

# Quality of Transport Service in Intercity Road Passenger Transport: A Literature Review

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**Abstract**—Achieving an adequate level of quality of transport services is a prerequisite for providing transport services. Certain level of quality of transport services is essential for the operation of intercity road passenger transport due to the increasingly competitive competitiveness of road transport companies in the transport services market. The topic of this research is also based on the presented topic, primarily through a comprehensive and systematic presentation of the current scientific knowledge in the area of quality management in road passenger transport. The structure of the public road transport system and the quality of transport services are described. The paper presents the quality of transport services as the basis of business excellence of road transport companies. Various models of quality management of transport services are described, as well as methods of assessing the quality of transport services in road passenger transport. The review is displayed of the current scientific research on the elements of quality of transport services in road passenger transport. The purpose of the research is to improve the methodology for assessing the quality of transport services with the aim of optimizing business and competitiveness of the road transport company.

**Index Terms**—road passenger transport, quality of transport services, competitiveness

## I. INTRODUCTION

Quality management of transportation services is concerned with the development and improvement of quality. The quality management described in the work is a management system that ensures the achievement and maintenance of the desired level of transport service quality, thus increasing the flexibility, effectiveness and efficiency of the business. Nowadays, business performance and development of any organization, level of customer or passenger satisfaction, carriers, and lasting and strong relationships with various business partners depend on the achieved quality level. High quality public transport of passengers should become a relevant counterweight to individual transport.

The quality management system implies the organizational structure, responsibilities, procedures and processes for achieving business management goals in road transport companies. The quality management system places the user and the carrier at the same time additional requirements. The user seeks to clearly specify

their needs, and the carrier's proof of effectiveness as a guarantee of achieving agreed quality. Given the market economy and the inevitable demand for profitability, an essential element of a successful business of a transport company is the relationship of the offer of transport services offered by the transport company to the transport market in accordance with the state and trends of passenger transport demand and optimization of the business system of carriers, primarily from the point of view of productivity and economy [1]. The quality management system as well as constant market competitiveness assessment contributes to the optimization and development of the road passenger transport business. It can therefore be said that an effective assessment of the competitiveness of the road transport company is an important way of promoting the efficiency of the work and quality of passenger transport systems. In this respect, successful management of the transport process is reflected in constant business decision-making related to the development of the transport process and the efficient and effective carrying out of transport [2].

Following the introductory chapter, the second chapter entitled "Road passenger transport system" defines the system according to the general theory and points to its significance in meeting the passenger demand in the transport system and describes the intercity road passenger transport as a subsystem of the traffic system. Also, this section provides an analysis of the level of quality of transport services in public road passenger transport in the European Union. In the third chapter entitled "Quality elements of transport service" define the terms of quality and its content, with particular reference to the definition of quality in road long distance passenger traffic. Historical quality management, quality assurance, quality control and quality improvement, up to business excellence, are presented. Also in this chapter are described the elements of quality of transport services and quality management models in road transport as well as methods of assessing the quality of transport services by measuring user satisfaction. The fourth chapter presents a comprehensive and systematic overview of the current scientific findings in the area of quality management of transport services in public road passenger transport. The conclusion of the paper describes the importance of assessing the quality of transport services and improving the competitiveness of the company for road passengers transportation.

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## II. ROAD PASSENGER TRANSPORT SYSTEM

One of the most important quality management principles described in the literature and applied in practice is the principle of systematic approach. The term "system" is one of the "most used" terms in general: it is about the social system, the economic system, the traffic system, and many other systems. There are many system definitions, and the basic can be expressed by the following expression [3]:

$$S = f(K, R, F) \quad (1)$$

where is:

$S$  – system

$K$  – system components (subsystems and elements)

$R$  – relations between system components (system connections)

$F$  – the function of the system (its purpose)

Following the above expression, the system is:

- A set of elements and subsystems (components) that form an integral whole within which certain processes take place, perform certain functions and there is some kind of control (and thus quality control);
- A set of objects (entities) united by the rules of interaction;
- A formal scheme by which certain elements or phenomena are regulated;
- A set of components that are interconnected.

The introductory insights on systems can be applied in the definition of traffic and transportation. Namely, it can be concluded that system theory and systematic approaches and analysis are powerful tools for describing the occurrences that are themselves complex and interdisciplinary and strongly intertwine with the environment, such as traffic and transport. The systematic approach to transport and transport research also contributes to a better understanding of the quality of transport services in all traffic areas and in road traffic. It is therefore necessary to first define the terms of transport and transport. Traffic is a wider concept of transport and, apart from transport, includes operations related to transport, transport related communication and logistical support for transport [4].

TABLE I. TRAFFIC ELEMENTS TOWARDS ŽUPANOVIĆ [4]

<b>TRANSPORT</b>	Moving people and goods from point" A "(starting point) to point" B "(destinations)
<b>OPERATIONS RELATED TO TRANSPORT</b>	Loading, unloading, transport control, management of transport, control of transport
<b>COMMUNICATION RELATED TO TRANSPORT</b>	Information, reporting, documentation
<b>LOGISTIC SUPPORT TO TRANSPORT</b>	Care of the vehicle, maintenance of infrastructure, supply of fuel, etc..

Transport is a narrow concept of transport and implies economic, entrepreneurial and specialized activity which, by means of traffic superstructures (movable objects) and

traffic infrastructure (immovable objects), human work (employees and managers) and organizations of transport companies, realizes production of transport services acting on the subject work (passengers, luggage, news, information or goods) through the change of location. It is quite certain that the quality of transport services has a lower or greater impact on all aspects of public transport of passengers in road traffic. The quality of transport services is also influenced by quality [5]:

- Means of transport;
- Traffic infrastructure: roads and facilities for initial - final cargo operations;
- Human resources (management and others) employees);
- Organization of work and business processes in transport companies;
- Logistic support for transport (procurement, maintenance, insurance, storage, etc.).

In accordance with the general definition of the system, the traffic system is defined as a set of components linked to certain relationships (connections) that make up the structure of the traffic system, in which the traffic process takes place and accompanied by processes that interact with the environment, which is a subsystem of economic and social a system that must be managed in the sense of achieving the goals of transporting goods, people, news and information in an efficient, effective and high quality manner. The traffic system is a serviceable, artificially created, primarily technical, technological and personnel system, which shows the characteristics of extreme stochasticity and dynamics. The developed transport system is a prerequisite for successful economic development, and at the same time for the development of the entire society and the state. The development of the traffic system is a long-term and planning process. Particular attention should be paid to the smooth development of each subsystem and elements of the transport system, as well as their complementarity or mutual integration. The prerequisite for such development is the achievement of the level of quality and value of the transport system as a whole. The quality of the transport system depends to a great extent on political and economic decisions and on administrative standards [6]. In general terms, the quality of the traffic system at the general level is related to:

- The usable value of the transport system;
- The value of meeting the transport needs;
- The value of general and common interests and goals related to traffic.

Intercity road passenger transport may be defined as a subsystem in the public transport system of passengers in road traffic which compensates for passenger demand on pre-established lines, fixed tolls and carriers tariffs under equal and pre-prescribed legal conditions for all types of transport services. Intercity passenger transport is a transport between two or more populated cities or towns [7]. In numerous quality-related transport quality surveys, highway long-distance passenger transport does not get high ratings. The statutory regulations and other related

by-laws regulate the conditions and manner of performing the activity:

- a) transport of passengers in internal road traffic;
- b) agency activities in road traffic;
- c) activity of the station to provide services;
- d) transportation for own needs;
- e) competence of bodies in charge of monitoring their implementation.

### III. QUALITY ELEMENTS OF TRANSPORT SERVICE

#### A. Quality Definition

In the current scientific and professional literature, a whole set of definitions of the concept of quality is found. Based on these definitions, the general term quality is analyzed with several aspects, namely [8]:

- a) From the manufacturer's point of view;
- b) From a consumer point of view;
- c) From the aspect of influential groups;
- d) From a market point of view.

The general definition of quality from a manufacturer's point of view (in this carrier's work) is that quality is the customer's satisfaction (in this work of a passenger) by a product or service (in this work of transport service) that are produced for that customer (passenger) and sold to that customer (passenger). So, only if the customers of the product or service are satisfied, the manufacturer can say that he is doing business well. Fig. 1 presents the constituent elements and aspects of quality and their interrelationships.



Figure 1. Aspects of defining the concept of quality. Source: Prepared by the authors

From a consumer (customer) aspect, quality means the convenience of a product or service for use (preferably on a daily basis). If consumers feel that a specific product or service is used and that their use ensures that they meet their particular needs then it is a quality product or service.

From the aspect of influential groups, quality means the satisfaction of all factors that affect and show interest in certain products or services. This applies primarily to the owners of manufacturers, employees of manufacturers, business partners of manufacturers and the wider community (the manufacturer's environment). If the interests and desires of all of the factors listed above are met, the quality is achieved.

From a market point of view, quality is what can be sold on the market at a price that will allow further economic viability for the manufacturer, while ensuring that consumers become loyal to the manufacturer and not change it or not to use the products or services of another. From this it is concluded that the concept of quality depends on the so-called. "The effect of the standpoint" and that when it comes to perceiving the notion of quality it is impossible to bypass the subjectivity of the one who "decides" what is good and what is not. Thus, the consumer (customer) realizes what is quality because he pays the product or service on the market. This should be borne in mind when defining the notion of quality in transport and transport. Therefore, quality should be interpreted from the position of the one who uses products or services rather than the position of a "satisfied" producer who thinks that what he has produced or even sold, best, most affordable, or in other words "best quality" [9].

#### 1) Quality development

The quality inspection phase is mainly related to the United States and Europe, and is characteristic for the period from the 20s to the 60s of the last century. Exceptional orientation to the product or service is present in the conditions of increased demand and final product control with the use of measuring tools, and quality concern is entrusted to quality services that does not directly participate in the production of products or services.

The quality control phase is related to the US, Europe and partly Japan, and is characteristic for the 60s of the 20th century. There is a product or service orientation, as well as initial routing on the process, statistical control of the process is applied, intermediate and final product quality control is performed, and the possibility of applying corrective measures occurs. Management is solely focused on financial flows. Quality control is a fully standardized approach, because quality control implies a set of methods and procedures that determine, on the basis of certain criteria, compliance with these criteria [10].

The stage of quality assurance is spatially linked to virtually all developed countries of the West and Far East, in time for the 70s and 80s of the 20th century, and it is characterized by complete orientation to the process, quality assurance through preventive actions and the observation of "low cost". This phase was developed under the strong pressure of large "public" customers (state-owned enterprises and US ministries and NATO countries in the procurement of weapons and military equipment). It is to be understood that quality assurance must be achieved through the construction of the so-called "Quality System" at all stages of product or service creation.

The quality management phase is time-consuming for the 90s of the 20th century and spatially for economically developed countries all over the world. That is why it is also called "the world's largest project". The emphasis is on the necessity of the existence of a business quality management function in companies (primarily

manufacturing and service) with the emphasized active participation of all employees, especially management, in achieving quality. Expert methods and quality tools are applied, and quality management implies process management with the aim of maximizing customer satisfaction with minimum total costs [11].

The stage of total quality management implies full mastery of quality issues for anyone who contributes in any way to the production and distribution of products or services. The entire quality management promotes the application of the quality principle in terms of integrating all functions and processes, with the ultimate goal of achieving customer satisfaction with continuous improvement. Currently, but not indefinitely one, the active phase in quality development is a phase of business excellence, which can only be pursued by companies that already have built and implemented quality management systems, followed by the stage of quality integration into the entire business system. Fig. 2 shows the order of the quality management stages as well as their content determinants.



Figure 2. Quality development phases. Source: Prepared by the authors

## 2) Quality control

The quality of production of products or services should be continually controlled. Therefore, quality control is not only the second stage in its development. In which quality standards are first defined, but it is an indisputable part of modern business operations and is one of the major subjects of contemporary management interest. In general, quality control is defined as part of a quality management system focused on meeting the basic quality requirements. The basic requirements are considered as measurable characteristics of products or services presented through generally accepted quality standards [12].

Standard is considered a recognized measure for a certain quantitative or qualitative size within a particular occurrence, activity or process. Internal quality standards in a particular economic organization, as an integral part of the quality planning carried out by management, must be aligned with higher-level standards (industrial standards, national, regional and international standards). Quality control, as a continuous process of measurement

and comparison compared to standards, is carried out as internal control and external control. Internal quality control is carried out "internally" within the organization for the whole time of production and other processes in the enterprise. Coordinated by quality managers or quality departments, covering all organizational levels and employees. External control is performed by elements (factors) outside the organization, either in an improper or passive manner, in a direct or active manner [13].

Passive external quality control is important because, in the case of maladministration, it results in loss of market positions of the enterprise and reduced competitiveness while active external control is faster and more concrete, given that the stakeholders (influential groups) are quite certain to respond to the management of the company if there is dissatisfaction the quality of the products or services they use or which have a particular interest.

## 3) Ensuring and improving quality

With the emergence of international quality standards, "classical" quality control gradually evolves into quality assurance. The same assumes an important change in terms of increased market orientation and customer. The business center and the focus of management's attention become customers and their needs that they present in the market. The transition to quality assurance means the management orientation towards management that will ensure continuous improvement of business and all processes that affect, to a greater or lesser extent, the ultimate business outcome.

Accordingly, quality assurance means planned and systematic activities implemented in a quality management system to ensure that requirements regarding the quality of products or services have been met, which is different from the concept of quality control which includes the techniques and observation tools used to meet the requirements for quality. Permanent quality improvement is due to two main reasons:

- Customers;
- Competition.

The process of continuous improvement can be mixed and gradual. Skimping improvements are necessary when companies need to emerge from the crisis, when new technologies are introduced or when investing in new equipment. For this reason, it is necessary to strive for a gradual improvement as a permanent business objective. The gradual improvement is more "acceptable" to the employees, it becomes part of organizational culture, and the changes made with the gradual improvement are more permanent, have "deeper roots" and achieve better results [14].

## 4) The quality and market competitiveness of companies

Based on the defined concept of quality, its development, control and security and the permanent improvement, the issue of quality importance is embedded. The paper focuses on two factors that are often mentioned: the market and the customers. The



market is dominated by customers. The customer is very important for two basic reasons: first, he has the option of choosing and the other, he is a payer. The customer decides what quality is, whose product or service is of a quality, and whose quality is not. The transformation of the former "producer market" into the present "customer market" has lasted for a long time and is still ongoing and is not fully completed. Such a state alone implies the importance of quality for business operations in the modern economy. Quality becomes the main "adut" for the achievement of competitiveness and competitive advantages as the ability of the company to achieve superior market position in relation to competition.

The dependence of quality and competitive advantage can be explained in the following way [15]:

- 1) Quality management, especially its control, improvement and insurance, has one of the priority goals to reduce costs at all levels and in all business process steps, which allows for a lower selling price compared to the competition;
- 2) Differentiation implies additional customer orientation and their specific requirements, depending on the type of market where a particular demand for a particular enterprise meets a given bid;
- 3) In managing quality and achieving competitive advantage, but also in all other aspects of business, human resources have a crucial role and importance. As a result, investing constantly in people, building their positive attitude towards quality and business strategy in general, the implementation of organizational culture, whose focus is the employee and his role in the company, are an element that is becoming a key competitive advantage on the market. Human (intellectual) capital and knowledge, become the main "asset and wealth" of the company. So people (management), "produce" quality for people (customers).

Managers, on the basis of all of the above, must define a strategy of achieving a competitive advantage that must be consistent with the quality management strategy. Regardless of what kind of strategy this was, it is necessary to answer the following questions, so that it would ultimately be successful:

- 1) What is the danger of entering a new competition?
- 2) What is the possibility of business negotiation with suppliers and other partners?
- 3) What is the risk of the occurrence of alternative products or services?
- 4) What is the possibility of business bargaining with customers?
- 5) What is the rivalry between companies that are already on the market, where they offer their products or services?

Based on the above, it is necessary to define the quality of transport services in the public road transport of passengers. Thus, the role and place of public transport of passengers must be analyzed within the whole transport system, as a very important subsystem of the overall economic and social system. In the public

transport of passengers, the traveler appears as a user, hence as the main factor of quality to which all subordinates. The degree and the way of meeting their demands and needs show how good the transport service is, and what it is useful. However, the concept of passengers is related to its characteristics and features that are of a quality aspect [16]:

- a) The degree of mobility - the need, the reasons and the possibility of passengers - the individual to travel;
- b) Transport needs - formalization of passenger mobility on the transport market;
- c) Age, gender and working status (young, older, women, men, workers, unemployed, students, etc.);
- d) Economic ability - the ability of passengers - the individual to pay the cost of the transport service (transport, transport ticket);
- e) The ability to travel - passenger capacity - an individual to physically withstand transport and certain specific fields of transport vehicle;
- f) The contractual connection of the passenger to the carrier if the passenger uses public transport.

Transport service "produce" carriers using objects of transport infrastructure, means of transport and human work, acting on the "subject" of transport (passenger and luggage), by changing the place where the passenger and luggage are located (from point A it is necessary to arrive in point B). Thus, the carrier, in terms of quality, appears as a producer. As far as carriers are concerned, as a transport service provider, quality is the satisfaction of a passenger (as a customer) transport service, which is manufactured for and used by passengers.

From the point of view of the influential groups, the quality of transport services represents the satisfaction of the influential groups by the way the transport service meets the transport needs, but also that it affects the overall social, economic and any other development. Like any other service (or product), the transport service is "realized" in the market (in this case, on the transport market, where transport and transport demand are met). From the point of view of the transport market, it is a high-quality transport service that can be sold on the market at a price which will enable the carrier to continue business and development, and to pay a real value for the passenger, which will be a major factor of loyalty and "fidelity" to the carrier whose service is used. It is therefore concluded that the quality of transport services is defined by the same methodology and with the same aspects as the quality in general. The overall level of quality of transport services implies the sum of the quality of individual elements specific to this type of transport service. The quality elements of the transport service and their meaning are described below in the text.

#### *B. Quality Elements of Transport Service*

Since the quality of transport services is defined from the point of view of customers (travelers), influential groups and the transport market (where customers and influential groups interact with carriers), their satisfaction must be monitored, explored, analyzed and measured on

a regular basis. The quality of transport service quality is most often carried out by recording different elements of transport services by the carrier in order to create a realistic picture of their own business.

The quality of transport services in intercity road transport makes 18 influential elements. Individual elements have different impacts on different categories of passengers, depending on their age, socio-economic conditions, purpose of travel, length of travel and more. It can be concluded that there are a number of elements of quality of transport services, and their meaning is not the same for all users. The higher the quality of individual elements, the higher the quality of transport services, and thus the greater the commitment to use the services provided by public road long distance longliners. The quality elements of transport services in road intercity transport can be divided as follows [17]:

- 1) *Availability*-(shows how road passenger transport is available to the traveler depending on the travel creation zones);
- 2) *Information*-(shows how and in what way the carrier informs the passenger about his services);
- 3) *Comfort*-(shows perceptions of passengers on the quality of the means of transport they travel);
- 4) *Traveltime*-(shows the time dimension for travel planning and implementation);
- 5) *Caring for the passenger*-(shows what the carrier offers to the passenger as part of the realization of the transport service);
- 6) *Security*-(shows the number and frequency of traffic accidents and other extraordinary events in road passenger transport);
- 7) *Impact on the environment*-(shows the extent to which road passenger transport contaminates the environment);
- 8) *Human resources*-(shows the way of work, courtesy and the way of direct operational personnel in road transport vehicles to passengers);
- 9) *Practice*-(shows how many times the passenger has to travel along the way to the destination and how the contact between public and individual transport is resolved);
- 10) *Image*-(shows the general perception and reputation of the carrier in the eyes of the passenger);
- 11) *Reliability*-(indicates whether a passenger can rely on public transport at all times);
- 12) *Accuracy*-(shows the extent to which the timetable is respected);
- 13) *Flexibility*-(indicates the ability to adapt road transport to changes in the transport market);
- 14) *Regularity*-(shows the extent to which the defined traffic regime is respected);
- 15) *Capacity*-(shows the extent to which the number of passenger seats in road transport vehicles meets the level of traffic demand);
- 16) *Price eligibility*-(shows how much the road transport prices and the system of its financing are tailored to the user's and social community's capability);

17) *Extensibility*-(shows how much of the transport market is effectively and efficiently covered by road passenger transport);

18) *Energy efficiency*-(shows how much rational road passenger transport consumes power).

However, when assessing the quality of transport services in public road transport, passengers should also consider the following:

- 1) Customer satisfaction (passenger) is a dynamic process;
- 2) Customer satisfaction does not exist as "general satisfaction", but is the "plurality" or "sum" of individual passenger satisfaction;
- 3) Satisfaction is a relative term.

An evaluation of the quality of transport services, it is necessary to highlight the following:

- The satisfied public transport user (the passenger) is a loyal (permanent) user;
- The carrier must do everything to make the potential users real users and actual users in a permanent;
- The satisfied passenger is free of charge to the carrier;
- A satisfied passenger is less susceptible to possible disturbances in the transport process;
- A dissatisfied passenger talks about his dissatisfaction with a wide circle of people and even the media.

### C. *Quality Evaluation Methods for Transport Service*

The quality of transport services results in a series of appropriate measurements based on the assessment of the quality elements for which the carrier is responsible. It follows that for each element there are expectations and impressions of users that are converted into understandable and measurable quality parameters. The quality of transportation services does not imply excellence, luxuries, validity and aesthetic appeal. The significance of the quality of transport service quality is much simpler than the above, ie it represents adaptation to user or passenger requirements. Quality is the measure of production of transport services with the satisfaction of the user or the passenger. Methods for measuring and assessing the satisfaction of users of transport services or passengers are divided into [18]:

1. Customer satisfaction measurement, ie, satisfaction rating related to the experience of performing a service from a user or passenger standpoint:
  - Customer satisfaction surveys (CSS);
2. Measurement of the performance of a service or performance assessment related to the quality of the service itself, in the manner:
  - Mystery shopping surveys (MSS);
  - Direct performance measures(DPM).

Customer satisfaction surveys (CSS) means assessing the satisfaction level related to the quality of the provided service, according to a predefined scale of quality elements. CSS is a tool for assessing user or traveler satisfaction. This tool is designed to evaluate the level of satisfaction offered by the service and does not represent

a precise measure. Such rating and quality measurement according to the scale in which the traveler makes an assessment of the extent to which the carrier meets his needs, and where the difference in the user's perception of his expectations should be highlighted. Passenger satisfaction surveys are carried out by surveying passengers. It is necessary to constantly adapt the survey related to the needs of the carrier, while also taking into account the priorities of the passenger.

Mystery shopping surveys (MSS) measures quality based on objective observation and is performed by an independent team, educated to behave as an actual traveler and then evaluate the service according to pre-agreed standards. The survey should be conducted in accordance with procedures that result in objective evaluations according to predefined standards. There must be a consistent ranking system that uses checklists to help mitigate variations among the users who rate it.

Direct performance measures (DPM) is performed according to established ranking systems. Direct rating allows you to track the actual performance of the transport service whether it is from service records or based on the observation of a randomly selected sample. The appraisal system must have two ways of collecting information: gathering data and collecting samples, then finding the middle. The assessment must be appropriate for the user, ie, the passenger and the carrier. Direct performance evaluation should reflect the overall organizational goals at each level, from which the carrier and his staff can find solutions and ways to improve the delivery of services.

#### IV. QUALITY EVALUATION OVERVIEW

It should be emphasized that rare researches describing the quality management system for passenger transport at the level of transport companies are rare. A review of the recent assessments related to the assessment of the quality of transport services has revealed that intercity road transport of passengers in developing countries faces a number of challenges [19], [20]. Some of the essentials relate to security and reliability [21], [22], planning and development [23] and socio-economic issues [24], [25]. Measuring passenger satisfaction is one of the most important methods of business decision making by transport companies, which is justified by the orientation philosophy of the client and the main activities of continuous improvement of a modern enterprise. In fact, measuring passenger satisfaction is one of five major quality management functions that enables understanding, analysis and improvement. In the last decades, the importance of passenger satisfaction in transport has been emphasized. Passenger satisfaction measurement is now considered to be the most effective feedback, given that it provides effective, direct and meaningful user desires and expectations. In this way, passenger satisfaction is a fundamental standard of performance and a possible standard of excellence for any transport company. Quality of service and passenger satisfaction are increasingly recognized as a critical

business line and as a strategic tool for gaining competitive advantage [26].

Assessing the performance of public transport shows that surveys are conducive to research [27], [28] where authors analyze the expectations and perceptions of users in assessing the quality of public transport operator services. It has been established that there is a big difference between user expectations and the perception of carriers on the quality of transport services in city buses. The survey results show that there is a large difference in the perception between regular and occasional public transport users. It was established that reliability and time travel are the most important elements of the quality of transport services. Research [29] is a work in which authors analyze customer satisfaction with public transport in Munich, suggest that carriers regularly assess passenger expectations in order to get information on the possible improvement of service quality and hence their competitiveness. The study [30] presents the results of research conducted in the Republic of Germany during the liberalization of the market in intercity road passenger transport in 2013. It is shown that existing and potential users of bus transport evaluate the quality of service compared to other alternative modes of transport (passenger car, rail transport, air transport).

In the research [31], authors categorized the elements of quality of transport services into basic and secondary quality elements based on user preferences. They argue that a low level of elemental quality (including accuracy, frequency and accessibility) can reduce the overall level of quality of transport services. However, they believe that the lack of quality sub-elements (including vehicle cleanliness and courtesy of drivers) should not jeopardize the quality of transport services because they are less important. Considering the lesser importance of these sub-elements in a specific context; in other cities, they could seriously jeopardize the quality of service and the way the bus companies operate. Other quality elements of transport services that are important to users are traveling time [32], regularity [33] and accessibility [34]. Furthermore, differences in the quality of transport services and preferences based on a certain category of users are presented by authors in the research [35]. The authors have found in this study that there is a clear distinction between a particular category of users (visitors/tourists) who prefer knowledge and courtesy of drivers as key elements of service quality, whereas (university students) prefer ticket prices as the most important element of quality for assessing a public bus carrier. Together, these studies show that regular public road transport users tend to give priority to service reliability rather than occasional users; while very few users are more influenced by information and availability of services [36].

The quality assessment of transport services with an emphasis on a particular category of users (school children) is described in the research [37] where authors as a result of the research indicate that the element of security is perceived by the user as the highest ranked

element of the quality of transport service, which is not surprising since is about bus transportation of school children, and the underlying criterion (vehicle technical validity) is considered to be the most important element of the safety element. The quality assessment of transport services based on the hybrid model is presented in the study [38] where all information was obtained by perceived user's perception of a unique IT system from which as a result of the research an application solution for business management engaged in bus passenger transport was created.

The research [39] presents an analysis of the ability to group the quality of transport services to "soft quality" and "quality of functionality". The authors state that so-called soft quality consists of elements (safety and comfort) while the elements (frequency of service, travel time, reliability and accuracy) are functional components. The results of these surveys confirmed that the relative importance of service quality elements is functionally determined by the characteristics of the passengers and the transport service in question. The study [40] presents the user's perception of determining the quality of service based on the convenience of bus stops on certain lines. Research results show how perception and expectations are important for determining the quality of the service. Based on data analysis four latent factors have been identified that affect the quality of service elements. The service quality level was measured by six grades, ranked A to F with A being the best service quality, and F representing the worst quality of service. The study will be useful in determining and improving the quality of the transit service bus service.

Study [41] presents work where authors evaluate the quality of transport services on individual bus lines of the wider Granada area of Spain. The results show that although users have evaluated the offered quality service elements on a certain line (with similarly equivalent conditions) that there is a clear difference in passenger satisfaction, and that it varies above and below the usual average. The most common element (convenience) was the one that lowered the overall quality rating below the average level expected by the bus carrier. Work [42] explores the quality of transport services and passenger perception of many elements of quality of transport services (including comfort, convenience, safety and cleanliness). The data was collected through administered questionnaires to explore the quality of the existing service and the future of bus service business performance. The efficiency of the method as a tool for measuring and analyzing passenger satisfaction is illustrated by the application in Doha.

In order to better understand passenger desires and to gain their perception of the quality of transport services, in the paper [43] the authors propose a hybrid approach based on the analytic hierarchis process (AHP) and the fuzzy linguistic method for assessing the quality of transport services . In the first stage, a hierarchy of the service quality index system (SERVQUAL) was developed. In the second phase, AHP was used to analyze the structure of the service evaluation problem in driving.

In the third stage evaluation was carried out under the criteria to express qualitative assessment of subjective attitudes of passengers. The survey [44] estimates that users of public road transport see the quality of service, solely on the basis of the information element before and after driving. Applying this methodology can provide bus companies with valuable information for planning marketing policies targeted at different categories of users, to improve service quality and attract more passengers in using public road transport.

In the paper [45], authors propose a new approach to improving the quality of transport services by applying AHP in obtaining weight criteria and new methods in ranking order priority by ideal solution (TOPSIS) where it was concluded that safety and comfort are highest elements. The concept of service quality goes beyond the technical aspects of service delivery, encompassing the perception of passengers on what services should be and how services should be improved. The survey [46] assesses the criteria for identifying the most important elements of service quality by travelers based on their estimates. A further exploration is an overview of new methods for improving the quality and efficiency of bus operators by applying an integrated approach to group-based analysis of the group analytic hierarchis process (GAHP) system and the multi-criteria analysis of the set of alternatives used to ranking organization methods for evaluation (PROMETHEE).

In addition, paper [47] presents new strategies to improve the quality of transport services and road transport competitiveness based on group research and surveys where they describe the application of fuzzy multi-criteria analysis in assessing the quality of transport services. The approach presented is effective and fuzzy estimates expressed in language terms are often a very important way for decision makers to use in the evaluation process. In order to ensure efficient service and maintain the success of a cargo-handling company, organizations responsible for organization and management of companies regularly assess the success of bus companies according to certain criteria. Depending on the objectives of the evaluation problem, various criteria for assessing public transport can be used from the perspective of different stakeholders. For example, a bus company would focus more on operational performance criteria while passengers are more interested in criteria such as quality of service and transportation security. The assessor may also have other criteria of his own interest, such as social sensitivity.

In the paper [48], authors present a new approach to assessing the quality of transport services based on the structural equation model (SEM), model used to detect latent aspects that describe the service and provide a theoretical description of the relationship between the aspects and the quality of the service. It is also interesting in the study [49] which provides an overview of the improvement of the quality of transport services in road passenger transport through the implementation of the quality of service index (SQI) model, where comparisons of the efficiency of a bus carrier are based on known



criteria and the level of quality of transport services. In a further review of literature, paper [50] presents a new model for assessing the quality of transport services by applying a Generalized Ordered Choice (GOC), which takes into account preferential heterogeneity through immediate parameters in the expected choice of service quality.

In the paper [51], authors presented the multicriteria satisfaction analysis (MUSA), model for assessing the quality of transport services. This is a model that uses multi-criteria analysis of multicriteria decision making (MCDM) to assess user satisfaction. The main advantage of the MUSA approach is that it takes into account the form of passenger ratings and preferences that are expressed in passenger satisfaction. This ability to qualitatively represent passengers and preferences makes MUSA a suitable tool for assessing passenger satisfaction, and thus assessing the quality of transport services. In the research [52], authors introduced a new approach to assessing the quality of transport services based on the artificial neural networks (ANN) model, where statistical analysis identified groups of quality elements with significant differences in their importance to determine their impact on the quality of the provided service.

In the last recent global research related to the evaluation and improvement of the quality of transport service highlights a study [53] that presents a standardization of the overall level of quality of transport service, which aims to minimize the differences between the expected and the quality of transport service provided in order to stabilize passenger demand. Using general and specific scientific methods of cognition, in the paper [54] authors explore the elements of the quality of transport service and their factors and explain their impact on the overall transport process in order to achieve that higher level of overall quality of transport service. Recent research such as the study [55] deals with the analysis of the interaction between the price of a transport service and the offered level of quality of a transport service by a carrier after using the service. In the paper [56] the authors present the impact of quality on sustainable mobility in large cities, analyzing how the quality of transport service can influence the choice of a means of transport other than the offered alternatives to public urban transport.

Furthermore, research [57], [58] presents the possibility of maximizing the impact of transport infrastructure on the quality of transport service, and how smart mobility can become a very important quality factor to be explored and included in future studies and analyzes to improve the quality of transport service. A research that defines and validates the scale of transport service quality elements by applying a new (collaborative consumption-CC) model to the overall level of transport service quality is presented by the authors in the study [59]. Research [60] presents a study that assumes that traditional concepts, tools and techniques for managing bus public transport are limited in practice, because they do not take into account the context and subsequent complexities. A very important area such as service

quality research in the transportation process has been summarized through a more recent approach in terms of modeling and new trends in service quality improvement as presented in the research [61].

## V. CONCLUSION

The problematic area of road passenger transport quality research has not been scientifically researched. Looking at the area in this paper, a lack of complete quality management value has been noted. Inadequate valorisation is reflected in the partial selection of elements for assessing the quality of transport services when it comes to the carriage of passengers in road long distance passenger traffic. According to the scientific findings presented in the literature review of the problem area of this paper, it can be concluded that it is necessary to explore and define a comprehensive set of elements that will be able to better assess the quality of public road passenger transport. By applying existing models that now value the quality of transport services, satisfactory results are not achieved, that is, they do not reflect an objective state in line with the perception of passenger satisfaction. This work and review of the area suggests the conduct of scientific research to set up improved models for assessing the quality of transport services. Applying such advanced models would provide a quality assessment service for road transport companies to optimize business and improve the quality of transport services.

In the successful companies for road passenger transport, quality is the job of every employee, ie, the quality management system. All employees of the company providing the services of passenger transport are involved. Improving the service will not only keep existing users of the service but will also contribute to increasing demand, with the ultimate goal of increasing the number of users of transport services in road passenger traffic. One of the conclusions that can be drawn here is certainly the fact that the transportation of passengers, especially those that take place outside major cities and their territories, that is to say in intercity relations, can in no way be neglected as a transport policy element, which we have witnessed so far. It is concluded that systematic investment in the quality of transport services is prerequisite for retaining existing passengers and attracting new ones. A modern user or traveler seeks quality and modern service, and it is the carrier's obligation to provide it to its existing and future passengers.

## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest through personal, financial and professional relationships related to the design and publication of this scientific work.

## AUTHOR CONTRIBUTIONS

Author Tomislav Bubalo conducted a research in the scope of the qualification doctoral exam related to the

review of the quality of transport service, which is also the subject of research for the future doctoral dissertation. An analysis and review of current scientific knowledge in the field of quality management has been made, as well as the application of methodologies for assessing the quality of transport service in public road intercity line passenger traffic. Author Prof. Marijan Rajsman as a future doctoral dissertation mentor also participated in the analysis and development of the paper and approved the final version of this scientific work.

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