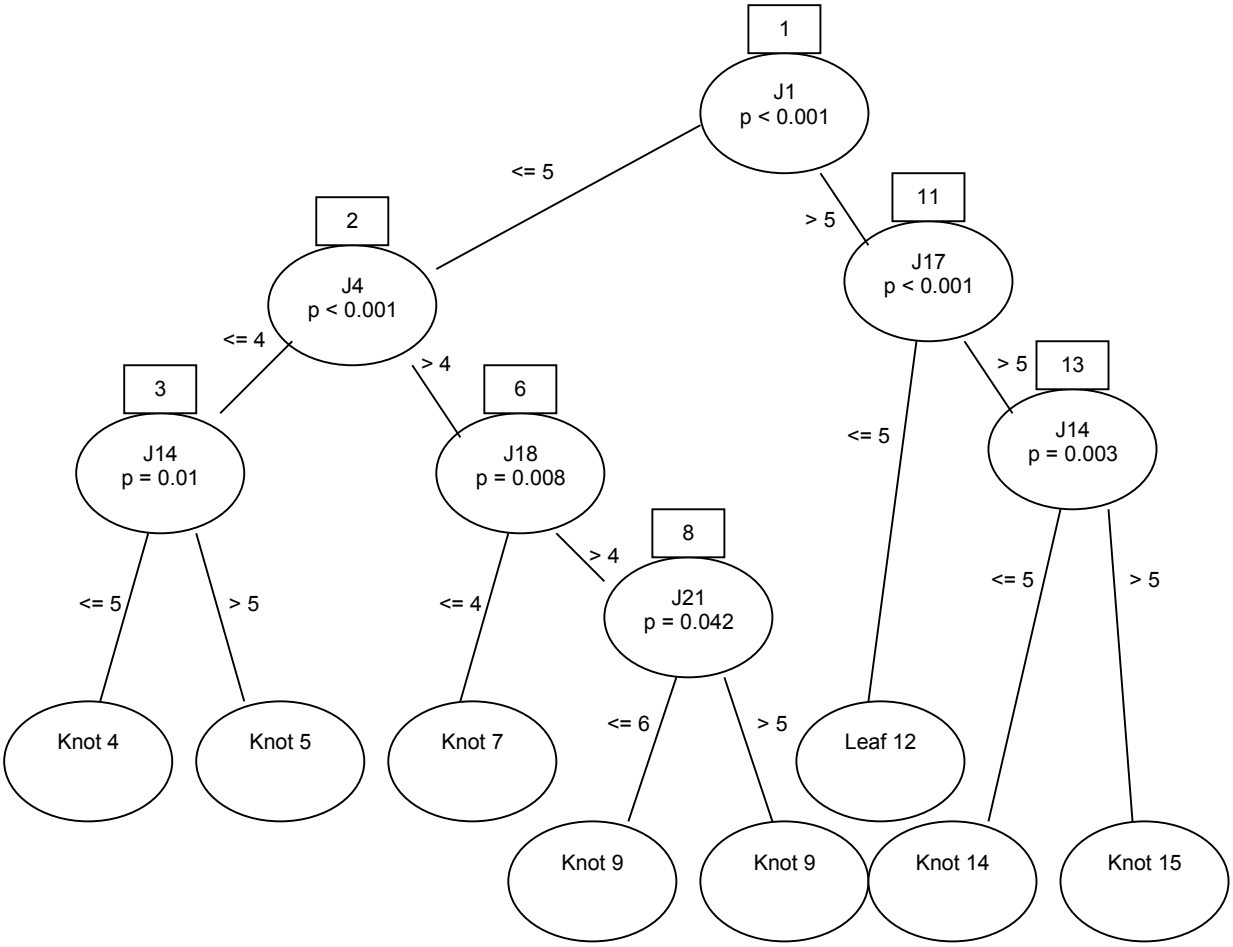

Figure 2. Classification tree for cognitive loyalty. Source: Authors' own study.

An analysis of Figure 2 demonstrates that statistically significant predicators of the loyalty of customers are only indicators of the perceived quality of services. The model includes 6 partial indicators of the quality of services (including one J14, which occurs twice), and it does not include any variables characterising the customer nor the manner of using the services. The best predicators of cognitive loyalty are the variables J1 (on the bank's website, I can easily find what I need), J4 (information on the bank's website is well organised), J17 (services offered on the bank's website are the same as the ones promised by the bank.), J14 (services on the bank's website are available at the proper time.), J18 (the offer of the services on the website inspire trust) and J21 (the bank's website does not reveal my personal data to other parties). The ASE value for the designed tree equals 0.41 for the training set and 0.47 for the testing set. This confirms a very accurate prognosis of the dependent variable with the use of the said tree.

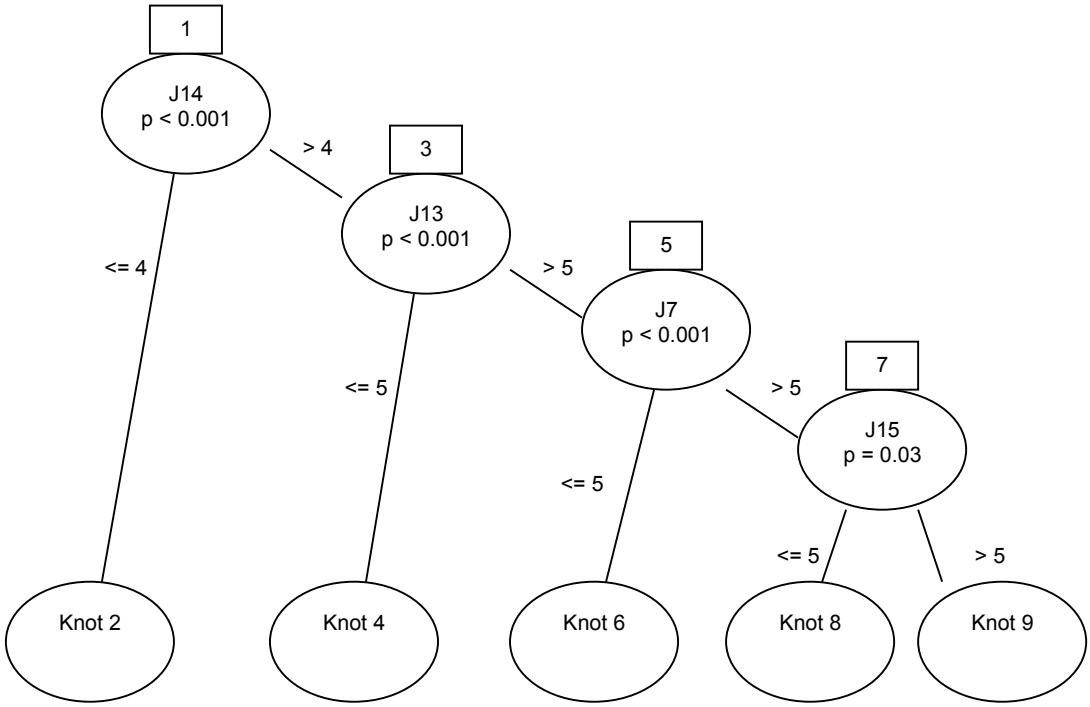

Figure 3. Classification tree for active-conative loyalty. Source: Authors' own study.

However, an analysis of Figure 3 leads to the conclusion that in the case of active-conative loyalty, statistically significant predicators are also only indicators of the partial qualities of services. Again, the model includes only indicators of the partial qualities of services (4 indicators), and it does not include any variables characterising the customer nor the manner of using the services. The best predictors of active and conative loyalty are the following variables: J14 (services on the bank's website are available at the proper time), J13 (the bank provides all promised information via its website), J7 (I can access the bank's website quickly) and J15 (services ordered on the bank's website are provided quickly). The ASE value in the case of this tree equals 0.68 for the training set and 1.00 for the testing set (the difference between the measured values is larger, and the higher value for the testing set proves the *overfitting* of the model, which "operates" better in the case of the learning set than for the testing set). A slightly worse adjustment of the model is observed here in comparison to the tree constructed for cognitive loyalty.

6. Conclusions

The purpose of this paper was to prove the role of the quality of online banking services in the shaping of the loyalty of customers. As a result of modelling carried out with the use of classification trees and the CTree algorithm, it was proven that:

- When applying factor analysis, two dimensions of the loyalty of customers taking advantage of online banking services were identified: cognitive and active-conative loyalty.
- Analysis of the classification tree created for the first loyalty dimension (cognitive loyalty) leads to the conclusion that among 33 analysed independent variables, only some of the indicators of partial qualities of services are included in the model. These are 6 variables: J1, J4, J17, J14, J18 and J21. The adjustment of the model indicates that the prognosis of the dependent variable is very good.
- Analysis of the classification tree created for the second loyalty dimension (active and conative loyalty) leads to the conclusion that only some of the indicators of partial qualities of services are included in the model. These are 4 variables: J14, J13, J7 and J15. The adjustment of the model is slightly worse than in the previous case.
- Significantly statistic predicators of loyalty are, in general, different in comparison to the case of cognitive and active-conative loyalty: only the J14 variable is repeated. As this independent variable appeared in the first model twice, it should be acknowledged that the availability of services at the proper time is the best predicator of customers' behaviours.
- Recommendation within the scope of the management for the improvement of cognitive loyalty concerns, above all, the improvement of the organisation of information on the bank's website and, secondly, keeping the promises and providing data protection and safety of transactions.
- Recommendation within the scope of the management for the improvement of the active-conative loyalty concerns, above all, the improvement of the availability of the services and promptness of services and, secondly, keeping of the promises.

With the use of this example, we proved the critical role of quality in the shaping of customers' behaviours.

However, the research limitations resulting from the scope of the research project, the applied methodology – selection and use of the methods, techniques and research tools, should be taken into consideration. In this study, the method of a snowball was applied in sampling. The most serious disadvantage of this method is the possibility of a considerable aggravation of the sample resulting from the fact that the participants have a tendency towards recruitment of persons from the same environments. In order to level this weakness of the selected method, we attempted to reach different environments in the empirical study. The study was carried out with the use of a traditional questionnaire carried out among the customers of online banking services, in the majority of the cases, in the Masovian voivodship. The authors realise that the results obtained in this way are very unlikely to be generalised on the scale of the entire population of the country.

Finally, the selection of the E-S-QUAL scale may bring aabout controversies. This scale was used due to the fact that it may be considered as the most methodological proposal, originating from the authors who are the pioneers and undisputed renowned authors in the area of the measurement of the quality of services.

The next limitation is the fact that only the declared level of the loyalty of customers was measured, according to the stream of motivation loyalty research. Although 14 indicators for 4 hypothetical types of loyalty were studied, all of these are still based only on customers' declarations. The indicators of behavioural loyalty were not applied.

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