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Aspects Regard of Quality and Quality Management in Road Transport

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Abstract
The scientific paper presents a concrete research carried out by the author in order to implement theoretical and practical concepts of a technical-managerial nature, in which aspects of quality and quality management in the field of road vehicle transport are presented. In this way those interested can learn about quality and quality management in the knowledge-based economy, described by increased competition with direct implications for the management of the road transport organisation. The following are aspects of quality and quality management in road transport in the context of market demands and the increasing complexity of the services provided. It also deals with issues related to how the activities and services of road transport organisations are certified in terms of quality and reviews the most important ISO standards used in the certification process of the quality of specific services. The principles and functions of knowledge-based quality management in road transport are defined. They are analysed from both an economic and a knowledge perspective. At the end of the paper it is shown how to implement Total Quality Management (TQM) in a road transport organisation and the conclusions in the field are drawn.

Keywords: Quality, Management, Road Transport, ISO Standards, Certification, TQM

1. Introduction

The term *quality* originates from the Latin language and would translate as "way of being". From this translation, however, to its present-day meaning, the term has come a long way, has acquired different definitions depending on its field of application, and has had to make a huge leap in order to be perceived by modern man [1, 2]. The most common definitions of quality are as follows: Fit for use [3]; as required [4]. In this case, the requirement is represented by needs or expectations that may be stated, implied or mandatory. Characteristic is represented here by a mundane, sensible, behavioural trait. Indeed, quality management systems have decision-making roles in road transport organisations, but each characteristic presented above has a decisive role in determining quality [5]. In Japan, the industry standard JIS 78101:1981 characterizes quality as the sum of all features or results specific to material goods or services that define their capabilities to meet the requirements or intended use demanded by customers who intend to use them [6, p. 13]. Improving and increasing quality for material goods or services always leads to achieving excellence. There is a need to develop the concept of quality in road transport, where there is no universally accepted definition. For this reason there is no generally valid model either [7, pp. 104-107].

The road transport system comprises the totality of subsystems consisting of installations, constructions, means of road transport and infrastructure, which use certain techniques, rules or principles to move independently, in a controlled and coordinated manner, in order to transport goods, material or persons. The optimal, efficient, effective and high quality operation of such a system requires sufficient knowledge of human resources, not only to operate hybrid or electric means of transport, but also to know the conditions that influence this activity. Therefore, in order to be successful in the transport market, transport organisations must constantly strive to improve processes in order to maintain a high level of quality [8]. International standards of the ISO 9000:2015 family apply in transport and more [9], where terminologies for quality management systems are found. In the chapter of terms referring to quality we find definitions and notions about quality, characteristics, requirements, processes, organisation, product-services, supplier, customer and environmental protection.

The main objective of the scientific research is to highlight the place, role and necessity of quality application and quality management in road transport, while establishing the following specific objectives:

- the place and role of and need for quality and quality management in road transport in the context of market demands and the increasing complexity of the services provided;

- To highlight the need for quality certification of the activities and services offered by road transport organisations. Presentation of the documents and steps to be taken with a view to certification;
- Presentation and analysis of the most important ISO standards used in the process of certifying the quality of services offered by road transport organisations.
- presentation of the principles and functions of quality management in a road transport organisation, analysed both from an economic perspective and from a knowledge perspective;
- Highlighting the need to implement Total Quality Management (TQM) in a road transport organisation.

2. Quality and quality management in the knowledge-based economy

2.1 Increased competition with direct implications for the management of the road transport organisation

Taking a look at the competitive factors of road transport organisations, we see that in the first half of this century their differentiation was achieved through lower prices for services offered with much cheaper labour compared to similar earlier periods. In the early 1950s competitiveness in this sector was driven by the development of technology, which was on the rise, and by the automation of road transport systems and processes. At the same time, the ability of these organisations to adapt to market requirements and the quality of the services offered in the sector increased. After the 1980s, the role of automation as a competitive factor in the road haulage market declined dramatically, and nowadays the quality of service in this sector is the main criterion for distinguishing this type of organisation.

According to a study carried out in the USA on the relationship between quality, market share and return on investment for 1,200 firms, it was found that for the same market share, the return on investment increases in proportion to the level of product quality [5, p. 80]. The increase in quality in the market has been driven firstly by the fierce competition from all organisations, including road transport organisations, and secondly by the ever-increasing demands of customers for other types of organisations and beneficiaries of freight transport services, passengers and society in general. All this has occurred with the increasing complexity of the processes and services offered.

Figure 1 a) shows the relationship between product quality and return on investment and Figure 1 b) shows the relationship between quality, market share and return on investment.

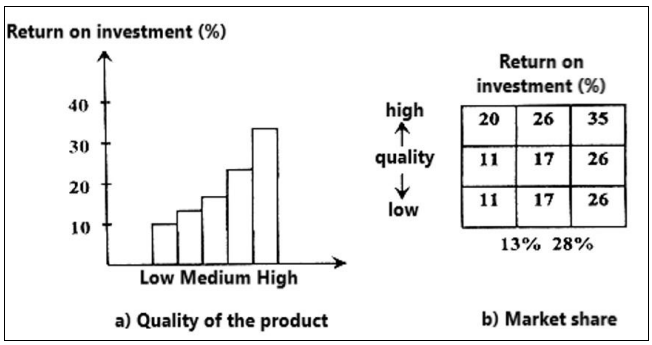


Fig 1: a) Relationship between product quality and return on investment, b) Relationship between quality, market share and return on investment [5, p. 81].

The processes are also identical for the quality of road transport services and can be taken as a relevant market similarity for all organisations, regardless of their profile. In the context of the modernisation of markets, a process facilitated also by the rapid advances in transport and telecommunications, especially in recent decades, more and more providers are meeting in these markets [5, p. 80]. In this respect, a good example to follow is that of Japanese transport organisations, which have gained competitive advantages through quality in all transport sectors. Japanese organisations have always known how to consolidate this advantage, which today should be taken into account, as an example that every organisation, whatever its profile, could follow. They have continually strengthened and amplified this advantage using their own dynamic techniques. We can argue with an example, which is by no means negligible. Japanese cars and motorcycles are characterised by enviable reliability. There are cars from these manufacturers which today have hundreds of thousands of kilometres on board without any intervention in the repair or replacement of a part or a component. Apart from regular servicing and inspections, no other work has been carried out on them. There is a myth that cars made in Japan do not go to service workshops for repairs. This myth seems to be true compared to the reliability of cars produced in Europe or Asia which do not always meet Japanese standards. The reliability of Japanese cars and motorcycles is the result of exceptional quality. In fact, one of the goals of Japanese quality is customer satisfaction.

The European Union has adopted the *Green Charter* and the *White Charter* to formulate requirements for quality of service in road transport. *The Green Charter* was adopted on November 29, 2000 under the title *Towards a European strategy for the security of energy supply*, with the following arguments:

- EU energy consumption is very high;
- Own energy production is insufficient;
- External energy dependence is growing (in the next 20-30 years EU energy imports will increase by 50%).

The main directions of the long-term strategy according to the *Green Charter* are as follows:

- Creating balances between supply and demand policies with a greater focus on demand;
- Shifting EU energy demand towards more efficient and less polluting managed consumption by promoting appropriate fiscal measures;
- Promoting new forms of energy.

The *Green Charter* also recommends the use of public passenger transport, which is much more economical and efficient than individual car transport. According to estimated calculations, energy consumption per passenger for public transport is four to five times lower than for individual motorised transport. This also reduces environmental pollution and increases road safety at least tenfold when using public transport.

All these concepts of integrated sustainable road transport are also found in the European Union's *White Charter*, which sets out the conditions for harmonious and qualitative development through environmental protection and the development of a sustainable and sustainable transport system. Under these conditions, only those organisations that can adapt quickly to changing requirements and offer

high quality products and services at reasonable prices can survive [5, p. 81]. These objectives can be achieved by improving the quality of road freight and integrated urban passenger transport services, in particular by promoting intermodal transport and increasing the efficiency of public passenger transport by minibus, bus and coach. The general principle that polluting hauliers must pay is also being pursued in order to improve the quality of car transport services in the EU.

2.2 Quality and management of road transport in the context of market requirements

Technical progress in general, the development of means of communication in particular, the increase in the level of culture, the rapid evolution of tastes, preferences, the diversification of people's needs [5, p. 81]. Based on these aspects, we transpose what the authors have said to the sphere of road transport services where, in addition to the basic needs of customers (punctuality, low cost, speed, comfort, ergonomics, safety, information, etc.), there are a number of general characteristics that make a qualitative difference. Of these characteristics, those that stand out in particular are: Variability, lack of ownership, but also the areas of extension of the quality of road transport in economic and social life and the problems of the natural or artificial environment in which it takes place. In this case, we can state that the most efficient road transport organisations are those that meet the needs listed above, but also those that ensure flexibility in meeting the requirements of customers regarding the assortment structure of these services. In other words, customers are becoming more demanding with regard to the quality of services provided by road transport organisations. They are formulating a series of requirements concerning the provision, sale and use of the services. The requirements formulated by customers constitute the three component stages of transport services: Provision, sale and use. All three stages are carried out at the same time and in front of the customer (the recipient of the goods or goods transported, or the passenger of the means of public transport). A direct link is permanently established between the carrier, who is the service provider, and the customer.

The way in which the service provider behaves, provides, sells and uses the service gives customers the opportunity to immediately make an analysis of the quality of the transport. In the long term, it is very important to establish relationships of credibility, respect, courtesy and honesty between the service provider and the customer. A transport service performed late, damage to or loss of goods or cargo transported, damage to or theft of luggage in the case of passenger transport, inevitably lead to the loss of customers by the transport organisations concerned. Transport service provided with defects or non-conformities becomes an unhappy experience for customers, who do not want it again. In such cases, customers give up part or all of the transport services offered by such providers.

In this sense, in order to offer quality services in the field addressed, it is necessary to customise the service in question, which consists of adapting it entirely to the requirements or demands of the market. In order to increase the quality of car transport services, beneficiaries must be given advice, assistance, additional information and advice on the service purchased. All this is necessary to enable the customer to understand the rules or aspects specific to the sector. The credibility and prestige enjoyed by certain organisations in the sector helps to retain old customers and attract new ones. As with the products, the service provided is accompanied by a guarantee of quality. The service provided is not subject to storage. It is carried out on demand, and promptness and accuracy are the defining characteristics of quality. These characteristics are very important to customers and are related to order, discipline, education and culture. For example, a few minutes' delay of transport in an Eastern country is often not as important as a few minutes' delay of transport in a Western country. The transport service provider's attention to the details specified by the customer is based on the observation that the investment in attracting new customers is sometimes five times greater than that made to keep the customer's business. Each time, practice has shown that a customer satisfied with the performance of the transport service provider conveys his conviction to three other customers, whereas a dissatisfied customer conveys his opinion to eleven other people. The Japanese rate this ratio as 7/30. This is why the provider needs to constantly survey the opinion of customers, because in the field addressed, all these characteristics are highly dynamic and tastes, opinions and views are constantly changing. In order to prevent this, clients often organise themselves into associations, in order to strengthen their forces and to be able to carry out a thorough analysis, but also to complement the services offered. Analysis also aims to counter the growing trend of services that do not meet their requirements. At the micro-economic level (national, regional, international), the quality of products and services is increasingly assessed in relation to quality of life. Particular importance is attached to the health-giving characteristics of products, to reducing the negative environmental impact of certain processes and processes, and more and more restrictions are being introduced to this end: Regulations, mandatory standards for the protection of life, human health and the environment, etc. [5, p. 82].

Activities to improve the quality of transport services are progressively expanding. They are evolving from isolated services, profile organisations, transport modes, transport systems, national, continental and global. This mode of expansion gradually and hierarchically highlights aspects of planned and realised quality, but also the consumption of energy and resources needed for useful activity, including basic social requirements, environmental requirements and quality of life tasks. At the level of the national economy, the quality of road transport services consists of the degree to which passengers and transport needs are met in terms of safety and integrity of goods, compliance with the requirements of transport plans and delivery deadlines laid down in contracts.

In these cases, at national level quality in transport can be measured by the following indicators:

- The number of passengers or the amount of freight transported in a unit of time;
- The specific amount of perishability in the value of the material goods or cargo carried (taken as a ratio to the volume of traffic or the quantity of cargo carried);
- The quantity of goods, taken in natural or valued form, which are in the course of transport at a given time.

At the level of the road transport sector the quality of service can be determined by the following indicators:

- Speed and journey time of means of transport;
- The safety of vehicles, goods, material goods and passengers in transit;
- Preservation of the integrity of the goods transported throughout the journey.

All these indicators can also be found in the elements by which the quality of road transport is determined at national economic level.

At the level of the road transport organisation, quality of service is assessed by indicators such as:

- Speed of vehicle movement;
- Specific cost of providing road transport services;
- Average daily journey time and period of re-use of vehicles;
- Static or dynamic load of road transport vehicles.

2.3 Quality and management in the context of increasing complexity of road transport services

The revolution in transport systems through the evolution and widespread introduction of intelligent systems, the realisation of flexible production systems in the road transport process, the use of state-of-the-art technologies for driving, comfort, ergonomics and vehicle safety have made it possible to provide more complex, efficient and faster services in this field. The most telling example of the increased complexity of car transport services is the computerisation of the related transport system. The emergence and development of computer technology represents a real revolution in human society, making the transition from an industrial society to an information society, where knowledge plays the leading role on the stage of intelligence and knowledge.

Today the computer is the basic component with which we solve almost all existential problems. Information technology and the possibilities offered by electronic communication networks have brought about major changes throughout society, permeating all aspects of technical, economic, social and cultural life. In all branches and areas where transport operates, computers and information technology have a wide range of uses, from traffic routing and safety, to logistics planning, to passenger information and autonomous, driverless cars. In order to carry out transport tasks, road transport service providers use computer technology to plan, organise, manage and control specific activities. The realisation of such products involves increasing the quality of technical as well as administrative processes [5, p. 82].

Under these circumstances, the responsibility of road transport service providers for quality assurance often goes beyond the limits of any single organisation, because they must make a commitment to their customers to design, implement and deliver the required transport service at a certain quality level. In order to keep the increasingly complex transport processes under full control, a new approach to them is required, quite different from the simple processes used in the past. To this end, integrated tracking and control systems for bus and coach transport activities have been implemented using *GPS (Global Positioning System)* and road telematics. The realisation of such products involves increasing the quality of technical as well as administrative processes.

The information and data that GPS systems provide in road transport activities are as follows:

- Transmit the positioning of means of transport on the route;
- Transmit data on the operating status of the means of transport (accelerations, decelerations, stopping times, etc.);
- Transmit data on driver behaviour in traffic;
- Keep accurate records of fuel consumption and alert the bus station when the fuel tank cap is opened;
- Generates ideal routes to reach points of interest on the route;
- Monitors vehicle routes and route adherence;
- Transmits the departure and arrival times of vehicles at and from their destination;
- Sends alerts on expiry dates and documents relating to vehicle administration and maintenance.

Telematics systems are integrated systems for the management of vehicle fleets by road transport operators. They are much more advanced than GPS systems, and their main objective is to provide additional solutions to the complex needs of road operators and drivers. Today, these devices can be used for planning, direct communication and navigation on both stationary computing technology and mobile devices and gadgets. In this case, a simple connection to the application gives the driver full access to data processing services via a tablet or smart mobile phone. With the Eco option, managers and operators can preview driver driving time data as well as data on the eco-rating programme. Through interfaces, they also facilitate integration with other applications or software on the dispatcher's computer and mobile gadget in the cab of the transport vehicle, allowing the vehicle and its trailer to be checked for driving conditions. Telematics systems can also control various systems and mechanisms of the means of transport, their maintenance, facilitate the organisation of work for partners, forwarding companies and logistics companies, and provide drivers with information about traffic and accident routines.

3. Quality certification of the activities and services of road transport organisations

In order to carry out its activities properly, any road transport organisation must certify its entire activity, including the services it offers. Certification of services in this case is the attestation by a certification body of their compliance with a specific standard, document or regulation.

According to the National Union of Road Hauliers in Romania (UNTRR), the advantages of certifying road transport services are specified as follows [10]:

a) *Internal advantages* - better organisation and functioning:

- Optimizing processes, identifying problems and reducing losses;
- Saving of all types of resources;
- Increased productivity and efficiency;
- Empowering staff;
- Optimising organisational structure.

b) *External advantages* - image:

- Improvement of image and public relations;
- Differentiation from the competition;
- Opening up new markets;

- Gaining the confidence of stakeholders, including authorities;
- meeting possible tender criteria;
- assuring partners and customers that relevant legislation is respected;
- limiting incidents involving the organisation's legal liability;
- increasing market presence, especially on the international market;
- insurance and credit conditions may become more advantageous.

At the same time, certification eliminates multiple and costly testing by both the manufacturer/service provider and various beneficiaries or intermediaries. With harmonised certification procedures and the use of identical or comparable references, certification can help to remove technical barriers to the free marketing of products and services [5, p. 83]. Taking into account all these privileges, road transport organisations must continuously improve the quality of their services in order to meet the conditions for certification. Proof of conformity of products and services may be in the form of a certificate of conformity, a mark of conformity, or a licence granted to the supplier concerned [5, p. 83].

Certificate of conformity in the field of road transport is the document issued on the basis of the rules of a certification system that gives a high level of confidence to the services offered to customers in this field. It certifies that the service is properly identified and complies with certain standards or legislation. It contains information on the characteristics of the service offered, information on the body that carried out the checks and the mark of conformity.

Mark of conformity for the certification of road transport services is a protected mark. It is applied or issued on the basis of the rules of a certification system and shows the high level of confidence in the service provided. The mark of conformity also certifies that the transport service provided by the organisations concerned complies with standards or other normative documents.

Licence for the certification of road transport services is the documentary evidence by means of which the certification body grants a person or organisation the rights to use certificates or marks of conformity for the transport services offered in accordance with the rules of the relevant certification scheme.

Within the European Union, there are two types of customer service certification in the field of road transport:

- Obligatory certifications of transport activities and services provided;
- Voluntary certifications of transport activities and services provided.

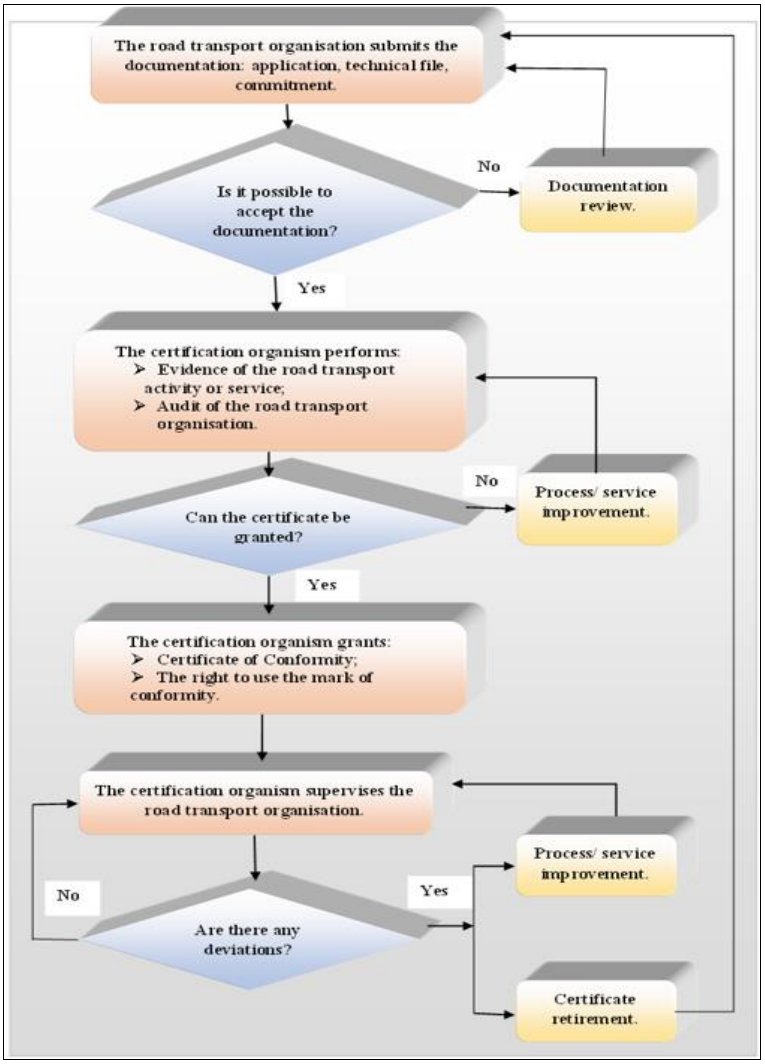


Fig 2: Flowchart of the general methodology for certification of road transport services

Obligatory certification of transport activities and the services provided is subject to the field governed by regulations and concerns services covered by national legislation. They relate to the protection of the life and health of passengers or customers, the occupational health and safety (protection at work) of employees and/or customers/travellers and the protection of the environment.

Voluntary certification of transport activities and services provided is an area not governed by regulations. It relates strictly to transport services provided outside the regulatory framework and is used by organisations as a document by means of which they maintain road transport markets, or win new segments of them.

Figure 2 shows the general methodology of the certification of road transport activity, which is carried out through the following main steps [5]:

- Application for certification, on the basis of an application accompanied by the technical file and an undertaking by the transport organisation to comply with the requirements of the technical reference regulation;
- The certification body will process the file and carry out tests and trials on the transport service under experimental conditions;
- Carrying out an audit of the road transport organisation by or on behalf of the certification body to verify that the process or service provided is kept under control and that inspections, tests on the service are carried out properly;
- Granting the certificate of conformity and the right to use the mark of conformity;
- Maintaining the right to hold the certificate or mark of conformity on the basis of the supplier's self-monitoring and periodic audits by the certification body.

Standards (or norms) in road transport are market conventions that promote and facilitate the movement of goods between producer and customer, seller and buyer, specifying the qualities or characteristics of goods or services in the interests of the parties and the welfare of society in general. They are international or European, natural or sectoral, but may also be company-specific. However, standards are by definition voluntary, not obligatory [11].

4. ISO standards used to certify quality of service in road transport

The first quality system regulations first appeared in the USA in the 1950s, triggered by the strict quality requirements imposed by the military industry and the safety of nuclear plants. Quality management is a phenomenon that has recently gained momentum and is of particular importance for all existing organisations, whatever their profile. Its implementation at organisational level guarantees the quality of products and services offered or provided by organisations. The planning, design, execution and verification of a road transport service provided by organisations is the cycle that enables them to ensure that processes are managed correctly and efficiently and that opportunities for improvement are applied consistently and on time. In transport, quality management focuses both on the quality of processes within organisations and on the services provided by freight or passenger vehicles outside organisations to customers or other beneficiaries.

The ISO 9000 family of standards refers to all aspects of quality management and includes some of the most important and common standards developed by the International Organization for Standardization (ISO). The standards applied in the certification of quality activities in road haulage or rail transport organizations are the ISO 9000 family of standards. They deal with aspects of quality management and cover the area of the most widespread and well-known standards, which provide a guide as well as the tools needed to certify the services provided in the transport market. Certification by certification bodies, using these standards, aims to ensure that the service provider constantly and permanently meets the requirements of customers or passengers, provided that their quality is constantly improved.

Certification can also be based on other normative documents but, in this case, the certification body will have to provide evidence that the documentation in question is subject to a quality system that is of a level and content similar to ISO standards. The proof of conformity with the established standard (normative document) is the quality system certificate [5, p. 84]. In Romania, the ISO 9000 series of standards was adopted for the first time in 1991, under the name SR EN ISO 9000.

The ISO 9000 standard has the following basic components:

a) ISO 9000 - Quality management systems - Fundamentals and vocabulary.

The characteristics of the standard are:

- A set of documents that provide an international guide for quality assurance of processes and services;
- Indicates guidelines to be followed for the selection and use of standards.

b) ISO 9000:2000 - Quality management systems - Requirements.

The characteristics of the standard are:

- Model for quality assurance of design, development and production in services;
- Model for quality assurance in production and services (does not include outline);
- Model for quality assurance in final inspection and verification;
- Requires the production of a quality and process documentation manual defining the organisation and operations of the quality system.

c) ISO 9004:2000 - Quality management systems - Guidelines for performance improvement.

The characteristics of the standard are:

- Basic elements for the introduction and development of a quality system;
- Elements of a quality management system designed for services;
- Procedures for implementing quality improvement within the system.

d) ISO 19011:2011 - Guidelines for the audit of quality and environmental management systems.

The features of the standard are:

- Helps road transport organisations to optimise and facilitate the integration of management systems;
- By facilitating a single audit of its systems, it simplifies audit procedures;

- Guidance on internal or external management system audits;
- Guidance on managing audit programmes.

Of course, the transport activity also involves reporting to other families of standards, such as those related to the environment, through the ISO 14001:2015 standards [12] – requirements of an environmental management system and ISO 14064-1:2018, ISO 14064-2:2019 [13]. The latter refers to organisations that release GHGs (greenhouse gases) into the atmosphere.

5. An analysis of quality management in the context of knowledge-based management in road transport

A number of quality management formulations exist and are constantly appearing in textbooks. Joseph Moses Juran, the father of quality management, defines this field, even through its role in the *quality trilogy*. He sees quality management as consisting of three main management processes quality planning, quality control and quality improvement [14]. Even the great Juran admitted that he borrowed the idea of the quality trilogy from finance.

Kelada J. for example, points out that quality management is a set of activities aimed at achieving objectives through the optimal use of resources [15]. The basis of this set of activities is the totality of the actions taken to plan, coordinate, organise and control quality activities. In its conception, organisations, whatever their profile, set themselves certain objectives of a technical, commercial, economic and social strategy which can be achieved through operational objectives.

By reproducing from the text of authors Constantin Oprean and Aurel-Mihail Țîțu, the relationship between quality management and organisation management, with applications in road transport organisations, consists in providing quality services corresponding to requirements ***(Q)***, in the required quantity ***(V)***, at the agreed time ***(T)*** and available at the desired place or market ***(L)***, all this at minimum cost ***(C)*** [5, p. 111].

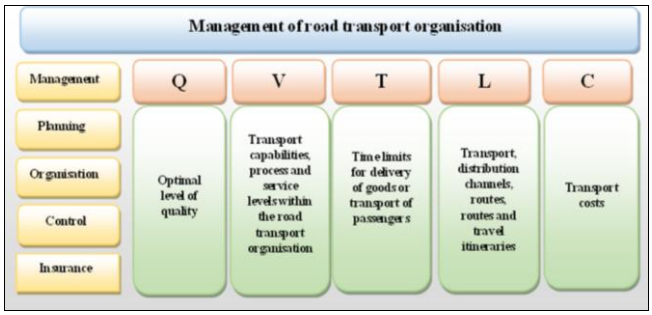


Fig 3: The relationship between quality management and organisational management. Reproduced after [5, p. 111]

All these are plotted in Figure 3. According to the two authors, the functions of the organisation should aim at "achieving these operational objectives" and quality management is an integral part of the organisation's management [5, p. 111].

Kelada J. points out that quality management "should not be the preserve of technicians and that responsibility for it "lies with the top management and coordinators of each organisation [15]. Practice and literature are in full agreement with the definition of quality management specified in the standard.

According to this standard ***Quality Management (QM)*** is the overall management function that determines quality policy through means such as quality planning, quality control, quality assurance and quality improvement [5, p. 111]. According to the standard, the responsibility for quality management lies with all managers, the coordinating role is played by managers at the top of the organisation, and the task of implementation lies with all employees. The starting point in quality management is the development of a quality policy containing the overall quality guidelines of the organisation and the establishment of responsibilities for all activities involved in achieving the quality objectives [5, p. 111]. The quality system in an organisation is the structure of the organisation, plus the procedures and processes on the basis of which all motor transport activity is carried out. In addition to all this, there are the material, financial, human, information and energy resources that contribute to the implementation of quality management in the organisation. By implementing quality management, these types of organisations aim to improve the processes that underpin the achievement of the overall objective, the specific objectives, the policies set by managers, and the services provided in the freight or passenger transport market.

From this point of view, the transport processes and services provided on the market by the organisations must meet the following requirements:

- Correspond to a clearly defined objective;
- Meet the needs, requirements and expectations of the beneficiaries (customers, travellers, etc.);
- Be applicable and conform to standards and specifications;
- Be made and provided in accordance with current laws and regulations in force;
- Take into account environmental and transport market requirements;
- Be offered at competitive prices;
- Bring profit and welfare to the organisations in which they are produced and run.

6. Principles of quality management in the knowledge-based road transport organisation

In order to develop policies and to achieve a more unified approach to quality in organisations transporting goods or passengers by motor vehicle, certain basic principles need to be formulated.

These principles are the cornerstone on which the ISO 9001 family of standards has been built, rooted in the category of standards:

- ISO 9000:2005 - quality management systems - fundamentals and vocabulary;
- ISO 9004:2009 - leadership for the sustained success of all organisations, regardless of profile or activity.

Experts in the field and the literature formulate a wide range of opinions that differ from one side to the other. For example, Chonberger focuses mainly on process quality and continuous improvement, Merli is based on some fundamental principles such as: Customer satisfaction, quality first, continuous improvement and the involvement of all staff in organisations. Stora and Montaige focus on principles such as: Commitment of managers, commitment of employees, quality improvement methods in line with the principles of reason. Haist promotes the principle of "zero defects", customer orientation, application of the principle of

prevention.

According to the father of quality management, Joseph Moses Juran, the basic principles are: Customer orientation, continuous improvement, market competitiveness and internalisation of the customer-supplier relationship. The implementation of these principles is only feasible if the top management of organisations is fully committed.

The International Organisation for Standardisation (ISO) conducted a survey and found that out of 1,000 organisations with different profiles and fields of activity, surveyed in order to identify and determine which principles should underpin quality management, which bring more benefits, improve products or services and satisfy customer needs and requirements, eight of them were decided upon. The principles established are applicable in all organisations producing goods or services, including road transport, and are as follows:

a) Customer orientation (focus)

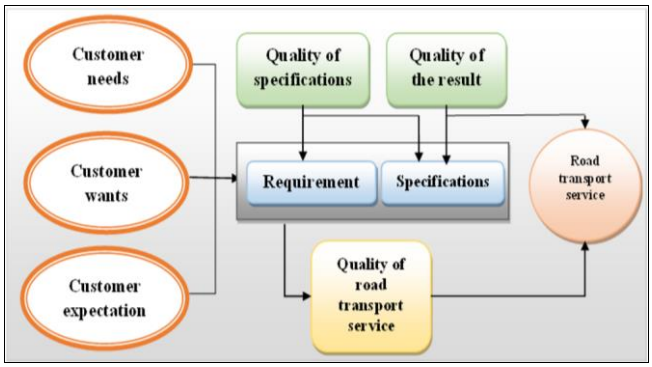


Fig 4: The relationship between the quality of road transport services and the quality of specifications. Reproduced after [23, p. 135]

Transport organisations depend on their customers. The customers of transport services are: Recipients of goods or material goods transport by lorry or truck and passengers travelling by minibus, bus, coach or taxi. In order to carry out and deliver quality services, organisations need to know and understand the current and future needs of their customers or passengers, meet their requirements and seek to exceed their expectations. A customer-oriented road transport organisation makes market decisions based on customer requirements and always develops ways to increase customer satisfaction. Identifying and satisfying customer requirements must be the starting point for all activities in the organisation. Quality must be defined in relation to customer requirements, which are determined by their needs, wants and expectations [5, p. 134]. Figure 4 shows the relationship between road transport service quality and specification quality.

b) Management (leadership)

As in any organisation, it is the managers in transport organisations who determine the unity of purpose and direction of the organisation. They create and maintain its internal environment. In this context, employees must be fully involved in actions to increase the quality of the objectives set by management. It is the organisation's management that coordinates management review meetings to ensure that the quality management system functions properly. In this regard, some authors point out that leaders ensure the alignment between the organisation's purpose and its internal environment. They need to create such an environment in which employees can be fully involved in achieving the organisation's goals [5, p. 135].

c) Involvement of all staff of the organisation

In road transport organisations, staff employed in sections, compartments, departments, maintenance services, logistics, finance, vehicle mechanics and electricians, drivers, etc., are the essence, and their involvement, knowledge and skills must be harnessed in the interests of the organisation in order to achieve the expected goals. This is a quality requirement, and for staff to meet these requirements, they must understand them. In order to understand them they must be trained. Employees must first and foremost be competent, and this is achieved through continuous training programmes. They must also be willing to use their full capacity and have a team spirit, i.e. be willing to work together to achieve the organisation's objectives [5, p. 141].

d) Process-based approach

Expected results are always achieved efficiently when transport activities and related resources are based on the processes carried out within the organisations concerned. In this context, a process is defined as a set of activities specific to the transport of goods or passengers by car, in which resources (human, financial, technical, energy, etc.) are used and consumed to transform inputs (goods or passenger transport vehicles, loading and unloading equipment, logistics, computing technology, vehicle fleet management and coordination means, telematics systems, etc.) into outputs (goods or passenger transport processes and services). At the heart of any transport organisation are the final processes, which are the transport services provided to customers by the employees using vehicles. In order for the quality management system to be effective, these processes, as well as the corresponding responsibilities, authority, procedures and resources, must be defined in a correct manner. It is also necessary to coordinate and ensure the compatibility of processes and define their interfaces [5, p. 138].

e) Systemic approach to the management of road transport organisations

Identifying, understanding and managing the processes and services provided to customers by transport organisation staff correctly and efficiently contributes to the achievement of the purpose and objectives of motor transport organisations. In the view of ISO 9000:2000, particular importance should be attached to a systemic approach to the organisation's process network by integrating the processes involved in dealing with customers and other stakeholders with those of the organisation's internal activities, from the definition of management requirements, the identification of necessary resources, the realisation of products, to the evaluation and analysis of results [5, p. 139]. The analysis is always carried out by the management of the organisations. It is done with the aim of identifying sources of improvement of the quality management system in order to provide customers with quality transport services. Involving management in the implementation of the planned improvements will start the cycle again, thus ensuring the prerequisites for continuous improvement of the quality management system [5, p. 139].

f) Continuous improvement of transport processes and services

Continuous improvement of the overall performance of transport organisations is a permanent objective for managers and staff. Continuous improvement of the transport services offered by these organisations to their

customers can only be achieved by improving the transport processes related to each stage of the service. In this respect, the road transport process must be staged and improved from its inception, starting with the first stage, the marketing study to identify what the customers' wishes and demands are, and then ending with the last stage, the provision of the transport service itself. To facilitate this process it is important to work in teams, promote quality circles, etc. [5, p. 141]. If these quality requirements are met, the organisation becomes competitive in the transport market.

g) Decision making by managers based on facts

Effective decisions by managers of transport organisations are always made on the basis of data and information. In order to make good decisions, they should always check information and data on their veracity. In the age of technology, information holds the power. This is one of the strengths that any organisation in the transport market must have. It is very important that when there are non-conformities in the transport process, preventive and corrective actions are taken. Data and information are needed from the stage of identifying customers and their requirements to assessing customer satisfaction. This data needs to be collected, processed and updated on a continuous basis. It is recommended that these data are rigorously checked before they are used in problem solving and decision making [5, p. 142]. Always, analysing the root causes that create dysfunctions in the organisation's system is the effective way to detect problems and solve them.

h) Mutual and advantageous relations with suppliers

There must be an interdependent relationship between organisations and their suppliers in the transport market. A mutually beneficial relationship on each side creates the capacity to bring added value and welfare to both parties. Through its quality policy, the organisation should define the guiding principles it promotes in its relationship with customers, suppliers and other stakeholders in its activities [5, p. 142]. The ISO 9000 family of standards always brings benefits and creates a solid basis for improving transport activities and increasing customer satisfaction.

7. Functions of quality management from the perspective of economics and knowledge-based management in the road transport organisation

As far as the functions of quality management are concerned, as specified in the literature, there are also different opinions.

Referring here to Juran's quality trilogy concept with application to road transport organisations, we deduce the following quality management functions:

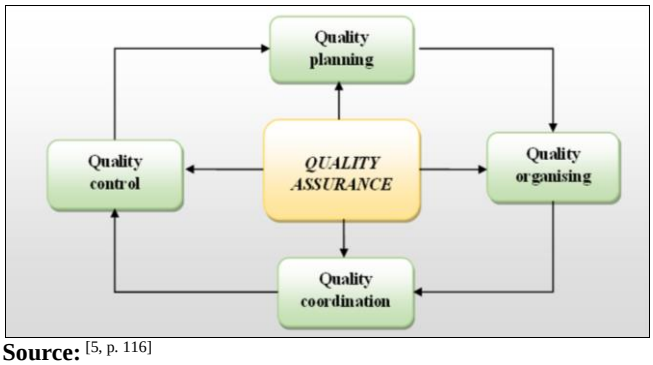
a) Planning

Within this principle, Joseph Moses Juran refers to the development of products as well as processes. By analogy to the great Juran's conception, in our opinion, in transport we are only talking about processes or services, and planning in this sense refers strictly to their planning, which must be in accordance with customer requirements.

b) Keeping quality under control

In the field of transport, this principle refers to ensuring that the range of its oscillations is as small as possible compared to the established one. To this end, the determined values of the quality characteristics are compared with the specifications (standards), and the necessary corrective measures are established throughout the product manufacturing process [5, p. 115]. Compared to what the two authors have stated, in relation to the specific activity in transport, this can be interpreted in a similar way for the services offered to customers, i.e. the established values of the quality characteristics of the transport services provided to a customer must be in line with quality standards. If deviations from the standards occur in this case as well, corrective measures should be applied urgently to the services concerned.

c) Improving quality



Source: [5, p. 116]

Fig 5: Functions of quality management.

According to Juran's same trilogy of quality, taken by analogy and transposed to the field of road transport, this function is of particular importance and the processes resulting from the specific activities of such organisations must eliminate past quality problems. By improving the quality of transport services, transport organisations achieve high performance in line with standards. The maximum results, achieved in this case, are due to the application of this principle at a higher level, much higher than the planned level. Taking into account the sequence of steps corresponding to the management process in general and the specificity of quality management, we consider that the functions of quality management are planning, organising, coordinating, coaching, controlling, ensuring and improving quality [5, p. 116]. Figure 5 shows the functions of quality management.

8. Implementing total quality management in road transport organisations

From a scientific point of view, clitatea is a field that has a very broad use and for this reason, defining it becomes quite cumbersome. Technical disciplines, economics or philosophy each define quality in their own way, but the literature defines the term as a concept specifically created for products and services. In road transport we are talking about processes and services, and in this sense we can define quality in the following ways: "meeting customer requirements", "a systematic approach to excellence", or "conforming to specifications".

According to the Quality Standards, *Quality Management and Quality Assurance - Vocabulary*, terms and definitions in this field are established, where quality is "the set of characteristics of an entity, which gives it the ability to satisfy expressed or explicit needs [16]. We can show here that, according to the definition in the standard, quality is not expressed by a single characteristic, but by a set of characteristics; it is not self-contained, it acts and functions only in relation to the needs of the customers, being a continuous variable; quality satisfies both the expressed and the explicit needs of road transport customers. Since the

1980s, we can speak of integrated quality assurance concepts. They were first applied in Japan under the name of TQC (Total Quality Control). These concepts were created with the aim of keeping quality under control in organisations, which later became a national and then a global issue.

Total Quality Management is a management system generally attributed to W. Edwards Deming, but J. M. Juran, Philip Crosby, Armand Feigenbaum and Kaoru Ishikawa also contributed to the body of knowledge known today as TQM. [17]. In the 1930s, Deming teamed up with Walter A. Shewhart, a statistician at the Bell Telephone Company from whom he learned the basic concepts of Statistical Quality Control; as a result, using Shewhart's theories (1931) [18]. W Edwards Deming invented the statistically controlled management process that gave managers the means to determine when to intervene in an industrial process.

The Japanese approach to this problem then becomes of interest to Western European countries, which are beginning to focus on the high level of transport services offered to their customers, but also on the implications of the underlying processes for environmental pollution. Europeans have accepted the idea of a systemic approach to supplier-customer relations, thus shaping a new concept: TQM (Total Quality Management). The TQM concept is based on a logical process orientation, in our case, transport processes, starting with the study of the transport market to identify the needs and requirements of customers and ending with the arrival of goods or material goods in warehouses and the arrival of passengers by public transport. It is estimated that TQM has now made strong inroads into the European freight and passenger transport services market. In this respect, most European countries have developed new techniques, better adapted to the requirements of economic, technical and social integration of quality management.

Total quality in road transport is characterised by a set of methods and principles grouped into a global strategy implemented by organisations in the sector to improve the quality of processes and services offered to their customers.

In the field of road transport, total quality was created for the following purposes:

- Customer loyalty through quality service;
- Road transport organisations have become more cost-effective;
- Understanding the meaning of zero defects, from the manager to the last employee, is the main objective of transport services offered in the market.

It includes:

- All functions in the organisational chart of a road transport entity;
- All employees of the organisation, irrespective of the activity they perform;
- The totality of the customer-provider relationship of a transport service;
- All activities and processes specific to the service provided by the means of transport;
- All current and potential transport markets won by an organisation.

There are close links between total quality management and total quality, but they should not be confused.

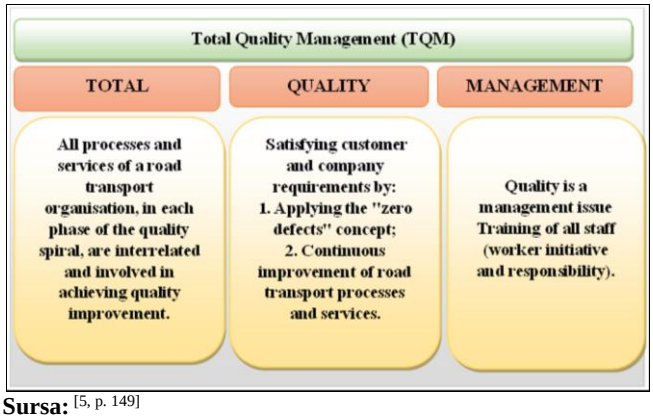
Total Quality Management (TQM) (translated from ISO 8402:1994 - English version) and Total Quality Management (French version: *Management total de la qualité*) [19, p. 115], is a means, an instrument, and total quality is a goal. This means satisfying customers beyond expectations. This can be achieved by involving all employees, but also partners outside the transport organisation (suppliers, distributors, company and after-sales service representatives, etc.).

The ISO 9000:2000 standard defines TQM as a quality focused management system (management approach) of an organisation, based on the participation of all its members, aiming at long-term assurance through customer satisfaction and benefits for all members of the organisation and society [5, pp. 148-149]. Total quality, at its core, is characterised by the following aspects: Customer satisfaction; increased productivity of the transport organisation; high involvement and motivation of employees; continuous quality training; low cost prices; competitiveness in the transport market of transport organisations and their outstanding business results. It is believed that the success of a management system is considered by the strong and permanent involvement of top management and the continuous training and education of all staff in the organisation. TQM adds to the concept of quality management a long-term global management strategy, as well as the participation of all staff in the interest of the company, themselves, its customers and society as a whole [5, p. 149].

Today, TQM is considered the new management system for road transport organisations, whereby managers use certain techniques to achieve the following objectives:

- Meeting current customer needs and exceeding customer expectations;
- Occupying a high and comfortable position in the transport market;
- Creating and strengthening a total management system by involving employees and managers, with the customer as the central pillar, for whom a real cult is created, exploring and constantly getting to know their implicit and explicit needs.

Analysing the philosophical, psychological and political dimension and character of TQM, it is the motivating and driving force for all staff in the road transport organisation, motivating them to get things done well. In this context quality becomes the essential condition by which the organisation survives, and also the satisfaction and pride of the employees. One of the definitions of TQM that focuses on the management system was given by Hellsten and Klefsjö [20, pp. 238-244] who define TQM as a continuously developing management system consisting of values, methodologies and tools, whose aim is to increase external and internal customer satisfaction with a reduced amount of resources". Foley K. points out that there is no generally accepted definition of TQM and that it has in some cases failed to deliver the promised results [21]. Quality assurance is defined as all planned and systematic activities implemented within the quality system and proven to be necessary to provide confidence that quality requirements will be met. The concepts of internal and external quality assurance are also used here. Internal quality assurance is the totality of activities aimed at providing confidence to management that the desired quality is being achieved.



Sursa: [5, p. 149]

Fig 6: Elementele de definire ale TQM, în cadrul organizațiilor de transport rutier

External quality assurance is the totality of activities aimed at giving confidence to customers (or legal authorities) that the quality system in place at the supplier will provide products or services that will meet the quality requirements. Figure 6 shows the defining elements of TQM in road transport organisations.

The formula of the philosophical dimension of TQM, specific to transport organisations, could be defined as follows: Quality = survival of the organisation; quality = pride and satisfaction of all employees of the organisation; exceeding all customer expectations = teamwork of all employees; the customer of the organisation = its master (owner). At its core, TQM is a business management philosophy that deals with achieving continuous improvement in customer satisfaction through quality management of products and services in the field of automobile transportation, bus driving, carpooling, etc [22]. TQM is widely used in manufacturing, education processes, services, NASA science and space programmes and road transport.

9. Conclusions

The main objective and specific objectives of this scientific work have been achieved by presenting the results of the research carried out in the context of this work. The quality of service in road transport depends on factors other than that of the products. In road transport, quality is determined by two main aspects. The first relates to the degree of development of the road transport organisation and the performance of its management, and the second relates to the customer, his satisfaction with the transport services he has received. Quality in transport services is determined by certain characteristics of services in general and transport services in particular, which are general and common to all transport branches, whether they concern goods, material goods or persons. Road transport continues productive processes in the movement of goods or people. The expenditure of social work in this respect increases the value of the goods transported by transferring value from the means of transport used to them. The objectives for sustainable road transport, as set out by the EU in the White Charter, can be achieved by increasing the quality of road freight transport services and integrated urban passenger transport services, promoting intermodal transport in particular and increasing the efficiency of public passenger transport by minibus, bus and coach. At the level of the national economy, the quality of road transport services consists of the degree to which passengers and transport needs are met nationwide in conditions of safety and integrity of goods, compliance with the requirements of the transport plan and delivery deadlines as stipulated in contracts. Telematics systems are more advanced than GPS systems and their main objective is to provide additional solutions to meet the complex needs of fleet operators and drivers. Certification of road transport services helps to remove technical barriers to their free marketing on the transport market. The implementation of quality management in road transport organisations guarantees the quality of service provided to customers. ISO quality standards provide a guide and the tools to certify the services provided by organisations in the transport market. The quality system in an organisation is its structure, plus the procedures and processes on the basis of which all motor transport activity is carried out. Implementing the ISO 9000 family of standards in any organisation brings benefits and creates a solid basis for improving transport activities and increasing customer satisfaction. By improving the quality of transport services, organisations achieve high performance in line with the standards. Total quality in road transport is characterised by a set of methods and principles grouped into a comprehensive strategy implemented by organisations to improve the quality of their processes and services to their customers. Knowledge management in road transport improves the performance and experience of groups in the projects the organisation undertakes and eliminates failures. Thanks to technology, compared to how things used to be, mankind has become much more efficient, moves much faster and safer, learns better and faster with easy access to information. This is due to efficient and effective quality management.

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