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APPLICATION OF THE CSI METHOD TO TEST CONSUMER SATISFACTION: A CASE STUDY OF PETROL STATIONS

Summary. Conducting research on the quality of service and customer satisfaction is currently necessary for the proper and effective functioning of any organization. One of the organizations that have changed in recent years is petrol stations. In this paper, the Customer Satisfaction Index (CSI) is used to measure the quality of services and customer satisfaction. This research was carried out with the use of a proprietary questionnaire in which the respondents assessed the level of service at petrol stations. The obtained results allowed identifying the most important areas for the customers of petrol stations. In addition, the developed quality map indicated areas that should be given special attention, improved and those that are least important to customers. The conducted analyzes indicate that the CSI method used in this study is a tool that enables the assessment of customer satisfaction in a complex organization such as a petrol station.

Keywords: CSI method, customer satisfaction, petrol stations, quality; quality management

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1. INTRODUCTION

The effectiveness and efficiency of a company's management processes, especially in the context of quality management, cannot be discussed without measuring, analyzing and assessing the quality level, as well as the customer satisfaction with the purchased products or services. The obtained results may also constitute a starting point for initiating and making decisions aimed at further quality improvement.

Researching the quality of products, services, and customer service, as well as customer satisfaction, is currently necessary for the proper and effective functioning of any organization operating in a complex, changing and often turbulent environment. It is also an important element in gaining a competitive advantage in the market. This study can be carried out both concerning production and service enterprises. However, in the case of the service sector, the precise assessment of quality, and consequently, satisfaction, is a bit more complicated than in the case of the quality of products, as it often depends on the subjective feelings of the consumer, his previous experiences, point of reference, the degree of requirements on the part of the assessor and many other not always measurable and quantifiable elements. In addition, the services themselves are complex and multidimensional in nature, which often makes it impossible to use many tools and parameters, especially those of a quantitative nature. Therefore, it is extremely important to choose and apply an appropriate method to measure the quality of services and customer satisfaction, considering the object, purpose, subject and scope of the research, as it determines the accuracy and reliability of the results obtained [1]. It should also be remembered that service quality is always a prerequisite for customer satisfaction [2].

Many different methods and indicators for measuring service quality and customer satisfaction have been classified and described in the literature. The most frequently used are SERVQUAL, SERVPERF, Martill and James's importance-performance technique, penalty-reward factors, customer satisfaction index (CSI), critical incidents technique (CIT), analysis of complaints and grievances, mystery shopping, the survey method and statistical quantitative methods [3–5].

The market of petrol stations in Poland has been undergoing a steady transformation in recent years, mainly regarding the ownership structure; however, this is not the only direction of change. Petrol station operators realize that a comprehensive and tailored commercial and service offer is what attracts customers. Hence, it can be noticed that the offer of the petrol station adapts to the new requirements of customers - there is a change from the traditional model toward the convenience store model, which makes the petrol station a place where you can "refuel the vehicle" and at the same time make basic shopping, rest during a trip, eat a meal, provide financial services, or perform simple servicing of your vehicle. On the other hand, presently, additional services are the main place of generating profits from the operation of petrol stations. Only highly specialized or extensive stations can afford the activity of merely delivering fuel to vehicles. However, changes in increasing the range of services offered are perceived differently by station customers, so examining which directions of changes are accepted and which are not accepted may affect the level of competition; consequently, getting to know them may be of great importance for enterprises and their functioning in the contemporary market.

Hence, this article aimed to present the problem of the quality of customer service at petrol stations and investigate and evaluate the level of their satisfaction using the CSI method (Customer Satisfaction Indicator).

2. CSI METHOD IN CUSTOMER SATISFACTION RESEARCH

The customer satisfaction index (CSI) is one of the popular indicators for assessing service quality; it is also used in measuring and assessing customer satisfaction with the services provided in the broadly understood TSL sector (transport, shipping, logistics). It enables the measurement and analysis of the level of customer satisfaction and expectations to the features important to him and is classified as a quantitative method.

The concept of the CSI model requires two assumptions [6, 7]. First, it should be remembered that the CSI and other constructs in the model represent different types of ratings that cannot be directly measured. Thus, these constructs should be seen as hidden variables, and the results or indexes should be general enough to be comparable between firms, industries, sectors and nations. Second, the customer satisfaction index must be measured in a way that not only considers the consumption experiences but also looks into the future [8].

The first stage of the procedure for calculating the CSI is collecting complete and reliable information through advanced marketing research. This research begins with the identification of possible factors influencing customer satisfaction, such as product quality, distribution level, as well as the quality of customer service (exploration phase; carried out in the form of a group or individual interview). This may be determined by the company commissioning the service quality survey or, more commonly, determined by the clients themselves. Then the research group is selected, and the research is carried out with the use of a questionnaire containing questions about individual factors determining customer satisfaction - respondents indicate both the importance of a given criterion and its assessment.

In subsequent stages of the research procedure, a hierarchy of identified customer satisfaction criteria is established. Respondents evaluate each criterion regarding the tested organization on an adopted scale (for example, from 1 to 5, where 1 means insufficient and 5 very good), then in the final phase, the CSI is finally calculated [9] - it is the weighted average of the customer satisfaction ratings of the product attributes (rating x weight).

CSI can also be expressed in percentage, which - due to specific intervals - allows for its accurate interpretation (Table 1).

Tab. 1

Criteria for assessing the CSI indicators expressed in percentage
(Wolniak and Skotnicka, 2008)

Range of CSI values (%)	Assessment
0-40	Very dissatisfied - extreme customer dissatisfaction
40-60	Dissatisfied - customer dissatisfaction
60-75	Hesitation - some problems in customer satisfaction
75-90	Satisfied - few problems in customer satisfaction
90-100	Very satisfied - customer satisfaction

After conducting the above research procedure, the value of the achieved CSI for a given service can be compared with companies from the same industry [11]. Customer satisfaction has a positive impact on loyalty; however, the scale of this effect varies greatly, depending on the company and industry [12, 13].

The discussed research concept allows for the measurement and analysis of both the level of customer satisfaction for each feature significant from the point of view of their satisfaction, as well as total satisfaction with the purchase and consumption of the product/service. Furthermore, it also enables further steps to analyze changes in preferences and assess the level of satisfaction with competitors' products [14, 15].

Besides CSI, other well-developed models for measuring customer satisfaction and loyalty are also used around the world: the American customer satisfaction index (ACSI) - based on a system of many equations relating to such variables as customer expectations, perceived quality, perceived value, satisfaction and customer loyalty, and complaints [16] and the European performance satisfaction index (EPSI) indicator, the base structure of which has been changed to adjust the measurement method to the specificity of European markets as much as possible [17]. The EPSI model allows the calculation of the customer satisfaction index using an econometric model that, in terms of causation, links a set of hidden variables (such as customer expectations and customer perceptions of quality and value) with the customer satisfaction index [18]. It should be added that both of these indicators were created based on the Swedish customer satisfaction barometer (SCSB) model developed in Sweden in 1989 [7, 19].

The main difference between the ACSI and EPSI models is the number of independent modules. In the ACSI model, it is only expectations, while in the EPSI model, we deal with four independent modules: image, expectations and the quality of material products and services. In addition, the EPSI model has an image area that is missing in the ACSI method; EPSI, on the other hand, does not consider customer complaints [20].

It should also be mentioned that several national and international barometers or indicators of customer satisfaction have been introduced over the last decade. Most of these satisfaction indicators are embedded in a system of cause-and-effect relationships or satisfaction models [21].

3. ANALYSIS OF RESEARCH RESULTS AND DISCUSSION

3.1. Methodology and organization of research

In the first quarter of 2021 in the Lublin region, proprietary research aimed at understanding the awareness and opinions of consumers regarding the issues of service at petrol stations was conducted. The research was conducted based on a proprietary interview questionnaire. Two hundred respondents took part in the research.

Socio-demographic characteristics indicate that 57% of women and 43% of men took part in the study, mainly respondents aged 26-40 (35%), 18-25 (33%), and 41-60 years (30%). As many as 73% of them declared higher education. However, when it comes to the place of residence, 60% of people participating in the survey come from a city with more than 100,000 inhabitants, 23% live in rural areas, and 17% in cities up to 100,000 residents.

Regarding the next grouping variable - the status of the respondents - it turned out that 55% of the respondents are full-time employees, 36% of them are students, 5% are self-employed persons, 3% are unemployed, and 2% are pensioners.

3.2. Determining the CSI for petrol stations

The first step in the research procedure was to calculate the evaluation of individual factors and their weights. For this purpose, the following formulas were used:

$$c_i = \frac{\sum_k c_k * n_{ok}}{\sum_k n_{ok}} \quad (1)$$

$$w_i = \frac{\sum_k w_k * n_{ok}}{\sum_k n_{ok}} \quad (2)$$

Resulting from the research (Table 2), the respondents assessed the possibility of using free toilets as the most favorable - the result is 4.10 and the convenient location of petrol stations - a result of 4.05. The least favorable was the area related to the prices of additional services (for example, restaurant, car wash or grocery store) - a score of 3.40, and also the area related to amenities offered by the station (for example, changing table for babies, helmet hanger in the toilet, etc.) - here the score was 3.45.

When analyzing the significance level, it turned out that the most important elements for the respondents are: service quality (4.47), station availability (4.37), station cleanliness (4.26) and fuel price (4.23). The least important for customers of petrol stations are the following elements: amenities offered by the station (for example, changing table for babies, a helmet hanger in the toilet, etc.) - (3.08), availability of loyalty programs (3.17), prices of additional services (for example, restaurant, car wash or grocery store) - (3.36) and the availability of the gastronomic offer.

The next step in the calculations was to determine the relative weight for the individual indicators of the analyzed service quality at petrol stations. For further interpretation of the satisfaction survey results, the maximum value was also calculated and converted into a percentage. The calculation of the CSI, CSI Max and CSI% for the analyzed petrol stations after the calculations is presented in Table 2.

The following formulas were used to calculate the above-mentioned indicators:

$$CSI = \sum_{i=1}^N w_i * c_i \quad (3)$$

$$CSI \text{ Max} = \sum_{i=1}^N w_i * c_{i \text{ max}} \quad (4)$$

$$CSI \% = \frac{CSI}{CSI \text{ Max}} * 100\% \quad (5)$$

Tab. 2

Calculation of the Customer Satisfaction Index, CSI max and CSI%

Satisfaction factors	Factor rating c_i	Weight of the factor w_i	Relative weight w_{wi}	CSI	CSI Max
Offer of additional services	3,75	3,52	0,041	0,14	0,205
Station availability	3,97	4,37	0,051	0,22	0,254
Professional service	3,78	3,77	0,044	0,17	0,219
Cleanliness of the station	3,79	4,26	0,050	0,21	0,248

Kindness of the station employees	3,87	4,12	0,048	0,2	0,240
Free toilets	4,10	4,17	0,049	0,2	0,243
Availability of a gastronomic offer	3,65	3,44	0,040	0,14	0,200
Reliability (for example, the ability to make purchases when stores are closed)	3,94	3,81	0,044	0,17	0,222
Availability of loyalty programs	3,59	3,17	0,037	0,12	0,185
Price of additional services (for example, restaurant, car wash or grocery store)	3,40	3,36	0,039	0,13	0,196
Security	3,82	4,18	0,049	0,2	0,243
Station equipment	3,88	4,10	0,048	0,2	0,239
No queues	3,61	3,95	0,046	0,18	0,230
Speed of service	3,89	4,11	0,048	0,2	0,239
Convenient location	4,05	4,30	0,050	0,22	0,250
Fuel price	3,44	4,23	0,049	0,21	0,246
Affiliation of the station to a given network	3,63	3,76	0,044	0,16	0,219
Fuel quality	3,96	4,47	0,052	0,23	0,260
Amenities offered by the station (for example, baby changing table, toilet helmet hanger, etc.)	3,45	3,08	0,036	0,11	0,179
No queues at distributors and cash registers	3,65	4,00	0,047	0,19	0,233
A well-known brand of petrol station	3,93	3,88	0,045	0,18	0,226
External appearance of the station (infrastructure condition, design)	3,91	3,85	0,045	0,17	0,224
		$\sum w_i =$ 85,9		CSI	CSI MAX
				3,94	5

The obtained CSI is 76%, which according to the criterion presented in Table 1 means that not everyone is satisfied with the quality of service offered by the petrol stations. When interpreting the results, it should be noted that petrol stations are highly competitive in the market. The range of services and products offered by these facilities change from year to year. As already mentioned, they are not limited only to the sale of fuel but also increasingly often to additional services, which, in turn, means that this area of the organization's functioning should be improved. Hence, the value of the indicator at a level slightly above the satisfaction threshold may turn out to be insufficient, especially in the dynamically developing market of services offered by petrol stations.

3.3. Development of a quality map

The CSI method allows creating a matrix of satisfaction factors (maps of satisfaction factors, conceptual table, and quality map), which is a coordinate system with axes expressing: the importance of criteria and the satisfaction of respondents, on which, after completing the survey, the places where individual, separate satisfaction criteria are found are marked. The satisfaction factor matrix allows, above all, for quick visual identification of criteria requiring

immediate improvement, that is, of high importance for customers but low rated ("factors requiring improvement in the first place"), as well as: of little importance and low rated ("insignificant factors"), unimportant but highly rated ("factors requiring improvement in the last order") and the strengths of the organization, that is, important and highly rated criteria ("factors that should be kept at a constant level") [9, 22]. Therefore, it is a graphic technique aimed at presenting the results of the assessment of individual elements influencing customer satisfaction.

Hence, based on the conducted research and the results obtained, a quality map was prepared (Figure 1). The first stage of developing a quality map was to determine its division points. The division is made into four areas, according to the average weight of the factor w_i and the average rating of this factor c_i . Thus, the division point on the axis of importance was obtained. The obtained results are presented in Table 3.

Tab. 3

Determining the division areas for the quality map

Satisfaction factors	Weight of the factor w_i	Factor rating c_i
Offer of additional services	3,52	3,75
Station availability	4,37	3,97
Professional service	3,77	3,78
Cleanliness of the station	4,26	3,79
Kindness of the station employees	4,12	3,87
Free toilets	4,17	4,10
Availability of a gastronomic offer	3,44	3,65
Reliability (for example, the ability to make purchases when stores are closed)	3,81	3,94
Availability of loyalty programs	3,17	3,59
Price of additional services (for example, restaurant, car wash or grocery store)	3,36	3,40
Security	4,18	3,82
Station equipment	4,10	3,88
No queues	3,95	3,61
Speed of service	4,11	3,89
Convenient location	4,30	4,05
Fuel price	4,23	3,44
Affiliation of the station to a given network	3,76	3,63
Fuel quality	4,47	3,96
Amenities offered by the station (for example, baby changing table, toilet helmet hanger, etc.)	3,08	3,45
No queues at distributors and cash registers	4,00	3,65
A well-known brand of petrol station	3,88	3,93
External appearance of the station (infrastructure condition, design)	3,85	3,91
medium	$W_m = 3,9$	$C_m = 3,8$

Then, the average weight of the factor W_m (3.9) and the average rating of the factor C_m (3.8) were plotted on the developed quality map, and consequently, a quality map was obtained for the analyzed case of petrol stations (Figure 1).

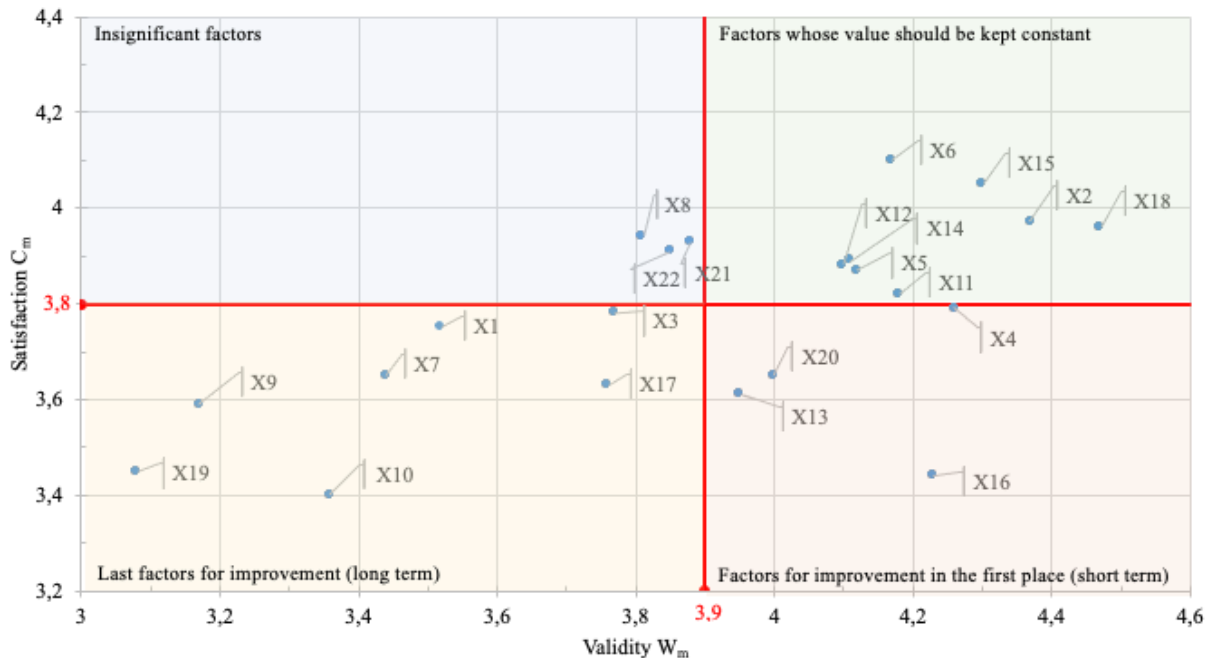


Fig. 1. Quality map for the surveyed petrol stations

In the group of "insignificant factors" respondents participating in the study indicated the following:

- X₈ - Reliability (for example, the ability to make purchases when stores are closed),
- X₂₁ - A well-known brand of petrol station,
- X₂₂ - External appearance of the station (infrastructure condition, design);

"Last factors for improvement (in the long term)":

- X₃ - Professional service,
- X₇ - Availability of a gastronomic offer,
- X₉ - Availability of loyalty programs,
- X₁₀ - Price of additional services (for example, restaurant, car wash or grocery store),
- X₁₃ - No queues,
- X₁₇ - Affiliation of the station to a given network,
- X₁₉ - Amenities offered by the station (for example, baby changing table, toilet helmet hanger, etc.).

Among the factors considered to require improvement in the first place (short term) were found:

- X₄ - Cleanliness of the station,
- X₂₀ - No queues at distributors and cash desks,
- X₁₆ - Fuel price.

Factors whose value should be kept constant are:

- X₁ - Offer of additional services,
- X₂ - Station availability,
- X₅ - Kindness of the station employees,
- X₆ - Free toilets,
- X₁₁ - Security,
- X₁₂ - Station equipment,
- X₁₄ - Speed of service,
- X₁₅ - Convenient location,
- X₁₈ - Fuel quality.

The analysis of Figure 1 allowed us to draw the following conclusions:

- the area which should be given special attention is: fuel price and cleanliness of the station;
- the area that should be kept unchanged is: fuel quality, location and availability of stations, free toilets, speed of service, station equipment, as well as the kindness of employees, and the issue of safety;
- the area that is of little importance to customers is: the well-known brand of the station, external appearance or reliability;
- the area that should be improved, but not necessarily in the near future, is the availability of loyalty programs, availability of gastronomic offers, no queues, belonging to a given network, additional amenities offered by stations, prices and the offer of additional or professional services.

4. CONCLUSIONS

Customer satisfaction has a huge impact on the profitability of an organization; it leads to repeat purchases, brand loyalty, customer retention and positive word of mouth marketing [11, 23].

As noted by [24], the competitive struggle between entities such as petrol stations is no longer limited to the question of price or perceived quality of fuel. The petrol station, as a trade format, is evolving, expanding the scope of its offer and increasingly valuing customer satisfaction. Above all, the role of a petrol station as a commercial facility is changing from a place of purchasing fuel to a place of consumption, meetings and rest [24]. Increasingly, additional services are crucial for the operation of petrol stations because, in addition to selling fuels, their commercial offer also includes automotive accessories, operating fluids, and groceries, they also enable car washing, provide catering services and hotel services [25]. A newly created market requires monitoring and evaluation given the quality provided. Importantly, both domestic and foreign companies, as well as stations of large independent operators located throughout the country, have quite similar fuel offers and a range of additional services. [26].

CSI models are usually used to assess customer satisfaction. CSI is a customer-based rating system that allows to measure and evaluate the quality of a service or product according to consumer experience [27].

The aforementioned changes at petrol stations that have occurred in recent years have made them not only a place where drivers can "refuel" with fuel, but also use several additional services. Although the stations are run by various entities, the area of additional services is

similar; therefore, measuring the level of customer satisfaction with the services offered is of key importance in developing the right strategy and attracting customers.

The conducted CSI method used to measure the quality of services and customer satisfaction allowed to identify areas that station owners should focus on to retain customers while attracting new ones. Undoubtedly, the area that needs to be maintained at a high level is the quality of fuels; however, it is also worth noting that users expect the cleanliness of the petrol stations. Moreover, the opinion of customers shows that they do not give much attention to the brand of the petrol station and its internal appearance. Subsequently, it is significantly important to focus on building a brand position.

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