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IDENTIFICATION OF LOGISTIC ELEMENTS OF CUSTOMER SERVICE USING PRINCIPAL COMPONENT ANALYSIS

JEL CLASSIFICATION: C38, D12

ABSTRACT:

Logistics activities are considered as a priority by the management in everyday business, while having an adequate customer service as a powerful tool helps achieving the competitiveness of the company to continuously grow and develop in a global scale. The purpose of this paper is to identify the key logistic elements of customer service by aggregating the most important components in the sample of customers for retail stores in Bosnia and Herzegovina. The principal component analysis of the logistic elements of customer service was employed in the research, within the principal components method with the application of orthogonal rotation of VARIMAX with Kaiser normalization. The analysis of the main components extracted six components with characteristic eigenvalues greater than 1, where 24 claims were grouped around them. Orthogonal VARIMAX

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rotation was performed to facilitate the interpretation of the obtained components. The rotated solution showed a simpler structure of components that explains 64.08% of the variance. The results of the study confirmed a six-dimensional component structure. The extracted components are given the following names: possibility of ordering and delivery of products, convenience of delivery, packaging and assortment of products, location of retail store and payment terms, loyalty card benefits, spaciousness of stores, improvement of sales and product complaints and correction of potential errors.

**KEYWORDS:****CUSTOMER SERVICE, LOGISTICS, PRINCIPAL COMPONENT ANALYSIS, COMPONENT AGGREGATION**



1. INTRODUCTION

Principal component analysis has found its application in various studies. All research efforts in the field of functional customers' structure were focused on the segregation process of marketing from the logistical services elements, so based on the attributes of these groups, their importance can be determined. Detailed analysis of the topic regarding application of principal component analysis and identifying key logistical elements of customer service does not exist so far by the author's knowledge, it is rarely analyzed in our region, and there is theoretical and practical justification for the implementation of this research. Previously stated reflects the importance of research on key logistical elements of customer service for retail stores in Bosnia and Herzegovina. When we elaborate the identification of key logistical elements of customer service, principal component analysis is the most appropriate method. From the previous statements, the central research question arises, can the factorization of the logistical elements of customer service achieve the aggregation of the most important components that affect customers' choice in Bosnia and Herzegovina? The subject of research is the possibility of applying principal component analysis while identifying the logistical elements of customer service. Principal component analysis groups a larger number of variables into a smaller number from the set of possible ones, and like most statistical methodologies, it is also supported by software. The central research hypothesis of the research was set, that by applying principal component analysis it is possible to identify key logistical elements of customer service in retail stores in Bosnia and Herzegovina.

The rest of the paper is structured as follows. After the introduction, part 2 provides an overview of the literature, and part 3 presents the methodology to be used in the research. Empirical results and their discussion are presented in part 4, while the main points of this paper are summarized in the conclusion.

2. LITERATURE REVIEW

Principal component analysis was a subject of many research papers in the past, where it used to be elaborated what determines groups of variables using components, and their influence on attitudes, perceptions or observations of the phenomenon's research subject. In order to identify the sustainable development of the European Union, Bahovec et al (2011) employed principal component analysis. The results showed that two components can be extracted from the initially selected nine indicators, where one of them is highly correlated with unemployment and the other one with GDP per capita, R&D expenditure and employment rate. Principal component analysis was used by Roszko Wójtowicz and Bialek (2016) in order to investigate the measuring performance approach and innovation, bearing in mind that technological advances, aggregation of knowledge, scientific and technical human potential (capital) are the most important drivers of the economic growth. The research included 25 variables, and 9 of them were extracted. In order to determine the position of individual countries in flexibility – security space, Jandrić (2017) deployed principal component analysis. Based on the six indicators related to the key elements of labour market security and external numerical flexibility, two

components were identified. The position of Serbia shows that the level of flexibility is somewhat higher than the average, while the level of security is the lowest in the observed group of European countries. Fazlić and Đonlagić Alibegović (2016) used principal component analysis to investigate the possibility of higher education services quality measurement, ie in identifying key dimensions and attributes of its quality. Based on the orthogonally rotated VARIMAX components matrix, five components within the expectation scale and four components within the perception scale were defined. Zoroja (2014) deployed principal component analysis while trying to show the indicators for the use of information and communication technologies from different sources, as well as to reduce this number to a smaller number of basic groups of selected variables. Principal component analysis was applied to the initially selected 17 variables and three components were extracted. Kondić et al (2013) used principal component analysis to investigate the impact of components on improvement and problem-solving procedures. Analysis was based on 18 source variables, and it resulted in four separate components: planning, implementation, control and action. Kurnoga Živadinović (2004) applied principal component analysis in the research to determine the source of companies' competitiveness, and conducted an empirical study on the characteristics of coffee products. Based on fifteen source variables, principal component analysis resulted in a total of four extracted components that could represent sources of the competitiveness for a company. In a research that aimed to single out certain categories, based on customer satisfaction and their attitudes regarding the behavior and appearance of sales staff and the arrangement of the point of sale, Mihić (2006) applied principal component analysis. By the method of extraction, combination of Kaiser's criterion and scree test with VARIMAX method, out of 26 variables, principal component analysis included 23 of them, classified into three components. According to Fazlić (2013), based on the research in strategic quality management of the hotel services in the function of improving the tourist market of Bosna and Herzegovina, the model for quality services measurement was based on five dimensions of quality. The dimensions identified in the baseline measurement model using the expectation scale and the perception scale were subject to principal component analysis. Based on the orthogonally rotated matrix of VARIMAX components, three dimensions were defined on both scales, where the majority of variables were grouped into the first three components in the expectation scale and the perception scale as well. Čulig (2005) investigated the desirability of alternative educational concepts among the student population of the University of Zagreb, related to the traditional educational concept and alternative pedagogical concepts. Principal component analysis, taking into account all the basic assumptions and restrictions proved to be adequate and successful in the methodological and even conceptual way of the problem solution. The scientific contribution of understanding the state of air transport in Bosnia and Herzegovina through the application of principal component analysis was given by researchers Dedić et al (2021). It was examined how satisfaction with customer air transport services affects customers' loyalty expressed through loyalty cards on the example of low-cost airlines. The claims were grouped into nine components that correspond to the initially set research variables and their dimensions. It was proved that the claims within the research dimensions are mutually homogeneous, while the dimensions are mutually heterogeneous. According to Šadić et al (2017), it was investigated how the basic characteristics of users' information system affect their experience of their use, deploying a modified model of information systems that had six variables at the beginning of the study, which were classified into four categories. Delić et al (2013) conducted a pilot study related to the identification

of key components of satisfaction regarding the quality of the teaching process for high school students. The authors pointed out that satisfaction can be expressed by four components: environment, quality of the teaching process, discrimination and performance. There is a need for further development of the model, in the direction of expanding to other components and identifying their mutual influences. Aćimović and Mijušković (2016) investigated the usage of logistic location selection factors – the analysis of retail objects in Belgrade, Serbia. The authors aimed to determine what are the most important logistics factors of object location selection with one specific participant of the supply chain, ie retail. The analysis has shown that the selection of adequate location has a big theoretical and practical meaning for all participants within the supply chain.

3. RESEARCH METHODOLOGY

While elaborating a certain theoretical and methodological results of the observed research problem, the method based on statistical analysis (principal component analysis with orthogonal VARIMAX rotation) was used, with a systematic approach to research. Using principal component analysis, the key logistical elements of customer service for retail stores in Bosnia and Herzegovina were identified.

In order to conduct the primary research, the survey method was used, along with a survey questionnaire (via the *Google Forms* platform) as well as the classic survey method, where the answers were based on the Likert scale. Respondents expressed their opinions, on the scale starting from complete disagreement (1) to complete agreement (5). The questionnaire used for the survey included five dimensions (24 questions). The following table provides an overview of the dimensions.

▶ **TABLE 1. AN OVERVIEW OF THE DIMENSIONS AND VARIABLES INVOLVED IN THE RESEARCH**

| DIMENSIONS | VARIABLES |
|--|-----------|
| Transaction logistics | 5 |
| Level of after-sales service and prices | 4 |
| Internal and external location | 5 |
| Convenience in ordering and delivery | 5 |
| Quantitative and financial sales constraints | 5 |

Source: authors' calculation

- The first dimension of "Transaction Logistics" implies accuracy and timeliness in invoicing, the possibility of packing in the premises, delivery of products (frequency of stock recovery and delivery time).
- The second dimension "Level of after-sales service and prices" refers to the possibility of product replacement, the speed of error correction, the acceptability of product prices and the presence of staff.
- The third dimension "Internal and external location" implies the convenience of the location, the existence of a parking lot, positioning of the retail store and its proximity.

- The fourth dimension “Convenience in ordering and delivery” includes the convenience of ordering products online, the ability to order over a certain amount, the ability to open a loyaltycard and realize additional promotions.
- The fifth dimension “Quantitative and financial sales constraints” includes an explanation of the size limit of the order, financial constraints when it comes to ordering products, flexibility while ordering, as well as the possibility of delayed payment.

The survey was conducted among customers of five retail stores („Mercator“, „Konzum“, „Bingo“, „Euromaster“ and „Piemonte“), but also other retail stores (due to lower percentage share in total retail in Bosnia and Herzegovina, they are not included individually). The survey encompassed six large cities across the state: Sarajevo, Banja Luka, Tuzla, Mostar, Brčko and Bijeljina. Data collection was performed on the basis of a convenience sample, within the period range from February 2021 to July 2021. Comrey & Lee (1992) state that a sample of at least 300 subjects is recommended for the application of principal component analysis, taking into account that the variables to be subjected to principal component analysis should contain from five to ten dimensions. Having that said, the survey was conducted on a sample of 300 respondents - customers of retail stores in Bosnia and Herzegovina. The total number of distributed survey questionnaires was 350, with in total of 300 questionnaires adequately completed. Thus, the rate of return of survey questionnaires was relatively high and amounted to 85.71%. The analysis was conducted using SPSS Statistics 25.0 (SPSS - Statistical Package for Social Science).

4. RESULTS AND DISCUSSION

Within the elaboration of certain theoretical and methodological starting points of the observed research problem, the following methods were used: induction and deduction method, analysis and synthesis method, hypothetical-deductive method, analytical-deductive method, comparative method, method of logical reasoning, understanding and interpretation and methods based on statistical analysis (principal component analysis with orthogonal rotation VARIMAX). The general purpose of principal component analysis is to find a way to summarize information contained in a large number of original variables into a smaller set of new, composite dimensions or variable components, with minimal loss of information, ie to search for and define fundamental constructs or latent dimensions that are assumed to be represented in the original variables⁴.

Empirical analysis was performed in order to test the central hypothesis that by applying principal component analysis it is possible to identify key logistical elements of customer service in retail stores in Bosnia and Herzegovina. The Kaiser-Meyer-Olkin (KMO) sample adequacy measure was used to examine the reliability of the principal component analysis results. KMO is a measure used to check the suitability of the application of principal component analysis and takes a value from the range from 0 to 1, where a value less than 0.5 indicates the unsuitability of the correlation matrix for principal component analysis. Therefore, it is not recommended to use the multivariate analysis if the critical value of the KMO measure is <0.50 (a value of 0.60 is recommended as acceptable). Table 2 shows the values of the Bartlett test of sphericity and the KMO coefficient for the

4 Hair et al. (2010), pp. 98-99

whole sample. Both tests are needed to assess the justification of principal component analysis.

► **TABLE 2. KMO AND BARTLETT TEST OF SPHERICITY OF LOGISTICAL ELEMENTS OF CUSTOMER SERVICE**

| KAISER-MEYER-OLKINOVA MEASURE OF SAMPLING ADEQUACY | .831 | |
|--|--------------------|----------|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 3385,294 |
| | Df | 276 |
| | Sig. | .000 |

Source: authors' calculation

The Bartlett test is used to test the null hypothesis that there is no significant correlation between the original variables. So, the correlation matrix of the respondents is a unit matrix, ie each variable is correlated with itself and there is no correlation with other variables. The basis for applying the Bartlett test is the Chi-Square test⁵. Since the value of the Kaiser-Meyer-Olkin measure is 0.831, we can conclude that the data of the variables used are suitable for conducting principal component analysis.

The matrix of components structure with 24 variables after the principal component analysis was conducted, contains components loadings that show the correlation coefficients of variables and extracted communalities. The component matrix consists of six extracted components. For component loads greater than 0.7, we can say that they are an indicator of a very well-defined data structure and that they also represent the goal of any component analysis. A load of 0.30 means that about 10% of the variance is explained, and a load of 0.50 means that the component explains 25% of the variance. The load must exceed 0.70 for the component to explain 50% of the variance. From the matrix of the component structure of the logistic elements of customer service, we conclude that most variables have decently large component weights (above 0.5) for the first component, while for the second component the value is slightly lower (but above 0.4). For other components we have approximate or less component loadings, but we will certainly take them into consideration. The first component is defined by the high component loading of a number of variables. Communalities are decently high for almost all components, ranging from 0.411 to 0.823. The communality of a variable shows us the extent to which that variable is known or explained to us, that is, the amount of variance of the variable explained by common components. If there are low values of the communalities, this implies that they can be omitted from the analysis. Table 3 shows the eigenvalues for the extracted components as well as the values for the total variance.

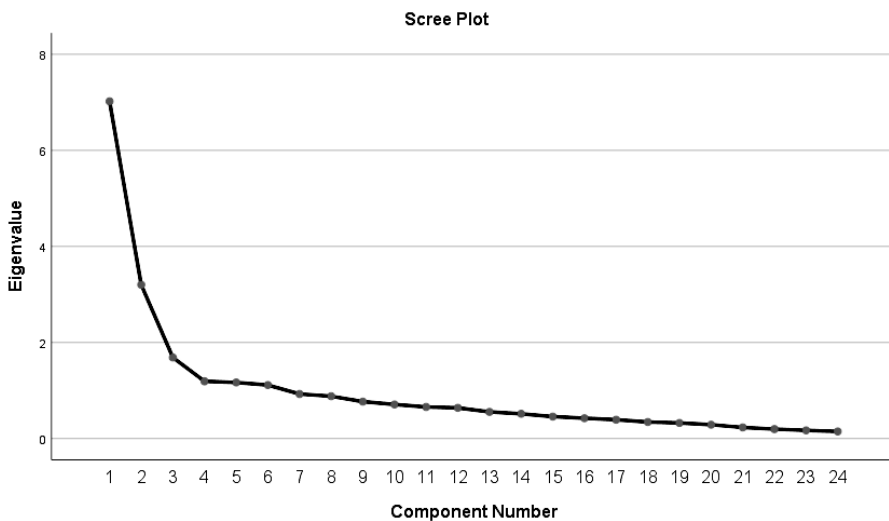
▶▶ **TABLE 3. MATRIX OF COMPONENT STRUCTURE, EIGENVALUES AND EXPLAINED VARIANCE - RESULTS OF EXTRACTED COMPONENTS OF LOGISTIC ELEMENTS OF CUSTOMER SERVICE**

| COMPONENT | INITIAL EIGENVALUES | | | EXTRACTION SUMS OF SQUARED LOADINGS | | | ROTATION SUMS OF SQUARED LOADINGS | | |
|-----------|---------------------|------------------------|-----------------------------------|-------------------------------------|------------------------|-----------------------------------|-----------------------------------|------------------------|-----------------------------------|
| | EIGENVALUES | PERCENTAGE OF VARIANCE | CUMULATIVE PERCENTAGE OF VARIANCE | EIGENVALUES | PERCENTAGE OF VARIANCE | CUMULATIVE PERCENTAGE OF VARIANCE | EIGENVALUES | PERCENTAGE OF VARIANCE | CUMULATIVE PERCENTAGE OF VARIANCE |
| 1 | 7,020 | 29,251 | 29,251 | 7,020 | 29,251 | 29,251 | 3,391 | 14,131 | 14,131 |
| 2 | 3,203 | 13,344 | 42,595 | 3,203 | 13,344 | 42,595 | 2,838 | 11,827 | 25,958 |
| 3 | 1,687 | 7,028 | 49,623 | 1,687 | 7,028 | 49,623 | 2,733 | 11,386 | 37,344 |
| 4 | 1,191 | 4,964 | 54,587 | 1,191 | 4,964 | 54,587 | 2,687 | 11,197 | 48,541 |
| 5 | 1,166 | 4,860 | 59,447 | 1,166 | 4,860 | 59,447 | 1,972 | 8,217 | 56,758 |
| 6 | 1,113 | 4,638 | 64,085 | 1,113 | 4,638 | 64,085 | 1,758 | 7,327 | 64,085 |
| 7 | ,927 | 3,862 | 67,947 | | | | | | |
| 8 | ,880 | 3,666 | 71,613 | | | | | | |
| 9 | ,768 | 3,201 | 74,814 | | | | | | |
| 10 | ,708 | 2,952 | 77,766 | | | | | | |
| 11 | ,658 | 2,740 | 80,506 | | | | | | |
| 12 | ,638 | 2,660 | 83,166 | | | | | | |
| 13 | ,555 | 2,311 | 85,477 | | | | | | |
| 14 | ,515 | 2,146 | 87,623 | | | | | | |
| 15 | ,456 | 1,902 | 89,525 | | | | | | |
| 16 | ,423 | 1,762 | 91,287 | | | | | | |
| 17 | ,391 | 1,628 | 92,915 | | | | | | |
| 18 | ,344 | 1,434 | 94,349 | | | | | | |
| 19 | ,325 | 1,353 | 95,702 | | | | | | |
| 20 | ,287 | 1,196 | 96,898 | | | | | | |
| 21 | ,231 | ,962 | 97,861 | | | | | | |
| 22 | ,196 | ,817 | 98,678 | | | | | | |
| 23 | ,170 | ,708 | 99,385 | | | | | | |
| 24 | ,148 | ,615 | 100,000 | | | | | | |

Source: authors' calculation

The eigenvalues (total) for the six extracted components, with values higher than 1, are: 7.020 (first component), 3.203 (second component), 1.687 (third component), 1.191 (fourth component), 1.166 (fifth component) and 1.113 (sixth component), which together explain 64.085% of the variance in the cumulative. The percentage of total variance for extracted components is greater than 60%, which is the lower allowed limit in social sciences research. The simplicity of the components is greater, as the variance is greater as well. Based on the scree plot criterion (based on the Cattell diagram), a break between components six and seven is visible, that confirms the extraction of six components, because their eigenvalues are separated from the eigenvalues of the remaining components. The break on the diagram is visible at the junction of the sixth and seventh components, which implies the conclusion that the first six components explain a much higher percentage of variance than the remaining components.

► FIGURE 1. CATTELL (SCREE PLOT) DIAGRAM OF LOGISTIC ELEMENTS OF CUSTOMER SERVICE



Source: authors' calculation

Since the initial matrix does not have the characteristics of a simple structure, component rotation is performed, which changes the relationship between variables and components. After component extraction, orthogonal rotation was performed using the VARIMAX rotation with Kaiser normalization method, which aims to ensure that each variable is representative including as few components as possible as well as the best possible spatial dispersion⁶. This method, compared to other methods of rotation, is more successful in achieving the principle of simple structure⁷.

The following table shows the component structure matrix for 24 variables after the VARIMAX component rotation was performed. The results show that the structure of

6 Đonlagić Alibegović S. et al. (2016), pp. 107

7 Kurnoga Živadinović (2004), pp. 961

component loadings has changed, ie that component loadings are distributed to all six components, which was not the case with the unrotated matrix. The structure of component loadings after the rotation enables better interpretation of components in relation to the initial component matrix.

► **TABLE 4. MATRIX OF THE COMPONENT STRUCTURE OF OF LOGISTIC ELEMENTS OF CUSTOMER SERVICE AFTER ORTHOGONAL VARIMAX COMPONENT ROTATION**

| VARIABLES | | COMPONENT MATRIX | | | | | |
|-----------|--|------------------|------|------|------|------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| V20 | There are limits on the size of the order | ,752 | | | | | |
| V16 | Delivery of the order over a certain amount is done free of charge | ,732 | | | ,300 | | |
| V15 | There is a possibility of ordering products by delivery (online, direct order, etc.) | ,723 | | | | | |
| V21 | Ordering products is financially limited | ,672 | | ,327 | | | |
| V23 | Ordering time is flexible (0-24h) | ,656 | | | ,312 | | |
| V2 | There is a possibility of packing in a retail store | | ,846 | | | | |
| V3 | Product delivery is reliable | | ,748 | | | | |
| V1 | The retail facility we visit is characterized by accuracy and timeliness in invoicing | | ,633 | ,425 | | | |
| V5 | Delivery time is satisfactory | | ,615 | | | ,342 | |
| V4 | The product range is frequently updated | | ,585 | | | | |
| V10 | The location of the retail store is convenient to visit | | | ,691 | | | |
| V11 | The retail facility I visit has a parking lot | | | ,683 | | | |
| V22 | Different payment terms enabled (card payment, deferred payment - payment in installments, etc.) | | | ,594 | | | |
| V24 | Adequacy of available supplies | | | ,577 | | | -,355 |
| V14 | The positioning of the product in the retail store is extremely adaptable to customers | | | ,553 | | | |
| V17 | There is a loyalty card with certain benefits | ,353 | | | ,817 | | |
| V18 | The loyalty card user is entitled to specially marked product prices that are lower than regular ones | ,334 | | | ,813 | | |
| V19 | The loyalty card user is entitled to additional special product prices | ,413 | | | ,751 | | |
| V8 | The price of the product is acceptable | | ,306 | | | ,720 | |
| V9 | The presence of staff and the domain of customer service in the retail store is evident (various promotional activities, sales promotions, etc.) | | | | | ,625 | |
| V13 | The proximity of another retail facility affects the choice of location to buy | ,518 | | | | ,540 | |
| V12 | The spaciousness of the retail facility I visit is an important factor when choosing a place to buy | | | ,352 | | ,480 | |
| V6 | There is a possibility of product replacement in the retail store (complaint, servicing and replacement of products under warranty, etc.) | | ,321 | | | | ,745 |
| V7 | Speed in error corrections in invoicing and delivery, and speed when responding to complaints | | | | | ,336 | ,726 |

Source: authors' calculation

Therefore, by applying principal component analysis and the above method for selecting the number of components, six components were identified around which the variables were grouped, and in the following table we presented the components with assigned names after orthogonal VARIMAX rotation.

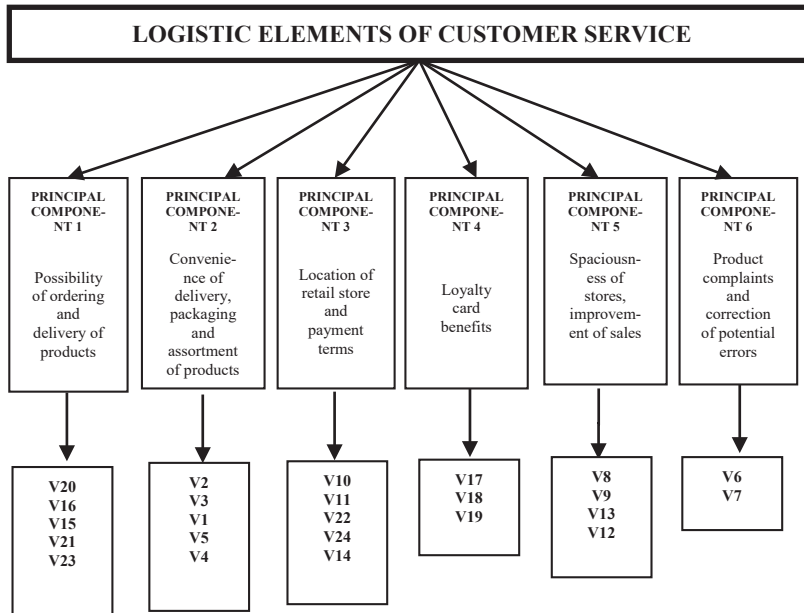
► **TABLE 5. THE EXTRACTED PRINCIPAL COMPONENTS WITH ASSIGNED NAMES**

| VARIABLES | | | PRINCIPAL COMPONENT NAMES |
|-----------------------|-----|--|---|
| Principal component 1 | V20 | There are limits on the size of the order | Possibility of ordering and delivery of products |
| | V16 | Delivery of the order over a certain amount is done free of charge | |
| | V15 | There is a possibility of ordering products by delivery (online, direct order, etc.) | |
| | V21 | Ordering products is financially limited | |
| | V23 | Ordering time is flexible (0-24h) | |
| Principal component 2 | V2 | There is a possibility of packing in a retail store | Convenience of delivery, packaging and assortment of products |
| | V3 | Product delivery is reliable | |
| | V1 | The retail facility we visit is characterized by accuracy and timeliness in invoicing | |
| | V5 | Delivery time is satisfactory | |
| | V4 | The product range is frequently updated | |
| Principal component 3 | V10 | The location of the retail store is convenient to visit | Location of retail store and payment terms |
| | V11 | The retail facility I visit has a parking lot | |
| | V22 | Different payment terms enabled (card payment, deferred payment - payment in installments, etc.) | |
| | V24 | Adequacy of available supplies | |
| | V14 | The positioning of the product in the retail store is extremely adaptable to customers | |
| Principal component 4 | V17 | There is a loyalty card with certain benefits | Loyalty card benefits |
| | V18 | The loyalty card user is entitled to specially marked product prices that are lower than regular ones | |
| | V19 | The loyalty card user is entitled to additional special product prices | |
| Principal component 5 | V8 | The price of the product is acceptable | Spaciousness of stores, improvement of sales |
| | V9 | The presence of staff and the domain of customer service in the retail store is evident (various promotional activities, sales promotions, etc.) | |
| | V13 | The proximity of another retail facility affects the choice of location to buy | |
| | V12 | The spaciousness of the retail facility I visit is an important factor when choosing a place to buy | |
| Principal component 6 | V6 | There is a possibility of product replacement in the retail store (complaint, servicing and replacement of products under warranty, etc.) | Product complaints and correction of potential errors |
| | V7 | Speed in error corrections in invoicing and delivery, and speed when responding to complaints | |

Source: authors' calculation

The results of the principal component analysis indicated a six- dimensional component structure, that is clearly shown in Figure 2.

► FIGURE 2. RESULTS OF PRINCIPAL COMPONENT ANALYSIS OF LOGISTIC ELEMENTS OF CUSTOMER SERVICE



Source: authors' calculation

5. CONCLUSION

With customer service management employed, retail trade stores do create a favorable ground for a positive image in the market, and while maintaining satisfied customers, a positive outcomes can be expected in terms of stable growth and business development. By deeper examination of the logistical elements of customer service, we can get a more realistic insight of the current market situation based on the results presented in the paper. The fact is that, although this topic has not been explored in Bosnia and Herzegovina, we can confirm the existence of most elements of customer service in practice, as well as some of its components. Following the development of the market, we can expect positive changes when it comes to improving business, especially from the aspect of customer service.

For the purpose of extraction, or identification of key logistical elements of customer service, we applied principal component analysis. For the purposes of the analysis, the opinions of 300 respondents (customers of retail stores) in Bosnia and Herzegovina were used. Principal component analysis was subjected to 24 claims that represent the characteristics of the logistical elements of customer service. The analysis of the main

components extracted six components with characteristic eigenvalues greater than 1, around which 24 claims were grouped. Orthogonal VARIMAX rotation was performed to facilitate the interpretation of the obtained components. The rotated solution showed a simpler structure of components that explain 64.08% of the variance. The extracted components are given the following names: possibility of ordering and delivery of products, convenience of delivery, packaging and assortment of products, location of retail store and payment terms, loyalty card benefits, spaciousness of retail facility, improvement of sales and product complaints and correction of potential errors. Thus, the results of the principal component analysis indicated a six-dimensional component structure. Accordingly, based on consulting relevant theoretical sources and conducted empirical research, we can conclude that the central research hypothesis is accepted, ie that by applying principal component analysis it is possible to identify key logistical elements of customer service in retail stores in Bosnia and Herzegovina. Estimates of all variables included in this study are based on the attitudes of customers of retail stores in Bosnia and Herzegovina. In order to be able to use the conclusions of this research effectively, it is necessary to take into account certain limitations of the research. First of all, generalization based on a single sample, regardless of its size, is always debatable. Since the sample used the most frequent retail stores in Bosnia and Herzegovina, the sample can be extended to some smaller retail chains. The limitation is certainly the lack of previous research on this topic, which actually made it impossible to compare the results with the results of similar research. Certain limitations may appear in the questionnaire itself, since only positively formulated questions were used, in order to facilitate their understanding, however, it would be desirable to include negatively formulated questions in the questionnaire. Notwithstanding these limitations, the results of empirical research can serve as a good basis for future research in the field of customer service in Bosnia and Herzegovina. The results of the research can benefit the management of retail stores operating in Bosnia and Herzegovina, since based on the results of the research, short-term and medium-term plans could be strategically approached, which would provide retail stores with a competitive advantage, strengthen ties with existing consumers and positively affect overall profits. The management of retail stores should pay attention to the wishes and needs of customers, their attitude towards the previously mentioned and analyzed logistical elements of customer service. With the application of previous research results, customer relationship management should be improved and it should drive the increase in total sales in the future.

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