QUALITY PAPER

Customer categorization using a three-dimensional loyalty matrix analogous to FMEA

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Abstract

Purpose – The purpose of this study is to present and explain a new customer segmentation approach inspired by failure mode and effect analysis (FMEA) which can help classify customers into more accurate segments.

Design/methodology/approach – The present study offers a look at the three most commonly used approaches to assessing customer loyalty:net promoter score, loyalty ladder and loyalty matrix. A survey on the quality of restaurant services compares the results of categorizing customers according to these three most frequently used approaches.

Findings – A new way of categorizing customers through loyalty priority number (LPN) is proposed. LPN was designed as a major segmentation criterion consisting of customer loyalty rate, frequency of purchase of products or services and value of purchases. Using the proposed approach allows to categorize customers into four more comprehensive groups: random, bronze, silver and gold – according to their loyalty and value to the organization.

Practical implications – Survey will bring a more accurate way of categorizing customers even in those sectors where transaction data are not available. More accurate customer categorization will enable organizations to use targeting tools more effectively and improve product positioning.

Originality/value – The most commonly used categorization approaches such as net promoter score, loyalty ladder or loyalty matrix offer relatively general information about customer groups. The present study combines the benefits of these approaches with the principles of FMEA. The case study not only made it possible to offer a view of the real application of the proposed approach but also made it possible to make a uniform comparison of the accuracy of customer categorization.

Keywords Customer loyalty, Segmentation, Loyalty levels, Loyalty priority number, LPN

Paper type Research paper

1. Introduction

Many past and present efforts in the fields of quality management and innovation have had the goal of increasing customer satisfaction. Customer satisfaction represents a customer's perception of the degree to which the customer's requirements have been fulfilled (Wang, 2013). A numerical value for this degree must represent the aggregate of customers' conscious and unconscious perceptions of the given object – e.g. a product or service. The higher it is, the greater is the customer's satisfaction. High customer satisfaction is a key

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factor for the long-term prosperity of an organization (Chi and Gursoy, 2009; Mittal *et al.*, 2005). It is, therefore, no surprise that many quality management concepts such as the ISO 9000 standard, Six Sigma and excellence models emphasize the achievement of long-term customer satisfaction (Han and Ryu, 2009; Sunder and Antony, 2015; Koc, 2006). As a key factor for the functionality of a management system, customer satisfaction remains a center of interest, not only in the practical application of such systems but also in scientific research (Rashvand and Zaimi Abd Majid, 2014). Over time, research has formed into a number of streams including research from the perspective of the overall impact on quality (Izogo and Ogba, 2015), from the perspective of marketing and sales (Eisingerich *et al.*, 2014), from the perspective of managerial and mathematical decision-making (Wang, 2013) and from methodological perspectives (Coelho and Esteves, 2007; Pantouvakis, 2010).

Customer satisfaction is one of the preconditions for the development of loyalty. As a rule, building customer loyalty is a long-term process in which customer satisfaction plays a key role. Measuring customer loyalty alongside customer satisfaction is a very reasonable step because it indicates the risk of losing a customer and their transfer to a competitor. The potential informativeness of loyalty measurement techniques increases with their complexity. The most detailed and most structured analyses of customer loyalty are provided by a loyalty matrix. It should however be noted that the principle of the loyalty matrix points to further potential for achieving an even more comprehensive view of the customer. The loyalty matrix is a two-dimensional model. If we look at past studies of a similar topic – risk analysis – it is possible to find a concept developed according to similar principles, the risk matrix (Cox, 2008; Duijm, 2015; Ruan *et al.*, 2015). In the past, risk factors were classified into groups based on an assessment of two characteristics – occurrence and severity. The categorization model was relatively popular, but over time it became increasingly apparent that it had significant weaknesses – especially its focus on just two aspects of risk. This weakness was eliminated by the development of the failure mode and effect analysis (FMEA) method, which added a third factor, detection, in addition to occurrence and severity. FMEA made it possible to categorize risk based on three points of view and thus take account of more precise information on its characteristics. The expansion of knowledge permitted by transitioning from two-dimensional to three-dimensional risk assessment is now incontrovertible and brings with it a range of other benefits (Ravi Sankar and Prabhu, 2001; Xiao *et al.*, 2011). A transition from the two-dimensional loyalty matrix to a three-dimensional model could have similar scientific potential to the development of FMEA. The FMEA was developed to prevent errors, and practice has shown that taking three risk aspects into account is very effective (Shahin, 2004). Some studies report that FMEA avoids up to 80% of the costs and problems that cause later product, process or system failures (Arunajadai, *et al.*, 2004). The primary purpose of FMEA was to prevent errors, but its modifications can be found in the literature for relatively diverse purposes (Madzík and Kormanec, 2018). Fuzzy-oriented solutions such as fuzzy linguistic modeling (Sharma *et al.*, 2005), fuzzy analytic hierarchy process (Kutlu and Ekmekçioglu, 2012), fuzzy cognitive maps (Pelaez and Bowles, 1995) and fuzzy data envelopment analysis (Garcia *et al.*, 2005) can be mentioned. FMEA was also used to knowledge modeling (Teoh and Case, 2004), scenario-based, or cost-based solutions (Rhee and Ishii, 2003) or Bayes belief network (Lee, 2001). Although the diversity of the use of FMEA and its principles is relatively high, we can assume that some of its applications and contexts will still be developed.

On the first look, we can say that there is no direct link between the loyalty matrix and FMEA, but deeper analysis reveals striking parallels. Both methods aim to categorize elements – risk factors in FMEA and customers in the loyalty matrix – into defined groups. Both methods use categorization as a means of avoiding risk – by taking preventive measures in FMEA or by deploying appropriate marketing measures in the loyalty matrix. In both methods, the approach to classification makes it possible to capture the intensity of a given element. The logic of the two methods work in opposite directions, however – while

FMEA is associated with factors of a negative character (errors), the loyalty matrix is associated with factors of a positive character (delights).

The aim of this study is to develop a new procedure for categorizing customers using a three-dimensional loyalty matrix based on FMEA concepts. The developed procedure is applied to an example situation of restaurant services quality, and its results are compared with those obtained by applying NPS, loyalty ladder and the two-dimensional loyalty matrix. The proposed approach permits better identification of customer loss trends and thus provides valuable information for preventive marketing activity. To the knowledge of the authors of this text, the use of FMEA logic for customer categorization has not yet been found in the literature, which makes this study relatively original.

2. Customer satisfaction and its measurement

The methodological perspective on the “measurement” of customer satisfaction continues to deal with multiple scientific questions that remain open in areas such as accuracy in determining the degree of satisfaction (Chougule *et al.*, 2013), preference analysis (e.g. share of wallet) (Keiningham *et al.*, 2015) and customer segmentation (Füller and Matzler, 2008) amongst many others. The main reason for this is the character of the “measured” variable. The definition of satisfaction indicates that it is of an intangible, nonmaterial nature that is hard to measure. Satisfaction represents a mental state that is hard to measure by standard means. The level of customer satisfaction nevertheless has a significant effect on the long-term prosperity of an organization and it is, therefore, reasonable to want to know its level and measure it. The literature includes two main approaches to the measurement of customer satisfaction.

The first of these is the direct measurement of satisfaction. This can take the form of a structured or unstructured interview/questionnaire with customers that allows them to directly state their satisfaction, as a rule using a predefined scale. In such a case, there is often an implicit assumption that the customer knows how to “most accurately” specify the degree to which their requirements have been met (Mkpojiogu and Hashim, 2016). On the one hand, this is a logical assumption given the subjective character of requirements, which can differ in content and priority from one customer to another (Franceschini *et al.*, 2014). On the other hand, there are grounds to suspect that such expressions of satisfaction (often given on the spur of the moment) cannot provide a precise and faithful reflection of customers’ real attitudes (Coelho and Esteves, 2007).

A second approach is to measure satisfaction indirectly. This most often takes the form of surrogate indicators of satisfaction (market share, number of complaints, repeated purchases, etc.) or the monitoring and evaluation of customer behavior. This approach also has advantages and disadvantages. Its proponents often emphasize that what matters to an organization is results such as whether customers purchase a product or service (Saeidi *et al.*, 2015). It is hard to disagree with this logic because in the normal run of things no enterprise can function for long without commercial success. On the other hand, these indirect methods of measuring satisfaction are criticized for a lack of informativeness (O’Connell and O’Sullivan, 2013). If a negative trend is detected in market share, for example, the monitored indicators are often unable to identify the cause of the decrease.

Several complex methods have tried to find common ground between the two approaches to make full use of their advantages and mitigate their disadvantages. They often rely on a combination of psychometric and behavioral factors that permit a more faithful reflection and exact quantification of customer satisfaction. Many such methods include the term “loyalty”. Customer loyalty can be understood as a sort of simplified summary indicator of a customer’s attitudinal and behavioral tendency in preferring one brand (product or service) over others (Watson *et al.*, 2015). The literature includes a large amount of empirical evidence of connections between customer satisfaction and loyalty.

3. Satisfaction and its relationship to loyalty

Customer satisfaction is one of the preconditions for the development of loyalty. The principle of loyalty is based on the creation of a psychological bond between a customer and a firm, brand or product. This bond manifests itself in the form of repeated purchases, a degree of price tolerance or positive recommendations from customers (Meyer-Waarden, 2008; Choi and Choi, 2014; Wieseke *et al.*, 2014). As a rule, building customer loyalty is a long-term process in which customer satisfaction plays a key role. In the past, it was demonstrated that increasing customer satisfaction leads to an increase in customer loyalty, which in turn leads to an increase in profitability (Hallowell, 1996). Some authors state that satisfied customer's affect toward a service provider could motivate the customer to patronize the provider again and recommend the provider to other customers (Lam *et al.*, 2004). Customer satisfaction is, however, not the only factor that influences the resulting degree of customer loyalty. Kuusik and Varblane (2009), for example, define four basic factors that influence loyalty: satisfaction, image, the importance of relationship and trustworthiness. Another study looked at the effect of the five dimensions of the SERVQUAL (Service Quality) model (reliability, responsiveness, tangibility, empathy and assurance) on loyalty and identified interrelationships (Vasumathi and Subashini, 2015). SERVQUAL was originally developed by Parasuraman *et al.* (1985) in the form of the scale used to measure service quality in a wide variety of service environments (Ladhari, 2009). Differences in measuring customer satisfaction with the product and with the service raise from differences between product and service. While measuring service satisfaction often includes primarily perceptual attributes, product satisfaction attributes often focus on physical design and functionality, which is easier for the customer to quantify. Nevertheless, it can be stated that both in the case of measuring satisfaction with the service and in the case of measuring satisfaction with the product, the relationship between satisfaction and loyalty is significant (Yu and Fang, 2009). There are different views on the main factors that contribute to loyalty but nearly all studies agree that customer satisfaction is the main predictor of customer loyalty (Kandampully and Suhartanto, 2000; Han and Ryu, 2009; Setó-Pamies, 2012; Ažman and Gomišček, 2015). Some differences between the measurement of satisfaction and loyalty should also be mentioned. Satisfaction is traditionally measured with attitude measurement scales built with items that refer to all aspects of the product or the service. The level of satisfaction with these items/aspects (sometimes referred to as quality attributes) determines overall customer satisfaction. Not every attribute of a product or service has the same effect on overall satisfaction. This is most often explained in the literature by different perceptions of the importance of attributes or a nonlinear relationship between attribute "quality" and overall customer satisfaction (Mkpojiogu and Hashim, 2016). Measuring loyalty on the other hand implies observing repeated behavior and/or knowing quantities bought of the different brands. This behavior is manifested, for example, by positive recommendations, repeated purchases or price tolerance (Kotler, 2000). Despite these differences, however, several integrated approaches based on satisfaction/loyalty level assessment are used in measuring satisfaction and loyalty. Empirical evidence suggests relatively strong links between satisfaction and loyalty (Lam *et al.*, 2004) on which these integrative measurements are based.

A customer can only form a bond with a brand, product or company based on positive associations. Businesses often promote their brand by building a brand image or personality but no brand management activities can have much effect unless a customer has direct experience of a product or service (Kuusik and Varblane, 2009). Measuring customer loyalty alongside customer satisfaction is a very reasonable step because it indicates the risk of losing a customer and their transfer to a competitor.

4. Methods of measuring customer loyalty and classifying customers

It is relatively difficult to define a precise method for measuring customer satisfaction. Measuring customer loyalty is more difficult still. The main reason for this is that whereas customer satisfaction represents the set of attitudes existing in the current moment, customer loyalty is based on long-term attitudes developed in response to multiple factors that may be internal (personal experience) or external (advertising, reported experiences, social factors, etc.). The literature includes a variety of approaches to quantifying the degree of customer loyalty ranging from the very simple to the relatively complex. The following examples illustrate the different levels of complexity.

One of the simplest methods of expressing customer loyalty is the net promoter score (NPS). NPS was first introduced by Reichheld (2003) to track customer loyalty, engagement and enthusiasm. The NPS concept is based on the evaluation of customer satisfaction and customer loyalty using a scale from 0 to 10 points. Customers are placed in one of three categories depending on the value they report. If customers report value from 0 to 6, they are considered "detractors", a value of 7 or 8 represents the "passively satisfied" while a value of 9 or 10 represents "promoters" who have the greatest potential to spread positive recommendations. The authors of the NPS interpreted this scale in such a way that it expresses customer satisfaction at lower levels and customer loyalty at higher levels. Thus, they simply integrated the link between satisfaction and loyalty into this scale, with the aim of maximally simplifying the interpretation of customer opinions on the organization or product. NPS is designed to implement universal principles and be applicable to any situation. Despite these clear advantages, there are relatively strong arguments why NPS cannot be the main KPI for quality improvement. For example, Kristensen and Eskildsen (2011) claim that NPS is an inefficient and unreliable measure of customer loyalty and point out that there are several more suitable metrics for the same purpose such as the American Customer Satisfaction Index (ACSI) or the European Performance Satisfaction Index (EPSI). It should be noted that the parallels between the NPS and ACSI or EPSI metrics are relatively obvious, as both essentially measure customer satisfaction (NPS mainly on the lower scale levels). Evaluating loyalty only through the NPS leads to problems with accuracy, diagnostics and ultimately also to more problematic quality improvement.

A slightly more complex view of loyalty than NPS is offered by the loyalty ladder approach. This is a more detailed classification of customers into groups depending on their degree of loyalty. The literature includes various definitions of the levels of the loyalty ladder. For example, Kuusik and Varblane (2009) list five levels of customer classification: leavers, reducers, dubious, loyal and committed. Other studies make a more detailed breakdown of the "upper" levels of the loyalty ladder. An example is the study by Narayandas (2005), which divides customers' loyal behavior into several levels: (1) wants to grow the relationship; (2) endorses products; (3) resists competitors' blandishments; (4) is willing to pay premiums; (5) seeks to collaborate on new product development and (6) may invest in you. This view permits a more accurate categorization of customers and a better estimate of the risk of losing a customer. An even more detailed loyalty ladder approach can be found in Mascarenhas *et al.* (2006), which considered total customer experience and lasting customer loyalty. In their view, the customer loyalty ladder can be seen as an aggregate of three more detailed perspectives. The authors identified these perspectives as (1) differentiated value ladder (at the top of which is community branding); (2) interactive relationship ladder (at the top of which is a long-established relationship) and (3) total customer experience ladder (at the top of which is lasting customer loyalty). As can be seen from the above, loyalty ladder approaches permit a wider-ranging view of the issue of customer loyalty and can make a contribution to addressing the issue. While loyalty tends to focus on a customers' behavior, satisfaction can be seen as an orthogonal perspective concerned with customers' attitudes. For this reason, the loyalty ladder concept was later expanded into a more complex form – the loyalty matrix.

This loyalty matrix is the third and most complex expression of customer loyalty. As in the previous examples, the main aim is to categorize customers. A loyalty matrix is made up of two dimensions – loyalty and satisfaction (Tanford and Baloglu, 2012; Aktepe *et al.*, 2015). The matrix is divided into four quadrants, one of which is identified as "not loyal" and comprises customers with a low degree of satisfaction and loyalty, while "true loyal" comprises customers with a high degree of both satisfaction and loyalty. A third category is "spurious loyal" where there are customers with a high degree of loyalty but a low degree of satisfaction. Such customers are often found in monopoly markets that offer either no alternative or only very limited alternatives to the dominant product or service. The fourth category is "latent loyal" customers, who are characterized by a high degree of satisfaction but a low degree of loyalty. The loyalty matrix permits a more precise categorization of customers because it takes account of a customer's attitudes and behavior at the same time. In terms of method, the production of a loyalty matrix involves determining both the customers' degree of satisfaction and their loyalty (for example, using loyalty ladder method). Both these degrees have a linked character and allow the customer to be classified into one of the four categories mentioned above. The accuracy of categorization can be enhanced by using cluster analyses (Hosseini *et al.*, 2010) or structural equation modeling (Aktepe *et al.*, 2015). Figure 1 represents a typical form of customer loyalty matrix. The figure shows a different approach to measuring satisfaction and loyalty. When measuring satisfaction, the degree of requirement fulfillment is evaluated – a scale from 1 (very dissatisfied) to 5 (very satisfied)

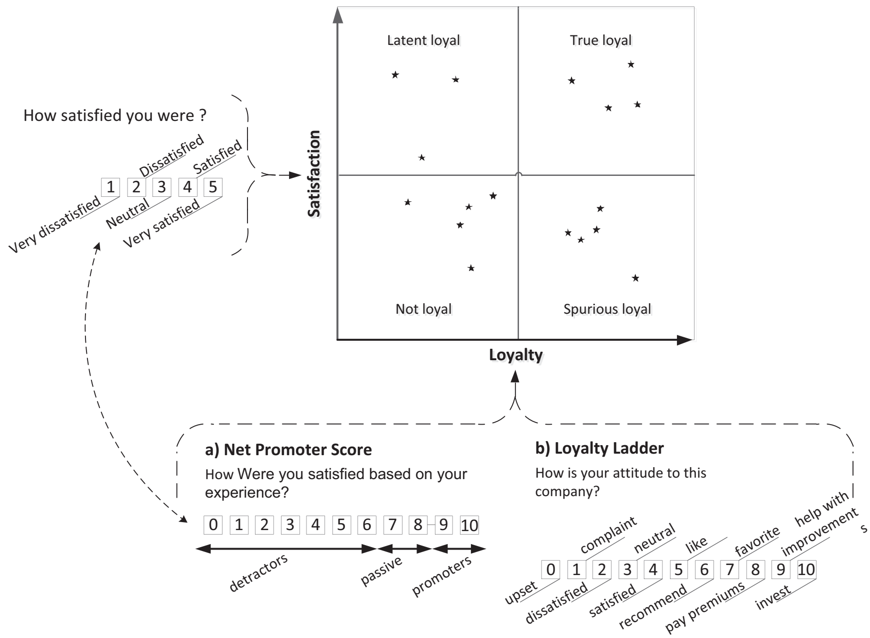


Figure 1.
A typical customer loyalty matrix

is used, This evaluation represents the y-axis of loyalty matrix. A scale from 0 to 10 is also used to measure loyalty, but its levels represent the intended behavior of the customer. This rating represents the x-axis of the loyalty matrix. NPS is an integrative approach to measuring satisfaction and loyalty. Therefore, it is in principle related to both axes of the loyalty matrix.

However, the reason that NPS is used for measuring customer loyalty is due to the way that the results are analyzed. In both approaches, a similar question is asked, but in NPS, the results are analyzed based on the segmented frequency of responses. Therefore, the results of NPS with an 1- point scale can be used instead of customer satisfaction with a scale of Likert five points scale.

5. Risk priority number (RPN)

In failure modes and effects analysis (FMEA), the failure occurrence, severity and detection (risk factors) scores are used to calculate risk priority number (RPN). The RPN values are utilized to rank failures (Geramian *et al.*, 2019). FMEA is designed to categorize risk factors and a loyalty matrix categorizes customers. FMEA assesses each risk factor on three scales – severity (S), occurrence (O) and detection (D) (Shaker *et al.*, 2019). Each of these factors can be assessed on a scale from 1 to 10. The result of the assessment is a list of all the risk factors and their calculated risk priority number (RPN).

$$RPN = S \times O \times D \tag{1}$$

A risk factor can be classified at various levels depending on the size of the RPN. The resulting RPN can have a value from 1 to 1,000 (excluding prime numbers) (Balaraju *et al.*, 2019).

6. Proposed method of categorising customers using a three-dimensional loyalty matrix

FMEA is concerned with risk, while the loyalty matrix is concerned with loyalty. If FMEA is to be used as the basis for a three-dimensional loyalty matrix, risk must be replaced by loyalty. This would give a "Loyalty Priority Number" (LPN) as a replacement for RPN in FMEA.

In FMEA, severity represents the maximum size of the potential negative effect of the assessed risk factor. This negative effect is most commonly expressed as the cost of risk (Rhee and Ishii, 2003). By applying parallel logic to a loyalty matrix, severity could be replaced by the size of the positive impact. There are various professional views on the types of positive impacts that customers have on enterprises. There is a general consensus that the largest positive impact is seen in economic terms – customer purchase value (V) (Ho *et al.*, 2012).

The occurrence of failure represents the probability that the given risk factor will occur. This probability is usually expressed as the frequency of occurrence of the studied situation. Occurrence can be evaluated by an expert estimate or based on historical data reporting the incidence of the given error/situation. As a parallel of error occurrence, the loyalty model should use the frequency of a positive event such as purchase frequency (F) (Shah *et al.*, 2014).

Detection represents the probability that a potential error will be detected before it reaches a customer. The main reason for including detection is to capture the potential duration of risk. A positive effect that could serve as a parallel of detection is customer loyalty (L). As mentioned above, customer loyalty represents the aggregate of an individual's long-term attitudes and as such can represent the opposite of detection.

The key indicator for the categorization of risks in FMEA is the RPN. The equivalent for customer categorization would be an LPN calculated using the following equation.

$$\mathrm{LPN} = \mathrm{V} \times \mathrm{F} \times \mathrm{L} \tag{2}$$

This index would show the relative importance of customers for an organization's long-term prosperity. As in the case of FMEA, the individual components of the LPN – the values V, F, and L – can provide more specific information if the organization wishes to strengthen or reduce the number of customers in a category. The above explanation of the research methodology is briefly illustrated in Figure 2.

In this study, a 2D loyalty matrix and a 3D loyalty matrix are developed and analyzed, using data collected from a sample of customers referred to restaurants. In the 2D loyalty matrix, the results of two indicators of NPS (instead of customer satisfaction) and loyalty ladder are applied. In the 3D loyalty matrix as the main developed model of this study, the results of the three indicators of the frequency of purchase (F), the value of customer purchase (V) and loyalty of customer (L) are applied, representing LPN as the proposed indicator of customer loyalty.

A questionnaire is designed for collecting the survey data. A scale of 1–10 is considered for the range of responses for all of the study variables – i.e. frequency, customer purchase value, loyalty, satisfaction, attribute satisfaction – for equality of the range of responses and ease of analysis. The questionnaire was divided into six parts. The first part rated the frequency of purchase, which was expressed on a scale from "1 = almost never" to "10 = very often". The second part evaluated the value of the customer purchase, with the scale representing from "1 = only symbolic amount of money" to "10 = considerable amount of money". The third part was focused on customer loyalty evaluation. This evaluation was carried out by expressing the intentions of the customer's behavior, offering options from "1 = I would like to complain" to "10 = I would like to invest to this company". The fourth part rated customer satisfaction on a scale from "1 = very dissatisfied" to "10 = very satisfied". This scale represented the NPS. The other two parts of the questionnaire were focused on the evaluation of the attributes of the service – a standard measurement of satisfaction with the attribute (fifth part of the questionnaire) and assessment of attributes using the Kano model (sixth part of the questionnaire). Due to the limited scope of this study, the fifth and sixth parts of the questionnaire in this study have not been analyzed and interpreted and will be the subject of follow-up research. A sample of the designed questionnaire is presented in the Table A1.

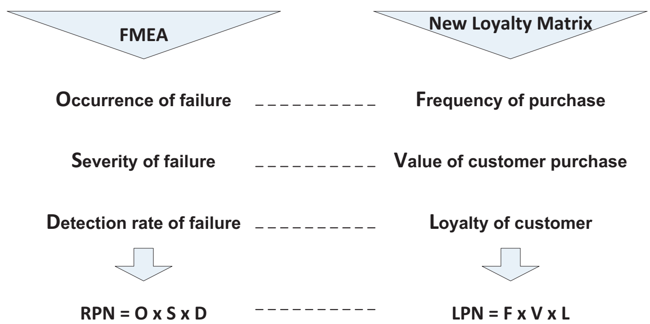


Figure 2.
LPN a new indicator of customer loyalty

7. Case study

The area of restaurant services was selected to verify the validity of the proposed procedure. There are several studies in the literature that have focused on the quality of restaurant services (Namkung and Jang, 2008). Over time, key service quality attributes have been profiled. As part of a broader research plan, a comprehensive questionnaire was created containing questions about the frequency of restaurant visits, the average sum of money spent at the restaurant, the customer's loyalty to the restaurant and overall satisfaction with the services. Other sections of the questionnaire contained eight quality attributes and paired questions related to the Kano model – but these results will be published in subsequent research later. The results of the survey were divided into five subchapters. In the first three, the results are analyzed using the three approaches examined – NPS, loyalty ladder and Loyalty matrix. In the fourth subchapter, these results are compared in order to present similarities and differences. The fifth subchapter presents the results based on the new methodology, which should both validate the approach and point out the ways of its use on a practical example.

12 experts including seven university faculties in the field of marketing management and five restaurant managers were asked to confirm the questionnaire. They were selected using snowball sampling and were asked to confirm the validity of the questionnaire. For this purpose, the Content Validity Index (CVI) was used. Experts were asked to sign the consent form and then rate the CV of each item as follows: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant and 4 = highly relevant. Only items that scored three or four were defined as relevant, and the content validity index (CVI) was calculated using the following equation:

$$\mathrm{CVI} = \frac{\text{Number of experts who evaluated the item with 3 or 4}}{\text{Total of experts}}$$

According to the Lawshe's table, the minimum value for confirming content validity should be 0.620 (Shultz *et al.*, 2013). Results indicated that the CVI was 0.833; hence the content validity was confirmed.

The survey was conducted in the first half of 2019. For data collection – restaurants were collected in two cities – one in Slovakia (SK) and one in Iran (SK). In Slovakia, data were collected from 12 restaurants, and a total of 404 valid completed questionnaires were returned and processed. 14 restaurants were addressed in Iran, of which 611 valid completed questionnaires were returned and processed. The total sample consisted of 1,015 valid questionnaires. A subsequent statistical test of the reliability of the scale used reached Cronbach's alpha 0.844, and the scale was validated (the minimum recommended value is 0.700).

Overall, 465 men (45.8%) and 550 women (54.2%) were involved in the survey. There were 55 (5.4%) respondents with primary education, 481 (47.4%) with secondary school education, 269 (26.5%) college and 210 (20.7%) university graduates involved in the survey. The average age of respondents was 42.7 years, and the standard deviation was 16.3 (SK mean = 41.1, SD = 13.8; IR mean 43.7, SD = 17.7). Figure 3 shows the age categories and education proportion of the two countries involved.

7.1 Results based on NPS approach

The basis for processing the NPS results was one question: How were you satisfied with this restaurant? The respondents were supposed to determine their satisfaction on a scale from 1 – very dissatisfied to 10 – very satisfied. Average satisfaction rate was 7.58 with a standard deviation of 1.72. Descriptive statistics indicators along with a histogram are shown in Figure 4.

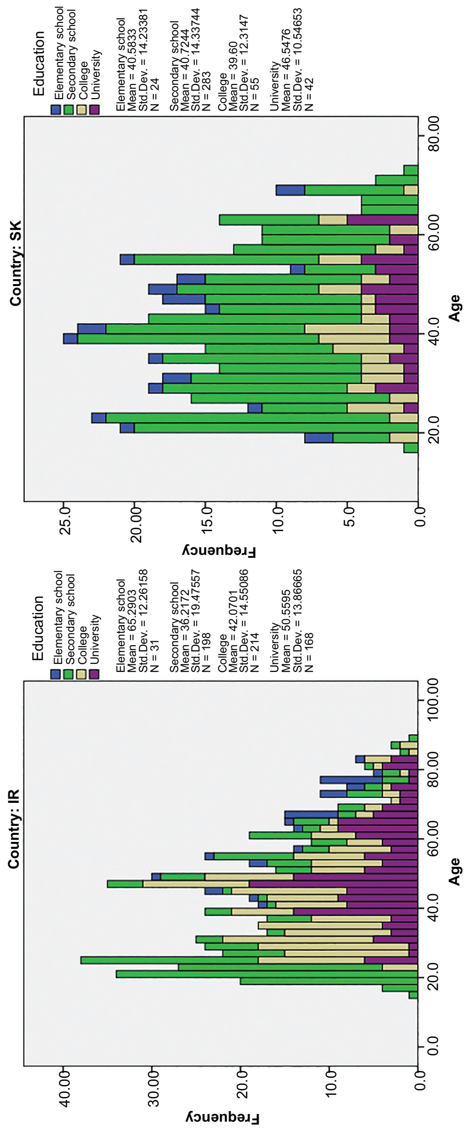


Figure 3.
Demographic characteristics of sample

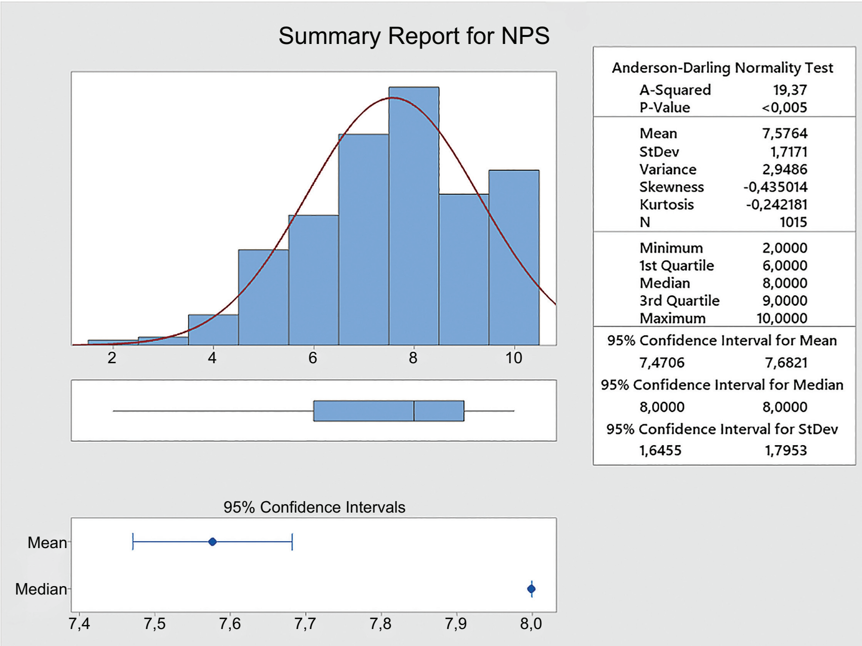


Figure 4.
Descriptive statistics of results based on NPS

According to the original NPS methodology, it could be stated that the number of detractors (satisfaction values up to 6) was 257 respondents (25.3%), passive satisfied (satisfaction values 7 and 8) were 437 respondents (43.1%) and the number of promoters (satisfaction values 9 and 10) was 311 (30.6%). The data do not have a normal distribution, as evidenced by the position of the quartiles. Responses are concentrated at higher values (especially value 8). This confirms the positive tendency of respondents to overestimate their satisfaction, which has also been recorded in the past (Tullis and Albert, 2013).

7.2 Results based on loyalty ladder approach

When evaluating the loyalty of customers, a question concerning customer attitudes was used: Which category represents your attitudes or behavior when you visit the restaurants? Respondents had ten options: 1 - I would like to complain, 2 - I was dissatisfied, 3 - I was neutral, 4 - I was satisfied, 5 - I like this restaurant, 6 - I recommend this restaurant to my friends, 7 - It is my top restaurant, 8 - I am willing to pay premiums, 9 - I would like to cooperate on service improvement and 10 - I would like to invest in this restaurant.

According to Figure 5, The loyalty rating was obviously lower than the satisfaction measurement. The average value was 5.25, and the standard deviation was 1.39. Quartile and median positions indicate the centrality of responses, but it has not been shown that the data has a normal distribution. Based on our results, we can conclude that in the evaluation of loyalty respondents tend to choose the middle level, which may be due to a higher competition of restaurants with each other. The group of dissatisfied or neutral customers (rating 1 to 3) consisted of 83 customers (8.2%). The group of satisfied customers (rating 4 to 7) consisted of 886 customers (87.3%). The group of the most satisfied customers (rating 8 to 10) consisted of 46 customers (4.5%).

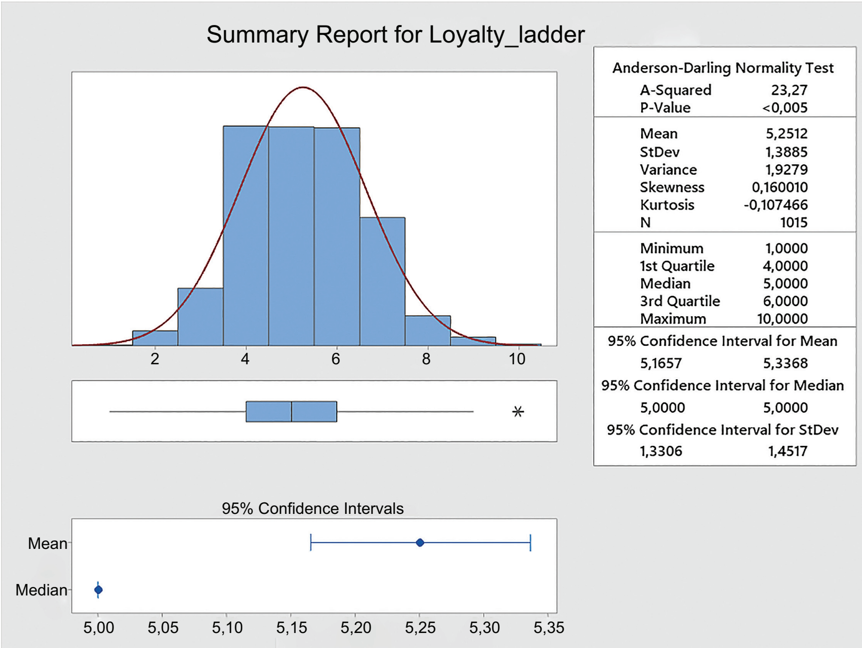


Figure 5.
Descriptive statistics of results based on loyalty ladder

7.3 Results based on loyalty matrix approach

In assessing loyalty through the loyalty matrix, two issues from the previous approaches (NPS and loyalty ladder) were taken into account. These results were combined into a two-dimensional chart, and each respondent was assigned a satisfaction value (S) and a loyalty value (L). The bubble chart in Figure 6 represents the distribution of customers into four quadrants. The bubble size corresponds to the number of customers. The picture shows that

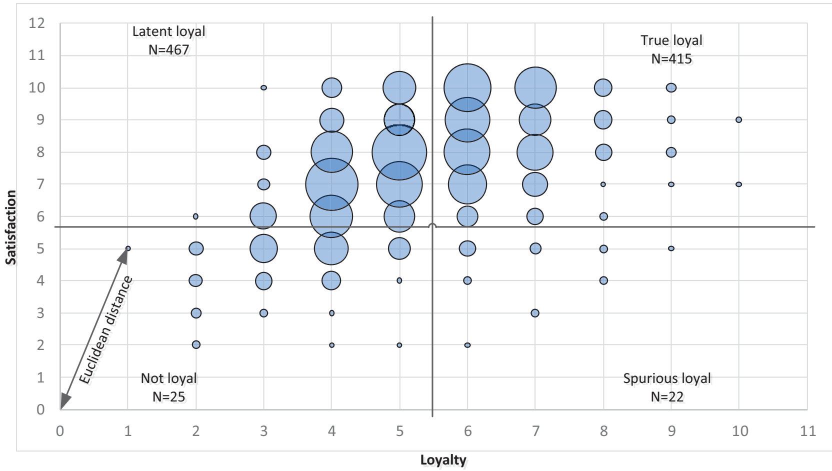


Figure 6.
Loyalty matrix

most customers were categorized as latent loyal or true loyal. In order to consistently compare the results obtained through the loyalty matrix with the results of the previous two approaches (NPS and loyalty matrix), it was necessary to transform the results into one numeric variable. The higher was the recorded value of customer satisfaction and loyalty, the more they could be considered true loyal. Thus, in a geometric sense, we could say that the more a customer's position moves away from [0; 0], the more loyal are the customers.

A particular customer's distance in two-dimensional space can be calculated as the Euclidean distance from the zero coordinate – in Figure 6 shown at bottom left. After calculating the Euclidean distance, the results were processed by descriptive statistics - Figure 7.

The results are a combination of the NPS approach and the loyalty ladder. Also, in this case, the normality of the data was not confirmed. Mean and median are at approximately the same values (9.28 and 9.43, respectively), indicating the relative centering of the data. Practically, this means that most customers will be in the middle of the loyalty matrix. Their inclusion in individual quadrants may thus not fully correspond to reality and may lead to miscategorization. If we compare the NPS results and the results obtained through the loyalty matrix, the number of customers with low loyalty is significantly different (in the NPS 25.3% of respondents were categorized as detractors; in the Loyalty matrix only 2.5% of respondents were not loyal). A statistical comparison of the similarities between the three approaches can be found in Section 7.4.

7.4 Comparison of results of NPS, loyalty ladder and loyalty matrix

NPS, loyalty ladder and loyalty matrix approaches have a common purpose – to determine the extent to which a customer is loyal to a particular company. This rate can be one of the quality indicators, but it can also serve to categorize customers into groups for which

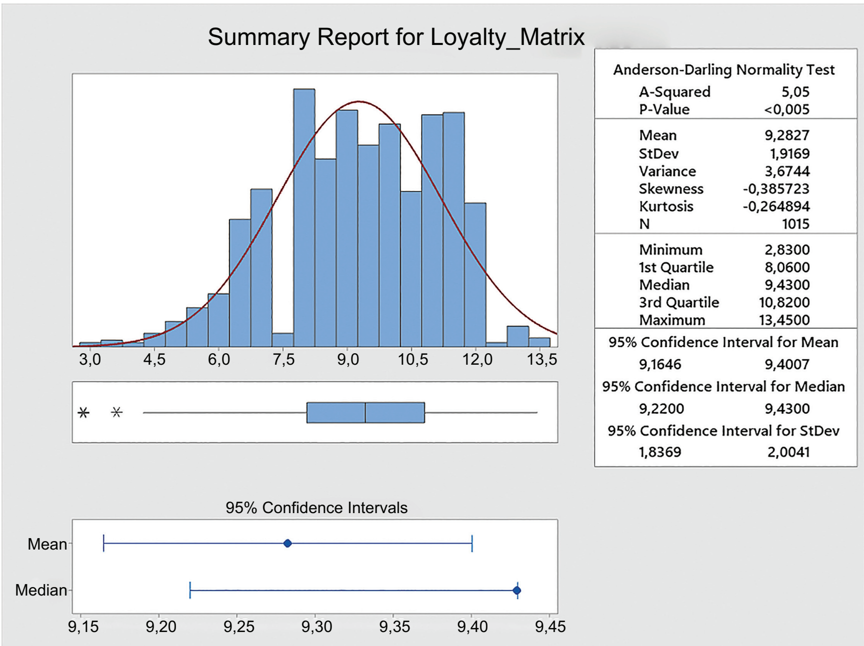


Figure 7.
Descriptive statistics of results based on loyalty matrix

different marketing strategies can be applied. Ideally, the three approaches should offer the same results. In reality, however, the results may differ, and the match rate can be determined by bivariate correlation analysis. Figure 8 shows an overview of the results obtained through the NPS, loyalty ladder and loyalty matrix.

An overview of the values of the Pearson correlation coefficient r shows the intensity of the relationships between these three approaches (CI represents 95% confidence intervals for r). The least intense relationship has been shown between NPS (measures satisfaction) and the loyalty ladder (measures loyalty). Since each of them "measures" a different entity, this finding is logically justified. The loyalty matrix is an access aggregating information from NPS and loyalty ladder. It is quite interesting to find that a higher correlation was identified between the NPS and loyalty matrix ($r = 0.922$) than between the loyalty ladder and loyalty matrix ($r = 0.784$). This is probably due to the fact that the data obtained through NPS have a higher degree of variability and thus have a greater impact on the result of the categorization through the loyalty matrix. In practical terms, however, it can be stated that measuring loyalty through all three approaches does not produce consistent results. The legitimacy of the procedure outlined in Section 6, therefore, appears to be justified.

7.5 Three dimensional customer categorization – a new approach based on loyalty priority number

The previous three approaches took into account customer satisfaction and customer loyalty. Both of these views are associated with the customer's attitudes and reflect the extent to which his/her requirements are met. However, it is suggested to take into account behavioral loyalty factors – the frequency of purchasing services or products and the value of the average purchase too. In addition to loyalty, we receive two other aspects that can be used to categorize customers. Respondents had the opportunity to express their loyalty (L), frequency of purchase (F) and an average value of the purchase (V) in the interval from 1 to 10. Multiplying all three values gave LPN - loyalty priority number.

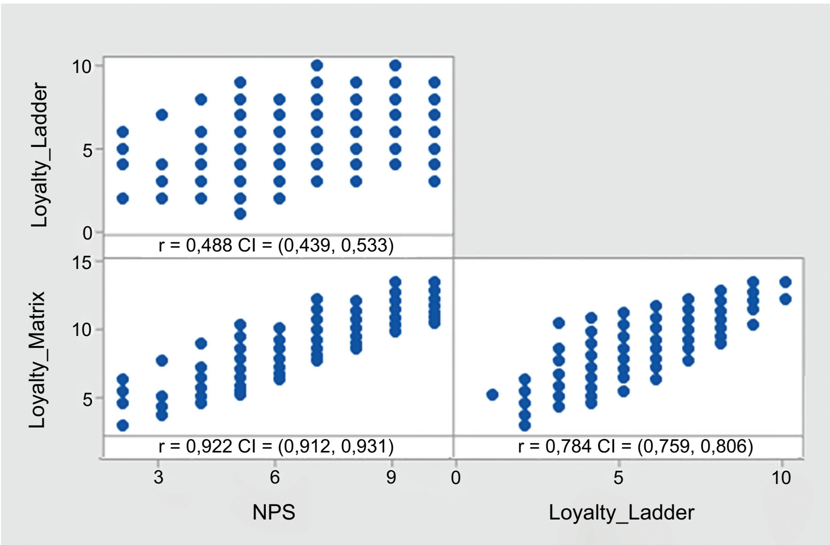


Figure 8.
Comparison of results based on NPS, loyalty ladder and loyalty matrix

LPN is a summary of the customer's attitudes and behavior. Therefore, it can be used to categorize customers. The organization can choose the number of categories, or it is possible to use one of the cluster analysis procedures. In our case, we chose four approximately equal categories. We divided our customers into four categories according to LPN: the first category is random customers (LPN from 1 to the first quartile), the second category is bronze customers (LPN from the first quartile to the median), the third category is silver customers (LPN from median to the third quartile) and the fourth category is gold customers (LPN from the third quartile to 1,000). Figure 9 shows the results of this categorization.

It can be seen from the figure that the last customer category shows a relatively large range of LPN values. These are the customers for which all three components of loyalty, i.e. loyalty, frequency of purchase and value of purchase have relatively high values. They bring the highest revenue to the organization, and it would be necessary to adapt marketing communication accordingly. Individual customer groups can also be presented using a three-dimensional scatter chart. Figure 10 shows the results of the customer categorization as well as the centroid positions of each category. Customer groups are vertical to the diagonal of the coordinate system, which is understandable since the segmentation criterion was LPN, which is a multiple of these three dimensions, and loyalty is depicted on the vertical axis.

8. Discussion

Customer segmentation is one of the first steps in targeted marketing (Van Raaij, 2005). Marketing strategy development and product portfolio selection for different customer groups is often based on segmentation results. Segmentation criteria can be of different types – demographic, geographical, psychographic, behavioral or their combination – and their choice should take into account the rational expectations of segmentation. The present study

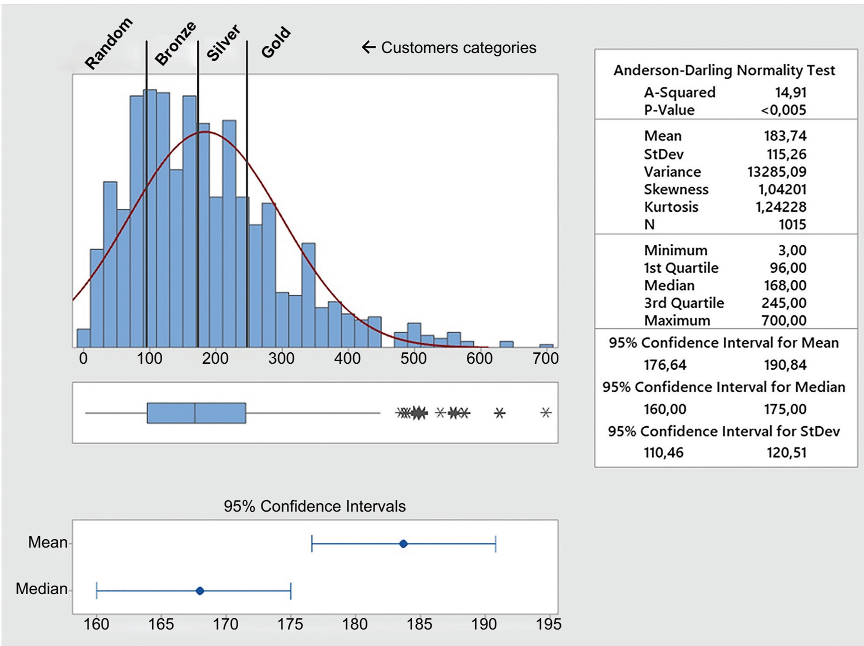
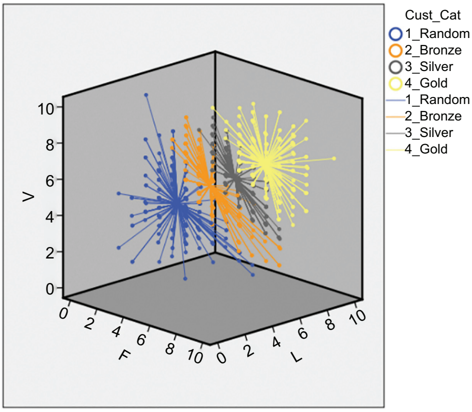


Figure 9.
Descriptive statistics of results based on LPN



Centroids position

Cust_Cat		V	L	F
1_Random	Mean	4.51	4.07	3.32
	Std. Deviation	1.566	1.126	1.424
	N	231	231	231
2_Bronze	Mean	5.72	4.83	4.97
	Std. Deviation	1.458	1.086	1.403
	N	261	261	261
3_Silver	Mean	6.19	5.61	6.05
	Std. Deviation	1.265	1.152	1.402
	N	258	258	258
4_Gold	Mean	7.15	6.34	7.58
	Std. Deviation	1.318	1.069	1.321
	N	265	265	265
Total	Mean	5.94	5.25	5.55
	Std. Deviation	1.686	1.389	2.068
	N	1015	1015	1015

Figure 10.
Segmentation based on LPN (left) and centroid positions (right)

offers an approach designed to categorize customers through a combination of their attitudes (loyalty) and behavior (frequency and value of the purchase). Access has been verified through a survey on the quality of restaurant services. The methodology itself and the results of the survey pointed to several topics that are discussed in the following sections.

8.1 Managerial implications

Choosing a customer segmentation method should reflect an organization's requirements. The three approaches used – NPS, loyalty ladder and loyalty matrix – were complemented by a new loyalty priority number (LPN) approach. To see the degree of similarity, the results obtained by LPN can be compared to those obtained through the previous three approaches. All four approaches (three existing and one new) offer numerical results, so bivariate correlation analysis can be used to compare them. Figure 11 shows the result of comparing LPN against three existing approaches: Net promoter score (NPS), loyalty ladder and loyalty matrix.

From Figure 11, it can be seen that the match rate of the results expressed by Pearson correlation coefficient r is relatively low. From this, it can be concluded that the results obtained by LPN will allow the classification of customers in other categories as would be obtained through three traditional methods. It can be assumed that this is due to the addition of other (behavioral) dimensions to segmentation. At the same time, it can be assumed that adding these dimensions will increase the segment definability – that is, the internal properties of the groups will be more consistent. In the meantime, however, it must be said that this is a presumption that can be confirmed by other applications of the proposed methodology. While all the data and results were used for customer segmentation, even after segmentation, the obtained results can be further analyzed for different segments of

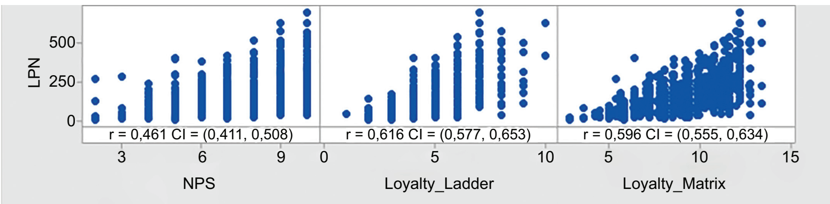


Figure 11.
Comparison of LPN according to NPS, loyalty ladder and loyalty matrix

customers, separately. In such a case, the bivariate correlation analysis might provide different results. Consequently, if for a segment of customers, the correlation coefficient becomes high, the influence of customer loyalty on the frequency of purchase and purchase value would be meaningfu,l and it can be concluded that such customers are truly loyal.

The areas in which the proposed approach may be implemented are not sectorally limited. The approach can be used in virtually any industry where customer loyalty can be expressed not only by their attitude to products of a particular organization but also by the frequency and value of purchases. The application of the methodology assumes the use of a questionnaire survey, which may not be extensive at all – it only needs to include questions about loyalty, frequency of purchase and value of the purchase. These three variables are the basis for calculating the loyalty priority number and the associated customer categorization. It should be noted that depending upon the availability of data, the values of frequency of purchase and value of the purchase can be objective rather than subjective. They can be extracted from a firm's documents. If so, consistency of the scale of data for all three multiplied values matters, but it is not a serious problem and the scales can be easily normalized.

The rule "it's cheaper to retain a customer than attract a new one" also applies here. The results of the proposed approach applied for segmenting customers might not remain valid for a long time and might not be true for every customer. In fact, it is better to classify further the customers in each group, particularly the silver and gold groups into two different groups of more and less critical. For this purpose, customer life value (CLV) can be very helpful. Therefore, the proposed approach can bring to the managers an initial segmentation of customers, which in turn can be further developed.

8.2 Theoretical implications

According to some studies, customer loyalty assessment is an essential part of customer relationship management (Verhoef *et al.*, 2010; Kumar and Shah, 2004). Loyalty studies tend to focus on customer perception of value (McDougall and Levesque, 2000), factors influencing loyalty (Lin and Wang, 2006) or on the relationship between loyalty and customer satisfaction (Kim *et al.*, 2004; Kandampully and Suhartanto, 2003; Bowen and Chen, 2001). Methods of measuring loyalty may vary, but in general, e-commerce is one of the areas with the greatest customer segmentation implementation. To some extent, the dominance of e-commerce on the issues related to customer segmentation is logical. Segmentation can be seen as a statistical procedure based on input data (segmentation criteria). In e-commerce, such data can be obtained relatively easily from the information system.

Segmentation in the field of e-commerce is relatively frequent in the literature, and the most frequently applied segmentation approaches include the RFM segmentation – based on three segmentation criteria: recency, frequency, monetary (Fader *et al.*, 2005). However, RFM segmentation can only be used when transaction data are usually available from an information system. However, in some sectors such data are not available or available, they are anonymized. In such cases, the approach proposed in this study can be used, in which the data needed to segment and calculate LPN are collected through a survey.

Concerning the three traditional segmentation approaches based on customer loyalty – NPS, loyalty ladder and loyalty matrix – some theoretical implications can be developed. Segmentation based on the Net promoter score (NPS) shows signs of simplicity, but the risk of very rough customer classification is relatively high. In the past, the NPS approach was criticized in a study by Kristensend and Eskildsen (2011) who declared that this metric is inefficient and unreliable for customer loyalty and customer segmentation. According to our results, this statement can be confirmed. Customer loyalty is too complex to categorize a customer by expressing one number (NPS). This is also true if we consider this figure to be absolutely accurate – since it is a psychometric indicator, this is not possible. Once we add other variables (in our case frequency and value) to the segmentation criteria, the results will differ significantly from the NPS (Figure 11). Regarding the shortcomings of NPS as an indicator of loyalty, the approach was used for measuring customer satisfaction. Based on Figure 1, there were two ways of measuring customer loyalty: the NPS and the loyalty ladder. As illustrated in the figure, authors preferred to use NPS instead of customer satisfaction due to their similarities and also because responses to the questionnaire will be given based on a scale of a wider range. From this point of view it can be mentioned that while NPS is not a good measure of loyalty, it can enhance the measurement of customer satisfaction. Expressing loyalty through loyalty levels that would express a customer's attitude to an organization's products could logically appear to be a more accurate metric. However, our results show that segmentation through the loyalty ladder is also very general and customer categories can only be very rough (the correlation coefficient between LPN and loyalty ladder was 0.488). The natural tendency of customers to overestimate their satisfaction will also be transformed into results obtained through the loyalty matrix (the correlation coefficient between NPS and loyalty matrix was 0.922). As the loyalty matrix extends customer segmentation from loyalty to satisfaction, it might seem to be a more complex and therefore more accurate approach to segmentation. However, our results did not confirm this. With standard quadrants reflecting customers division, virtually all customers were classified as latent loyal (46.8%) or true loyal (40.9). Customers have thus "merged" into two high-number categories at the expense of two low-number categories.

Our approach allows us to categorize customers according to three aspects – loyalty (L), frequency of purchase (F) and purchase value (V). The result is the loyalty priority number (LPN), which is the basis of customer segmentation into four categories – golden, silver, bronze and random. The three-component FMEA logic was used to design the approach. It has been modified to use the inverted logic of FMEA itself, which has so far been used only in isolated cases (Madzík, 2019). The original purpose of FMEA is to prevent errors. The presented approach uses some FMEA components for a different purpose– customer segmentation. Using a 3D shape for analysis in addition to numerical computation of values does have a background in research. Similar to the development of 2D to 3D loyalty matrix, Shahin *et al.* (2020) proposed a 3D matrix for analyzing RPN. In fact, they developed the traditional risk priority matrix, which was a 2D matrix with occurrence and severy of failure on each axis, to a 3D matrix with an added axis of failure detection rate.

While researchers such as Jahanbazi Goujani *et al.*, (2019a, 2019b) developed the application of 2D customer loyalty matrix in measuring employees' loyalty and their segmentation, the application of the proposed approach of this paper cannot be extended to employee loyalty measurement and segmentation,because apart from the loyalty indicator, the other two indicators of the customer purchase value and purchase frequency cannot be defined for employees.

As mentioned in the managerial implications section, the application of the proposed approach can be further enhanced by including customer life value (CLV). For this purpose, recent studies on the development of such index can be helpful, particularly the study of Shahin and Mohammadi Shahiverdi (2015) can be a good reference of the improvement of CLV based on the Kano model.

It is important to note that the proposed approach can resolve the problems of other tools and techniques. For example, in quality function deployment (QFD), ambiguity in the voice of customer will result in poor results, and segmenting customers or segmenting them based on their requirements will be a very good solution for such a problem (Shahin and Chan, 2006).

Similar to FMEA, in which RPN is used to prioritize failures, the proposed index of LPN can be used to prioritize customers. Similar to FMEA, the scope of the study can be developed further by improving the quality of service and re-measuring LPN after improvement to see how much it is increased. Such a development can be limited to a particular segment of customers of whom the correlation of the three items of LPN is high. Even, such development can be performed for the segment with a low correlation coefficient to see if improvement plans result in meaningful correlation coefficients.

9. Conclusions

This study presents the results of using multiple segmentation approaches based on customer loyalty. The results of the three most widely used approaches – net promoter score, loyalty ladder and loyalty matrix – were analyzed and later compared to the results obtained through the new LPN-based approach and its three components: loyalty (L), frequency (F) and value (V). This allows to categorize customers into four groups according to loyalty and value for the organization: gold, silver, bronze and random. This approach allows for a relatively original and efficient way to segment customers using simple segmentation criteria without complex statistical calculations. The proposed approach can be practically used in any industry where consideration of customer loyalty is relevant. In addition to the segmentation options, the proposed approach also offers an insight into the further use of FMEA and its elements. Such an application of FMEA has not yet been addressed in the literature.

Since an FMEA-based mechanism was applied for proposing the new index of LPN; not only this paper can help service managers and analysts to segment customers better, the development of this approach similar to the technique of FMEA, as mentioned in the theoretical implications, can benefit the managers and analysts in improving the quality of service for particular segments of customers. Since the new approach provides a 3D matrix for customer segmentation, it can lead to more customer segments compared to existing approaches which are mostly based on the 2D matrix. Consequently, the proposed approach can help service organizations to make better and more accurate decisions in their improvement plans regarding their target groups of customers, which in turn leads to more satisfied and truly loyal customers.

10. Research limitations and future research agenda

The proposed methodology was based on a survey and is therefore bound by various survey bias limitations. The first is sampling bias – the risk of sample unrepresentation. Respondents were selected at random. Stratified quota sampling was not used, and therefore the numbers of respondents in individual categories (eg by age, education, or gender) were not determined. After collecting and processing the data, we subsequently tested the sampling bias. The demographic characteristics of the sample in terms of age, gender and education roughly corresponded to the demographic structure of the two countries involved (Slovakia and Iran) – sampling bias was therefore low even though we used a random sampling method. Nonresponse bias refers to a group of respondents who did not want to participate in the survey. Data were collected in the restaurants, and respondents were also customers of the restaurant. However, it is possible that a certain group of customers did not want to complete the questionnaire, which may have partially affected the results. The third type of survey bias is response bias. It is linked to the formulation of questions and concerns tendency. Confirmatory types of questions that can be answered from “totally agree” to “not at all” carry the risk of overestimating the answers. Such questions were not included in the presented research, but partly there was a response bias in the NPS method, where a tendency to overstate customer satisfaction was identified.

Customer satisfaction was totally measured by a single question via the NPS approach, while this indicator can be measured based on a questionnaire of different service quality dimensions, i.e. a question per dimension, not a question per all of the dimensions. In addition, since customer satisfaction is the result of subtracting expectation from perception, the questionnaire for measuring customer satisfaction can be designed with dual questions for each of the service quality dimensions.

In the proposed approach, customer segmentation was performed through quartiles. This is a nonalgorithmic approach. However, from a statistical perspective, various cluster procedures can be used for segmentation – for example, hierarchical clustering, K-means clustering or two-step clustering. These approaches would likely offer different segmentation results even if the same segmentation criteria are used - loyalty (L), frequency (F) and value (V). The results are based on a manual segmentation method, which may be perceived as limiting under certain conditions.

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Appendix

Question group	Questions	Answers
F: Frequency	How often do you visit this restaurant?	1 – almost never ... 10 – very often
V: Customer purchase value	How much money do you usually spend in this restaurant?	1 – only symbolic amount of money ... 10 – considerable amount of money
L: Loyalty	Which category best represents your attitudes or behavior when you visit the restaurant?	(1) I would like to complain (2) I was dissatisfied (3) I was neutral (4) I was satisfied (5) I like this restaurant (6) I recommend this restaurant to my friends (7) It is my top restaurant (8) I am willing to pay premiums (9) I would like to cooperate on service improvement (10) I would like to invest in this restaurant
S: Satisfaction (NPS)	How satisfied are you with this restaurant?	1 – very dissatisfied ... 10 – very satisfied
A: Attribute satisfaction	How satisfied are you with these attributes? (1) Appealing food presentation, (2) Tasty food (3) Spatial seating arrangement (4) Fascinating interior design (5) Pleasing background music (6) Reliable service (7) Responsive service, and (8) Competent employees	1 – very dissatisfied ... 10 – very satisfied
K: Kano	How do you feel if the restaurant has / does not havethese items Appealing food presentation, (1) Tasty food (2) Spatial seating arrangement (3) Fascinating interior design (4) Pleasing background music (5) Reliable service (6) Responsive service, and (7) Competent employees	(1) I like it that way (2) I am expecting it to be that way (3) I am neutral (4) I can accept it to be that way (5) I dislike it that way

Table A1. A sample of questionnaire

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