



Quality Management at Service Business: Theoretical and Methodological Aspects

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ABSTRACT

The article views the issues connected with the improving transport service that in the market conditions are closely related to the problems of quality. The aim of the research is the development of theoretical assumptions and methodology of enterprise strategic management of road transport services and the development of methods and models for decision-making. The study reveals the most important components (parameters) to measure the service quality, presents the main methods and models to determine the service quality; the characteristic of main incentives for the quality standard is given. The authors studied the factors of external and internal environment of Samara city, the results of which are presented in the form of strengths, weaknesses, opportunities, and threats-analysis; that is developed a modified technique to measure the quality of passenger transport services and determined its integral index on the basis of the data that are obtained by questioning passengers. The results of these studies led to the conclusion that there are significant reserves to improve the quality of passenger services.

Keywords: Dispersion, Economic and Mathematical Model, Integral Index Service Quality, Mathematical and Statistical Analysis, Standard Deviation, Weighting Factor

JEL Classification: C61

1. INTRODUCTION

Transportation of cargoes and passengers as the kinds of economic activities in the sphere of services plays an important role in the national economy. The significance of transport services in the national economy of the Russian Federation is determined by geopolitical, territorial, social and economic factors.

The current state and development of freight and passenger transport does not provide the growing needs of the population and organizations in speed, reliability, timeliness, and security of operations. This is due to the poor road condition, worn out vehicles and infrastructure, underdeveloped management system in the organizations which are engaged in passenger and cargo transportation.

Socio-economic character of transport services requires the participation of legislative and executive authorities of the Russian

Federation at the federal, regional and municipal levels in the organization and planning services of cargoes and passengers transportation, the creation of technical, technological, economic conditions for transport development, social employee support of transport organizations and tariff regulation for population transportation.

The increase of social and economic efficiency and quality improvement of freight and passenger transport is impossible without the organization of evidence-based transport system of government, municipal and economic management. Appropriate and strategically tuned service management of freight and passenger transport is based on setting goals of transport service development and the development of strategic directions to achieve them according to such optimality criteria as the cost reduction for the transportation of goods and passengers, increase of service quality, environmental friendliness and transport security. In this context theory development and methodology of strategic

management of road transport sector, the use of economic and mathematical methods and management models and decision-making models in the field of passenger transport are actual.

The research goals are the development of theoretical assumptions and methodology of enterprise strategic management of road transport services and the development of decision-making methods and models.

The realization of these goals demanded solving the following tasks:

- Determining the nature and content of transport services quality;
- Justification of passenger transport importance;
- Revealing the tendencies and factors of passenger transport development;
- Assessment of transport service quality;
- Determining the integral quality index of passenger transport services.

The objects of the study are such subjects of the market passenger transport services as road transport companies, consumers of transportation services, bodies of state and municipal government.

Currently the improvement of transport service level which is closely connected with the problem of service and quality is an urgent issue. If the company is committed to deliver the goods to the destination that is specified in the contract under the terms of preservation, a customer expects in the future that the carrier will reduce downtime, reduce the storage cost, expand delivery network, i.e., improve the service quality.

It is wrong to think that that granting service quality is expensive. On the contrary non-fulfillment of contract terms results in additional spending of material and labor resources aimed to eliminate the mistakes. Systematic failures of the transportation schedule result in the loss of customers, reputation and position in the transport service market (Isaev, 2010).

Quality is understood as a set of properties and characteristics of services that give them the ability to meet customer needs. The International Standard ISO 8402:1994 defines quality “as the totality of characteristics of the object relating to its ability to satisfy existing and implied needs.”

In regard to logistics server quality in our opinion should be defined as “the degree of mismatch between consumer expectations and their perception of such criteria as reality, reliability, competence, feedback, politeness, trust, safety, sociability, customer understanding”. Those companies that have such characteristics according to customer opinion are considered to be the companies with the highest quality (GOST R ISO 9001:2001 Systems of Quality Management, 2001).

2. METHODS

The need to control the quality of passenger transport services is dictated by high economic and social importance of this economic

activity for the population. The Russian legislation defines the general principles of transport services on the regular routes of the Russian Federation (Bolshakov and Mikhailov, 2009).

Certification and standardization play an important role in the normative and legal provision of passenger transport quality. According to the RF Law “On Technical Regulation,” the service is the object of voluntary conformity assessment, i.e., the object of voluntary certification.

The most important components (parameters) to measure the service quality (Mirotin et al., 2010):

- Tangibility - physical environment, which presents service, facilities, office equipment, personnel, etc.;
- Reliability - performance “just in time,” for example, the delivery of needed goods in the right place in the right time;
- Completeness - presence of required skills, competencies and knowledge;
- Accessibility - ease of establishing contacts with service suppliers, convenient for customer time of logistics services;
- Safety - absence of danger, risk, mistrust (for example, safety of cargo during transportation);
- Politeness - behavior of service provider and personnel;
- Interpersonal skills - ability to speak to customer clearly;
- Rapport with a buyer - a genuine interest in the customer, ability to enter into the role of a customer and understand his needs (requirements).

Measuring service quality in the analysis and designing logistics systems should be based on the criteria that are used by the consumers of logistics services. When the consumer assesses the quality of logistics if they are the same, the quality is considered satisfactory.

1. Specification of logistics service quality parameters and selecting assessment methods and monitoring are probably the most complicated issues in logistics administration.

All methods of determining quality indicators are divided into the methods and sources of information (Parasuraman et al., 1990). Methods for obtaining information on quality indicators are now divided into the following categories: Measuring, registration, organoleptic, calculation methods.

The measuring method is implemented when using technical measuring instruments.

Registration method is based on the use of information that is obtained by counting the number of certain events when assessing the value of a quality indicator.

Organoleptic method is based on the information that is obtained from the analysis of senses perceptions, the experience analysis, as a rule, is expressed in points. This method does not preclude the application of technical, measuring or recording means to enhance the ability of human senses, and, consequently, the level of precision of made decision.

Calculation method is usually based on the use of theoretical or empirical relations and is used mainly on the quality design stage.

The practice of determining quality indicators commonly uses a combination of several methods which are described above. Depending on the source of information to determine the quality the methods are divided into traditional, sociological and expert methods.

In the traditional quality method indicators are identified by testing analysis. Expert methods are based on generalized experience and expert intuition. Sociological method of determining the values of quality indicators is based on the collection and view analysis of actual or potential consumers of products and services (questionnaires, consumer conferences).

2. The methodical basis of determining service quality, in particular passenger transport services are connected with the work of an American economist Granroos who introduced the concept of “perceived quality” (Granroos, 2000).

Perceived service quality is defined as the ratio of the consumer expectations and perceptions of received service. To describe the perceived quality it is assumed that there are two parameters of quality: Technical quality (output quality) and functional quality (interaction quality).

Technical quality is defined as something that consumers get in contact with the service company. Functional quality is the way consumers receive services. Functional quality can be assessed objectively. Technical and functional quality and company image determine consumer expectations.

Granroos proposed Gap model “consumer expectations are the perception of the received service.” The basis of the model is a set of gaps. From the point of view of a consumer in accordance with the model the service quality depends on the magnitude and direction of the gap between consumer expectations about the service and the service perception after its receipt (Gap 5). Gap 5 is determined by the other gaps in the model (1-4):

- Gap 1: Consumer expectations - Managers ideas about these expectations. If there is discontinuity managers do not have full idea of consumer expectations and needs;
- Gap 2: Managers ideas are service standards. The gap arises if, in spite of manager awareness of consumer expectations, these views are not reflected in the developed service standards;
- Gap 3: The establishment of service standards is service delivery. Gap 3 appears, even if the Gap 2 is minimal, but in reality services are not offered properly because of the person who provides the service;
- Gap 4: External communications are service providers. It occurs when an organization creates false impression about the services that can actually be provided for a consumer.

Further development of methodologies to assess the quality of passenger transport services may be associated with the concept of service quality (more exactly - service quality).

Perceived quality is embodied in the method as the difference between the measurements of consumer service perception and expected reaction to the service. This expectation is regarded as consumer expectations and desires, as a standard (in some

methodologies it is viewed as “an ideal standard”) when creating goods and services. The characteristics of main incentives for providing quality of goods and services is presented in Table 1.

The method “SERVQUAL” is a questionnaire consisted of two parts. Each part consists of 22 questions. The first part of the questionnaire is dedicated to consumer expectations. The second - to the perception of provided service. The questions are divided in groups in accordance with the determinants of the service quality: Tangibility: 1-4, reliability: 5-9, responsiveness: 10-13, assurance: 14-17, empathy: 18-22.

The method involves identifying so-called “expected” and “adequate” service quality, numerically defined with five quality determinants. Analysis of tolerance zone is used when making recommendations on specific areas to improve service quality.

The main reasons for method developing are:

- The attempt to find some common model that reflects the universal factor structure of service existing in consumer mind which is equally applicable in different failed industries because of such structure absence in consumer mind;
- Low practicality: Trying to provide model universality, the authors formulated the parameters of quality assessment too vaguely, which reduced the diagnostic potential of “SERVQUAL.”

Using basic principles of modern methodologies to assess service quality the author developed a modified technique to measure the quality of passenger transport services and integral index determination.

3. RESULTS

1. Practice shows that 80% of transport service quality problems are connected with company management failure. The ISO 9001:2000 specifies the quality system as “a set of organizational structures, procedures, processes and resources needed to implement administrative quality management” (GOST R ISO 9001:2001, 2001).

Table 1: Characteristics of the main incentives in the quality standard SERVQUAL

The main stimulus	Interpretation
Tangibility	“Tangibility”-reflects how tangible and clear is the feedback from the service
Reliability	“Reliability”-reflects how authentic and reliable are assurances concerning the service provided
Responsiveness	“Responsiveness”-reflects how the consumer assesses the degree of responsibility reinforced by adequate solvency
Assurance	“Assurance”-the degree of person competence providing the service
Empathy	“Empathy”-reflects the degree of understanding of consumer needs

Source: Granroos (2000). Service management and marketing. West Sussex

Quality system is considered well-organized and functioning if:

- The system is understood and well-perceived by the personnel, it is properly used, effective and has necessary resources;
- The services (products) really satisfy consumer needs and expectations;
- Impact on the environment and the society needs are taken into consideration;
- Main attention is paid to prevent negative situations;
- The system not only solves the problems of service quality but also improves discipline, reduces unproductive labor, makes work with clients easier;
- Implementation of quality system should be determined by tasks, products, processes, and individual characteristics of a particular company or organization and meet the requirements of continuous quality improvement in accordance with the anticipated consumer needs.

One of the important issues of logistics services is price as expected compensation for the total package of services that the company offers to consumers. It is much more difficult to determine the price for logistics services than to determine the price of the transportation itself, as the price for logistics services depends much on the perception of the whole service system by the consumer.

Selection of the optimal level of customer service is determined by the dynamics of the costs value. It was revealed that, starting from 70% and higher service costs grow exponentially and it depends on the level of service and at the service level of 90% or higher service becomes unprofitable (Isaev, 2010). Experts estimate the level of service increases from 95 to 97% the economic effect is increased by 2%, while expenses increase by 14%.

To find a rational level of service there must be compared expenses, revenues and profits by implementing the principle of compromise when the companies achieve the best correlation between the prices and the level of service, between expenditures and revenues.

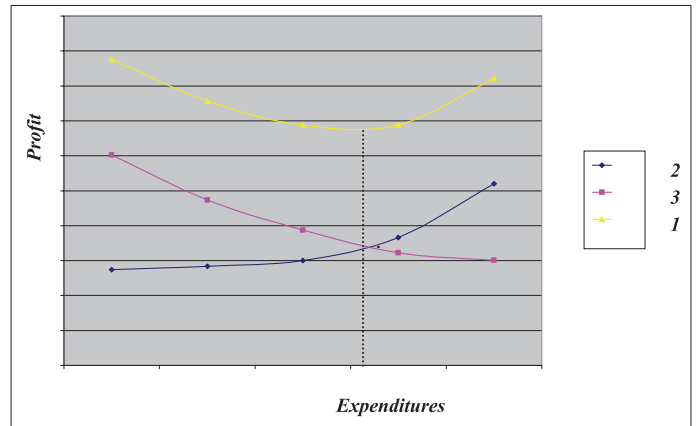
In fact, the procedure is reduced to comparing the costs connected with increasing the level of service with the loss of revenues that grow with the decrease in the number and service quality. As a result a certain optimal level of servicing is found (Figure 1).

With the increase in the level of service costs on it grow (Curve 2), but the loss of revenue from the decrease of the level of service also decrease (Curve 3).

The Curve 1 is obtained by summing coordinates of the two named components. Because of considerable difficulties in finding and practical realization of the optimal level of service (at least ordinates of Curve 1) the enterprises which provide services and their customers are guided by “quite a good solution” - A rational, reasonable ratio of costs and revenues.

Service is assessed by the indicator “the level of service” $\dot{O}_{i\dot{a}}$ which is calculated like this:

Figure 1: Revealing the rational level of service



Source: Toymentseva (2011). Strategic management the service industries road transport (theory and methodology). Doctoral Dissertation, Samara State University of Economics

$$\dot{O}_{i\dot{a}} = \frac{\sum_{i=1}^n t_i}{\sum_{i=1}^{i+1} t_i} \quad (1)$$

Where n is a factual number of the services provided;

N is a number of services which can be provided theoretically;

t_i - Time on service fulfillment i .

The work of transport should be based on consumer requests. The consumer is attracted by the minimal delivery terms, a 100% preservation of cargo during transportation, convenient reception and goods delivery, the possibility of obtaining reliable information on tariffs, delivery terms and cargo location. Then the client will be willing to bear related costs.

When the issues of transport service quality are studied it is necessary to remember and take into account the following peculiarities:

- Selection of services requires consideration of all options of the levels of transport services;
- A consumer can have several needs, so the features and characteristics of services must correspond to different and sometimes contradicting requirements;
- Customer requirements and needs must be clearly specified and fixed in the contract;
- In many cases the customer needs change over time. So, it is necessary to make marketing research from time to time. Each type of transport services demands serious research and analysis;
- Customer needs and demands are usually expressed in certain properties with quantitative characteristics and include such aspects as safety, functional suitability, availability, reliability, economic factors, environmental friendliness, etc.;
- To quantify service quality of such expressions as “relative quality,” “quality,” “measure of quality” are used.

Quality management of passenger transport services on the municipal level suggests the analysis of factors of internal and external environment on its preliminary stage, which may influence management decisions of the municipality in the sphere of service quality provision.

Study of external and internal environment factors of Samara was made, the results of which are presented in the form of strengths, weaknesses, opportunities, and threats (SWOT)-analysis in Table 2.

Thus, on the basis of factors analysis of external and internal environment of public transport in Samara city the main directions of its development strategy were determined.

To assess the quality a list of separate (private) parameters was developed, consisting of 7 parameters. The basis of observation was 43 completed questionnaires received from passengers immediately after their travel commission. To determine the service quality there was used 10-point grading system.

Methodical basis of determining the list of quality indicators of passenger transport services and their characteristics was the state standard of the Russian Federation GOST R 51825-2001, which takes into consideration the following characteristics of a service when assessing the results of granting a service:

1. Safety. The service provider ensures compliance with safety requirements for citizen life and health and environment;
2. Timeliness and speed. The service provider ensures transportation in accordance with the established schedule, other demands on time and speed of vehicles provided by the contract;
3. Comfort, ethics and aesthetics. The service provider ensures compliance with the requirements to the conditions of service in the vehicle, as well as in places of initial, intermediate and final destination;

Table 2: SWOT-analysis of passenger transport services in Samara

Advantages	Disadvantages
Necessary financial resources	Absence of exact goals and strategies
High professional personnel skills	High wear of vehicles
Rather high level of production potential	Unsatisfactory road state
Relatively low costs	Absence of profitable services activities
Professional management	Low level of additional services
Possibilities	Risks
Increase of services and their quality	Increase of motor vehicles
Absence of significant competitors	Decrease of real population profits
Budget financing	Undeveloped repair base
Implementation of transport automated system	Increase of fuel and lubricant prices

Source: Toymentseva (2011). Strategic management the service industries road transport (theory and methodology). Doctoral Dissertation, Samara state University of Economics. SWOT: Strengths, weaknesses, opportunities, and threats

4. Complexity. The service provider ensures that all components of technological content of services are fulfilled and provides related services, composition and requirements which are set in the contract;
5. Reliable information. The service provider gives passengers all necessary and reliable information arrival and departure of vehicles, rules on travel and luggage, route, placement of fire extinguishers and medical kits, locations of emergency exits, the way to communicate with a service performer;
6. Affordability. The service provider gives the possibility to different groups of consumers (passengers) to use the service by establishing corresponding social, economic and technical characteristics of the service;
7. Luggage preservation. The provider of the service ensures the delivery of luggage in stated terms to the point of destination without loss or damage.

The basic method of determining a summary quality indicator of passenger transport services was the method of its calculation on minimum dispersion criterion of a summary indicator considering the weighting coefficients of particular indicators in the Integral 1.

It is believed that the integral quality index of services provided (Y) is a linear combination of individual quality indicators (X), the normalized values of which vary from 0 to 1:

$$Y = \alpha_1 \cdot X_1 + \alpha_2 \cdot X_2 + \dots + \alpha_n \cdot X_n = \sum_{i=1}^n \alpha_i \cdot X_i \quad (2)$$

Where α_i are weighting coefficients of separate indicators of quality in the Integral 1.

Assuming that single indicators of service quality are independent variables (factor characteristics), the dispersion will be equal to:

$$\sigma_Y^2 = \alpha_1^2 \cdot \sigma_1^2 + \alpha_2^2 \cdot \sigma_2^2 + \dots + \alpha_n^2 \cdot \sigma_n^2 = \sum_{i=1}^n \alpha_i^2 \cdot \sigma_i^2 \quad (3)$$

Since the integral index, and some indicators of service quality change from 0 to 1, then

$$\alpha_1 + \alpha_2 + \dots + \alpha_n = \sum_{i=1}^n \alpha_i = 1 \quad (4)$$

We find what values of weighting coefficients the integral index the lowest average error (σ) has

We make an objective function taking into account the term of sum equality of weighting coefficients of separate indicators of service quality to 1 and considering them to be unknown variables:

$$\sum_{i=1}^n \alpha_i^2 \cdot \sigma_i^2 \rightarrow \min, \quad (5)$$

With the limits,

$$\sum_{i=1}^n \alpha_i = 1, \quad \alpha_i > 0 \quad (6)$$

Nonlinear programming task can be solved by the method of Lagrange multipliers (γ):

$$F = \sum_{i=1}^n \alpha_i^2 \cdot \sigma_i^2 - 2\gamma \left(\sum_{i=1}^n \alpha_i - 1 \right), \tag{7}$$

Where F - Lagrange function.

Equating partial derivatives of F α_i to zero, we obtain:

$$\alpha_i \cdot \sigma_i^2 = \gamma, \quad i = 1, 2, \dots, n \tag{8}$$

If we denote practically allowable accuracy of the integral index as σ_y^2 , then each dispersion of a single indicator is included in dispersion of an integral indicator with the definite weight (p_i) which can be calculated like this,

$$p_i = \frac{\sigma_y^2}{\sigma_i^2} \tag{9}$$

Where σ_y^2 is the dispersion of an integral quality index of the services provided.

Then we can write,

$$\alpha_i = \frac{\gamma}{\sigma_i^2} \cdot p_i, \quad i = 1, 2, \dots, n \tag{10}$$

$$\gamma = \frac{\sigma_y^2}{p} \tag{11}$$

Where

$$p = \sum_{i=1}^n p_i \tag{12}$$

That is why,

$$\alpha_i = \frac{p_i}{p}, \quad Y = \frac{1}{p} \cdot \sum_{i=1}^n p_i \cdot X_i \tag{13}$$

Dispersion of the integral indicator (Y) is:

$$\sigma_y^2 = \sum_{i=1}^n \alpha_i^2 \cdot \sigma_i^2 = \sum_{i=1}^n \frac{p_i^2}{p^2} \cdot \frac{\sigma_y^2}{p_i} = \frac{\sigma_y^2}{p} = \gamma \tag{14}$$

Consequently, the sum of weighting coefficients will be equal to 1: or,

$$\sigma_y^2 \left(\frac{1}{\sigma_1^2} + \frac{1}{\sigma_2^2} + \dots + \frac{1}{\sigma_n^2} \right) = 1 \tag{15}$$

Then α_i is calculated as,

$$\alpha_i = \frac{\sigma_y^2}{\sigma_i^2} \tag{16}$$

Economic-mathematical interpretation of a weighting factor is that the more variation of the integral quality index of services provided to the change (variation) of a particular quality indicator, the higher the weighting factor is.

According to study results, the following values of average assessment scores of the service quality, their variances and weighting coefficients were obtained (Table 3).

The integral quality indicator of passenger transport services is the sum of average scores given by the passengers on each individual quality indicator and their respective weighting coefficients. According to calculation results of the integral quality index is 6.35. It means that there are significant reserves to improve the quality of passenger services.

4. CONCLUSION

The quality management of passenger transport services on the municipal level suggests the analysis of internal and external environmental factors on its preliminary stage, which may influence management decisions of the municipality in the area of service quality, so the authors investigated the factors of external and internal environment of Samara, the results of which are presented in the form of SWOT-analysis.

With the use of basic principles of modern methodologies for service quality assessment, there was developed a modified technique to measure the quality of passenger transport services and the determination of its integral index.

The integral indicator of quality of passenger transport services is the sum of average scores given by the passengers on each individual quality indicator and their respective weighting coefficients.

Table 3: The calculation of the integral index of passenger transport quality, Samara

Quality index	The total score	The average score	Dispersion	Weighting coefficient	Weighted quality evaluation
Safety	319	7.42	1.267	0.380	2.82
Timeliness and fastness	264	6.13	1.289	0.225	1.38
Comfort, ethics and esthetics	215	5.00	1.398	0.057	0.29
Complexity	268	6.24	1.501	0.030	0.19
The adequacy of information and reliability	235	5.47	1.412	0.055	0.30
Affordability	216	5.03	1.292	0.223	1.12
Luggage safety	352	8.19	1.502	0.030	0.25
Sum (average)	1869	6.21	-	1.000	6.35

Source: Toymentseva (2011). Strategic management the service industries road transport (theory and methodology). Doctoral Dissertation, Samara State University of Economics

According to the results of calculation the integral quality index is 6.35. It means that there are significant reserves to improve the quality of passenger services.

According to the research results the aim of the social policy of the municipality in the field of passenger transport is the harmonization of interests and the humanization of the relations connected with the provision of passenger transport services. Therefore, the assessment of social impact of this type of service should be given after positive changes assessment in the external and internal social environment of management system of passenger transport.

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