

DOI 10.20544/HORIZONS.B.03.1.16.P47

UDC 656.2.025.2:005.336.3(497.11)

MODEL FOR MEASURING QUALITY OF RAILWAY PASSENGER SERVICE¹

Kire Dimanoski¹

Macedonian Railways Transport JSC,
III Makedonska Brigada 66, 1000 Skopje, Republic of Macedonia,
kire.dimanoski@mztransportad.com.mk

Gordan Stojic

Faculty of Technical Sciences
Novi Sad, Republic of Serbia

Gligorche Vrtanoski

Faculty of Mechanical Engineering
Skopje, Republic of Macedonia

Abstract

This paper has particular emphasis on rail transport, and its quality, therefore the increasing the efficiency and effectiveness of the system. The measuring of the quality of services in railway passenger transport can be performed by GAP analysis and SERVQUAL method which are adjusted and implemented in the proposed single model.

Keywords - service quality; passenger railway transport; SERVQUAL

¹ Original scientific paper

INTRODUCTION

Since the railway transport companies are providing service therefore it represents a service company, and like all other companies aimed towards profits. So the philosophy of its operations must be directed that way, in order to go through the less "thorny" way for the organization (cost, time, etc.), and at the same time to be more accessible to consumers (to meet their needs, wishes and requirements). Also, it's crucial to know that the product of the railway operators is the transportation of goods and passengers, which represents a special category of product called service.

Every product delivers benefits to the customers who purchase and use them. It can be described as physical objects or devices and services or actions and performances. Early research into services sought to differentiate them from goods, focusing particularly on four generic differences, referred to as **intangibility**, **heterogeneity** (or variability), **perish ability** of output, and simultaneity of production and consumption [1].

Another dimension that differentiates the service from the goods is their marketing mix, which is expanded with special characteristics of the services.

Although it is known that the traditional marketing mix consists of four elements also known as "4P" (Product, Price, Place, Promotion), when it comes to services, most authors have expanded the marketing mix of seven elements ("7P"), according Kilibrada [2]:

- Product;
- Price;
- Place;
- Promotion;
- **People;**
- **Process;**
- **Physical Evidence;**

According to the experts of quality represents a set of characteristics of products aimed to satisfy the demands, expectations and the needs of the customers. Taking this into account, according to Harvard professor, David A. Garvin the quality can be defined through eight dimensions of quality in terms of consumer, as follows [3]:

- Performance,
- Special Features,
- Reliability,
- Conformance,
- Durability,
- Serviceability,

- Aesthetics,
- Perceived quality.

In order to link the needs and desires of consumers to the possibilities and capacities of the manufacturers or service providers, companies need to have all necessary information for optimal design of facilities, meeting the needs and desires of consumers within the possibilities of the company.

In order to the relevant data can affect the right and useful decisions, it is necessary to gather data in ways that will bring an objective and correct information. This is done by application of marketing research. Marketing research is a specific scientific field and part of the marketing, and is problem-oriented research activity aimed on collection, process and analysis of data and the output of that process is an input of basic information for management decisions [4].

KEY INDICATORS FOR SERVICE QUALITY

As mentioned above, according to marketing standpoint, the quality of rail services is a set of features whose value corresponds to the demands and expectations of users. However, one question arises: Which structure and value of quality characteristics are expected and required by the users? Because it matters qualitative variables whose values cannot explicitly express the needs, desires, demands and expectations of the users, they are defined and formulated in different ways. Mainly, these are linguistic variables like "little", "medium", "great" or "very important" "important" and "less important" and so on. From this vantage point, it was very difficult to define the systems and criteria for assessment and evaluation of absolute values and the relative importance of the individual characteristics.

Service providers are regularly faced with these dilemmas and issues especially when they need to meet the transport requirements, needs, desires and expectations from users. Rail system must develop procedures and methods of identification, measuring and monitoring the quality of transportation services.

According to Rahaman R. K. and RahamanMd. A, the indicators of quality of services in rail transportation can be quantifiable and converted into quantifiable units, which still would be easily measurable. According to them, the characteristics of rail transport can be assessed by using the importance odds of each attribute, by which a weighted environment is produced. However, the process of subjective assigning weight ratios doesn't give good results, and those ratios are dependent on the experience of the assessor, which is a subjective method.

DISCREPANCY ANALYSIS MODEL (QUALITY GAP MODEL)

One of the most popular methods for measuring the service quality is the Discrepancy *analysis* model (GAP ANALYSIS), which in 1985 is proposed by *Parasuraman, Zeithaml and Berry*[5]. The GAP model, service quality is defined as the difference (Gap) between expected and perceived service by the user. The initial model recognizes five differences which are important and have influence on the quality of the delivered service, but in the later papers the concept has suffered significant expansions and improvements.

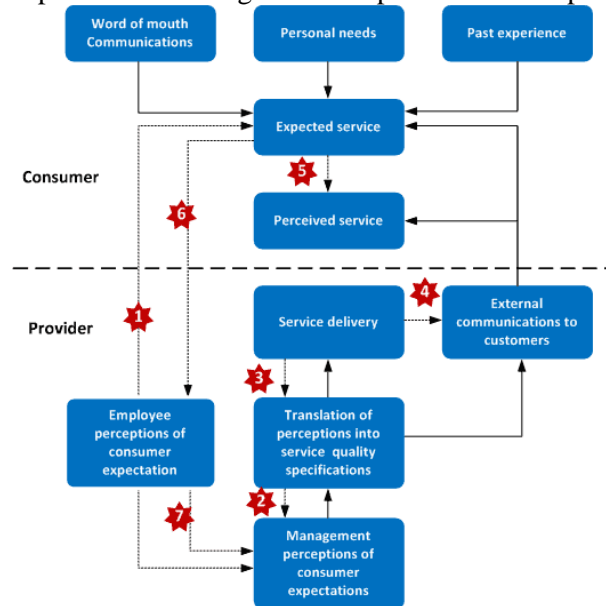


Fig.1. Gap analysis model (GAP MODEL)

(Parasuraman A., Valarie A. Zeithaml, and Leonard L. Berry: "A Conceptual Model of Service Quality and Its Implications for Future Research", Journal of Marketing, Fall 1985th)

The main difference (GAP) is the gap on the consumer (client) side, which originated as a result of the difference between consumer expectations about the service (where the oral propaganda role is the biggest, personal needs and past experience) and consumer perception about the consumption of service by the specified company [6].

MODEL FOR MEASURING QUALITY OF RAILWAY PASSENGER SERVICE - SERVQUAL MODEL

SERVQUAL is a complex and reliable instrument for measuring service quality. This method is designed by Parasuraman, Zeithmal and Berry [7] in 1985, and is designed to measure service quality in different organizational models of service sector, which includes railways, such as transport and logistics companies. The model is defined in 1985 and later modified and upgraded (1988, 1991, 1994).

This model measures difference between perceptions and expectations of service users. Under expectations implies hopes and wishes of users, and standards in planning of services, while the perception means experiencing the specified service. Because each service has specific attributes which are determined by the overall quality of services, level of service quality can be presented with the following equation (1) [8]:

$$Q = \sum_{j=1}^K W_j(P_j - E_j) \quad (1)$$

Where:

Q – level of service quality;

P_j – perception value of „ j “ attribute;

E_j – expected value of „ j “ attribute;

K – number of analyzed attributes ($j=1,K$);

W_j – relative meaning of the attribute.

Unlike product quality can be objectively measured by indicators such as durability and number of damage, service quality is an abstract and difficult for the three measurable characteristics that are unique to services, and it intangibility, heterogeneity and the perishability of the services from production and consumption.

In absence of negative indicators for measuring service quality, acceptable approach for assessing the quality of services the company is measuring consumer perception of quality, which in essence would be an important measure of quality, because the users are those for whom the products are designed in the frames of the marketing concept, where their desires and needs are superlatives to the service providers.

The various statements of the respondents are measured according to their perception, by using the Lickert scale [9] and is in the range from 1 (total disagreement) and 7 (complete agreement). This scale is used for quantifying the qualitative features of the service and their subsequent comparison.

The agreement or disagreement to the problem it is ranged with numerical values, which provides an opportunity for determining the appropriate intensity of agreement or disagreement [4]. This scale is important because it allows to the intensity of the particular feelings to be shown. The Lickert scale is constructed so it can obtain the level of the consumer statements and to give clear believe to the respondents that this scale is easy to understand and allows them to express the degree of their feelings.

The confidentiality of SERVQUAL measuring instrument is proved by using the Cronbach's "Alpha" coefficient. The coefficient α is a coefficient which measures the consistency, correlation between a set of questions in the individual dimensions. The unaccepting point of Cronbach's alpha coefficient is 0.70 of its value, while the value of 0.90 or more is recommended reliability of the coefficient and the analysis [10].

In 1988 the authors have reduced the ten components to five main dimensions [11]:

- Reliability,
- Assurance,
- Tangibility,
- Empathy,
- Responsiveness.

The scale in the literature often called RATER scale, consequently to the first words of the dimensions. The authors of the SERVQUAL method are defining the quality according to the following relation (2):

$$Q = P - E \quad (2)$$

Where:

E – expectations of the users, measured with 22 elements

P – perceptions of the users, measured with 22 elements. [12]

The model is based on the aforementioned five dimensions (Groups) arising from the 22 analyzed elements and 22 questions that respondent has answered. These 22 questions are structured in two sections: one examines the respondent's perception and the other respondent's expectation as a user of the service.

If the estimation of perception correspond to the estimation of the expectations, the customer is satisfied with the service, if the difference between the established perceptions and expectations exceed the expectations of the user than he is delighted, and if determined expectations are greater than the user perception than he is dissatisfied.

**SERVICE QUALITY MODEL (SERVQUAL MODEL) FOR
REPUBLIC OF MACEDONIA**

The SERVQUAL model determines the quality of the service according to the following prescription:

- The quality dimension is ranked by the user;
- The overview by the user on every aspect of the quality is made based on his previous experience;
- Differencing the expectations of the users according to their perspective of the quality is done by comparison of the two dimensions (expectations and experience).

The detection, measurement (comparing) the expectations of users and their deviation from the quality of service, is a good basis for improving the quality of service in the future and maximizing customer satisfaction.

In this manner a SERVQUAL survey model was made to fit the main goal such as measuring the quality of railway passenger transport. From the aforementioned research and results arising which will be presented in the continuation of this work.

Table 1. Aspects and dimensions which need to be measured
by SERVQUAL survey

Dimension	Aspects which need to be evaluate
Tangibility	1. Modern equipment (wagons, locomotives etc.)
	2. Facilities (buildings, waiting rooms, stations) attractiveness
	3. Staff look.
	4. Visual attractiveness of materials (brochures, tickets etc.)
Assurance	5. Assurance that the service will be performed without error.
	6. If the passengers have a problem the company shows sufficient interest to fix the problem.
	7. The service is performed in the right way every time.
	8. The service is performed as it is prescribed by the time table.
	9. Insisting on mistake-free performance.
Responsiveness	10. The employees inform the users exactly when the service will be performed.
	11. The employees are performing in time service.
	12. The employees are always helping the passengers.
	13. The employees are always at disposal at the passengers and they are never busy to answer the requirements of the passengers.
Reliability	14. The behavior of the employees inspiring confidence by the passengers.

	15. The users feel safe and satisfied.
	16. The employees are constantly generous towards the passengers.
	17. The employees have knowledge to answer the questions of the passengers regarding the service.
Empathy	18. The company pays enough personal attention to the passengers.
	19. The company has time table according the needs of the passengers.
	20. The company has employees which are performing personal attention.
	21. The company cares about the interest of the passengers.
	22. The employees are understanding the specific needs of the passengers.

DETERMINING THE CURRENT STATE OF SERVICE QUALITY IN PASSENGER RAIL TRANSPORTATION IN THE REPUBLIC OF MACEDONIA BY APPLICATION OF THE SERVQUAL METHOD

According to the SERVQUAL method, which measures the quality of services in rail transport, a research was done on the on-line based application, where the surveyed people were able to complete the survey and to give their opinion on the specified dimension of the SERVQUAL instrument. Also, this survey was conducted on classic way with a survey on citizens and passenger in trains throughout the cities of Macedonia.

The above mentioned research arose results that will be presented in the sequel of this paper.

Within the SERVQUAL method in order to get the final result, the GAP that occurs between expectations and perceptions of the service, should be multiplied with the weight (importance) ratio, which will result the average SERVQUAL scores (table 2).

Table 2. Weighted results of all dimensions of service

SERVQUAL dimension	Results from Table 4.4.	Weight coefficient from Figure 4.13	Weighted result
Tangibility	-3,74	0,21	-0,78
Assurance	-3,29	0,31	-1,00
Responsiveness	-3,08	0,20	-0,61
Reliability	-3,36	0,16	-0,55

Empathy	-3,30	0,13	-0,42
Average SERVQUAL result:			-0,67

We can consider that the quality “Q” will be at least satisfactory, if E=P (expectations are equal to perceptions) or ideal if E<P, but in the case of this research the expectations are multiple bigger than the perceptions (E>P), which means that the quality is at low level, and expectations are much more higher than the perceptions, suggesting that the company should work hard to improve this state on many fields of work.

In order to gather best results from this research the SERVQUAL results should be checked in a certain way, in this case it is done by using the Cronbach’s alpha coefficient.

The Alpha coefficient can get any value that is less than or equal to 1, including negative values, although only positive values have meaning to the quality. Higher values of alpha are more desirable. According to experts, as a rule of reliability, alpha should have a value 0.70 or higher.

Cronbach's alpha is a measure of internal consistency. However, a high coefficient alpha does not mean that the measure is not dimensional. If, besides the measurement of internal consistency, we want to provide evidence that the scale in question is not dimensional we can perform additional analysis. Technically speaking, the Cronbach’s alpha coefficient it is not statistical test, but a coefficient of reliability (or consistency).

The Cronbach's alpha can be written as a function of the number of subjects tested and the average correlation between the internal objects. The equation for standardized Cronbach's alpha (α), for the conceptual needs, is shown below [13]:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N - 1) \cdot \bar{c}} \quad (3)$$

Where N represents the number of items \bar{c} and it is the average internal point of the covariance between records \bar{v} and it represents the average variance. From this equation can be noted that if the number of items arises, then the Cronbach's alpha is increasing. Moreover, if the average internal point of correlation is low, alpha will be low. As the average internal point of correlation increases, so does the Cronbach's alpha too (if the number of items is constant).

And from the analysis of the research using the software tool "SPSS Statistics 19" we are coming to the fact that the Cronbach's coefficient is 0.868 (Table 3), indicating that the consistency (reliability) of the survey is at good level (>0,7).

Table 3. The result of the calculation of the consistency of research

Consistency (reliability) stats		
Cronbach's Alpha	Cronbach's Alpha based on standard questions	Number of answers
0,868	0,865	44

CONCLUSIONS FROM THE ANALYSIS CONDUCTED ACCORDING SERVQUAL

According to the results of the SERVQUAL analysis, biggest "GAP" occurs when it comes word to the equipment for providing the transport (cars, locomotives and stations), timely and flawlessly realized transportation, safety and satisfaction. The smallest gap occurs when it comes to the realization of schedule, assistance to passengers, the willingness to provide assistance and kindness of the staff. But it is noticeable that there is no great perception scores in any category, compared to their expectations, and in no time the experienced service has not exceeded the expectations of costumers. It may also be noted that in average the largest difference occurs in the tangibility of service, then comes confidence, empathy, reliability and responsibility of the company in the process of providing the service.

If we look at the results, the average score, or satisfaction of surveyed customers is rated with the coefficient of -0.67, which is representing low quality.

The most important dimensions of service quality which is determined by surveying people are: appearance, buildings, equipment, staff, and ability to provide promised service, which follows to conclusion that the tangibility of the service is one of the most important issues for users.

The analysis of the internal consistency of the survey results, or the reliability of the results using the software tool "SPSS Statistics 19" shows the fact that the Cronbach's coefficient of 0.868, suggesting that the consistency (reliability) of research is on good level, because it is bigger than 0.7, which is the lower limit of reliability.

Besides the SERVQUAL method for service quality measuring another way for measuring quality was conducted by using sublimete method consisted of the SERVQUAL and conventional surveys which are used for collecting primary data for the marketing research purposes. The results of

this confirmed survey have confirmed the suspicions that were previously mentioned and shown, and referred to the quality of services. Notably among other data, the most important features for one type of transportation should have been: punctuality and availability, along with comfort and cleanliness. In addition, the Cronbach's alpha coefficient indicates a high degree of reliability (0.931), which is sufficient reason to believe that this analysis of survey data has adequate weight.

With the application of the SERVQUAL method for measuring the service quality it comes to increased objectivity by using the subjective opinions of customers, employees, management, etc., and by using this method and testing its results and statistical software for the consistency coefficient, it can be obtained objective opinion of the target group about the quality of the services.

ACKNOWLEDGEMENT

This paper is a contribution to the Ministry of Science and Technological Development of Serbia funded project TR 36012.

REFERENCES

- [1] Christopher H. Lovelock, Lauren Wright, *Principles of Service Marketing and Management*, Pearson Education Limited, 2004.
- [2] Kilbride M., *Upravljanje kvalitetom u logistici*, Saobraćajni fakultet, Beograd, 2002.
- [3] Bovee, C. L., and sothers, *Management*, McGraw-Hill, Inc., 1993
- [4] Sekulovska N., Basheska – Gjorgjieska M., *Marketing research*, 2 Edition, Faculty of economics, Skopje, 2004.
- [5] Parasuraman A., Valarie A. Zeithaml, and Leonard L. Berry: "A Conceptual Model of Service Quality and Its Implications for Future Research", *Journal of Marketing*, Fall 1985.
- [6] Devlin J., Dong H.K., *Service Quality from the Customers Perspective*, *Marketing Research: A Magazine of Management & Applications*, 1994.
- [7] Parasuraman A., Valarie A. Zeithaml, and Leonard L. Berry: "SERVQUAL: A multiple item scale for measuring consumer perceptions of services quality", *Journal of retailing*, Vol 64, 1988.
- [8] Kilibrada M., Zecevic S., *Upravljanje kvalitetom u logistici*, Saobracajni fakultet, Beograd, 2008.
- [9] Valarie A.; Berry, Leonard L.; Parasuraman, A. Zeithaml, *Delivering Quality Service: Balancing Customer Perceptions and Expectations*, 1990.

- [10] The value of Likert scales in measuring attitudes of online learners, Hilary Page-Bucci, February 2003, <http://www.hkadesigns.co.uk/websites/msc/reme/likert.htm>
- [11] Buttle,F.: *SERVQUAL: Rewiev, critique, research agenda*, European Journal of Marke
- [12] Amstrong, R., Connie, M., Go, F., *The Importance of cross-culture expectations in the Measurement of Service Quality Perceptions in the Hotel Industry* , Int.J. Hospitality Management vol. 16, No 2. (1997).
- [13] Allen, M.J., & Yen, W. M. *Introduction to Measurement Theory*. Long Grove, IL: Waveland Press, 2002.