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## INTEGRATED QUALITY MANAGEMENT SYSTEM IN PUBLIC URBAN TRAFFIC

### ABSTRACT

Public urban traffic (PUT) requirements are based on the specific characteristics that dictate the requirements themselves. The problems faced by all the big cities regarding public urban transport are very similar, and they range from unacceptability of the very organisational structure of the system facing the population growth, limitations and congestions of the traffic routes loaded by an increasing number of automobiles, to the chronic lack of economic funds for the investments that would create the necessary conditions for positive shifts. In PUT there are many random parameters whose statistical laws are not easy to determine and it is often the topic of research of various profiles of scientists. There is always the satisfaction, that is, the lack of satisfaction by the final user of the public urban transport and all the other involved groups. The result is that the potential users of public urban transport give up and try to find other solutions for their transport needs, turning in principle to individual traffic. Consequently, the number of passenger cars on the traffic routes increases along with all the resulting negative effects. The complex systems of public urban transport facing the increasing requirements to improve efficiency have to be subjected to certain changes in order to achieve physical sustainability of traffic at all, and to satisfy the environmental requirements that occur as counterbalance to the pollution of the urban area.

With the aim of achieving optimal conditions for the quality of service, and by introducing acceptable traffic solutions combined with the integrated quality management system based on the standards ISO 9001 and ISO 14000 high-quality shifts are made possible. The integration of these standards results in the rational combining of the quality management system into a single efficient system, reflected in achieving high-quality traffic and transport service, improved information flow, unique documentation, positive orientation to the environment with concurrent reduction in the costs of resources, energy and number of automobiles on the traffic routes.

### KEY WORDS

public urban transport, ISO standards, quality of transport, environmental protection

### 1. INTRODUCTION

Public urban traffic features extremely marked specific characteristics which distinguish it from other transport modes. These specific characteristics have crucial significance for the organization and operation of traffic and the design of transport means.

The main characteristics of public urban traffic are the following:

- it serves exclusively for passenger transport,
- it is physically restricted to the urban and suburban area,
- technical and organizational solutions of public urban transport are specific for certain areas and there are no identical solutions,
- extremely expensive infrastructure,
- it operates on relatively short distances depending on the size of the urban and suburban space,
- it is time-conditioned, there are high oscillations per hours in the day, depending on the working hours of the users, within a week regarding days, e. g. workdays, weekends,
- high concentration in the downtown areas and around the traffic nodes,
- there is no flexibility, it depends on rigid requirements of the working hours, directions of movement, passenger volumes and travelling hours,
- it is integrated with its most part into the entire torrent of road traffic resulting in the reduction of capacities and lower efficiency,
- it is sensitive to interruptions, and therefore requires appropriate organization and very operative professional personnel,
- sensitive to sudden population growth,

- sensitive to the increase in the number of automobiles in urban and suburban area,
- it depends on the economic potentials of the society.

Today's goal of all technical activities is the improvement of human living in compliance with the development and use of technical means and therefore, the goal of public urban traffic is to develop first of all the technical systems and to provide their functionality. It should be also noted that apart from the characteristics of improving the quality of living, there are also certain adverse consequences for the humans and their environment. Such situation is reflected in the satisfaction, that is, dissatisfaction of the end-users of public urban transport, and it is implemented through the quality of service.

The quality level of the passenger transport service affects directly the transport demand and it may be said that the quality level of the offered and realized transport service in public transport is a complex term. The optimal quality of the transportation service is achieved by mutual correlation of the transport service quality and the transportation process.

## 2. INFLUENCE OF AUTOMOBILIZATION ON URBAN AREA

The main problem that has resulted in reducing the transport service quality in public urban transport is the sudden growth in the number of passenger cars on the roads. Large number of people uses personal cars for their transportation, primarily due to its flexi-

bility, so that personal cars have become also the main symbol of personal freedom in the modern society. This situation has resulted in tripling of the number of automobiles over the last twenty years, so that there is on the average one and a half cars per one household. However, the construction of traffic infrastructure in urban areas did not accompany the increasing trend of the number of personal cars. This resulted in traffic congestions and standstills caused by the unbalance between the large number of transport means and the capacity limitations of the very traffic routes.

The failure to control the newly created traffic situation in urban centres has resulted in traffic problems of urban centres being reflected in reduced travelling speeds, overburdening of the traffic network by automobiles, lack of parking spaces for automobiles, lack of safety for traffic participants, and high pollution of the environment and noise.

The problem of the increased number of automobiles and the tendency of further "automobilization" lead to the anomalies that are felt also in the reduced number of passengers in public urban traffic. The load of taking over and solving this everyday problem in the big cities is seen in the public urban traffic and it is the only way to alleviate the current situation caused by the congestion of the cities by automobiles and to make a shift in solving the traffic problems by its high-quality organization. This assumption is based on the fact that all the attempts with some other solutions have not succeeded until now because public urban transport is the only one that has the capacity to satisfy the traffic demand regarding the limitations of the traffic infrastructure in big cities.

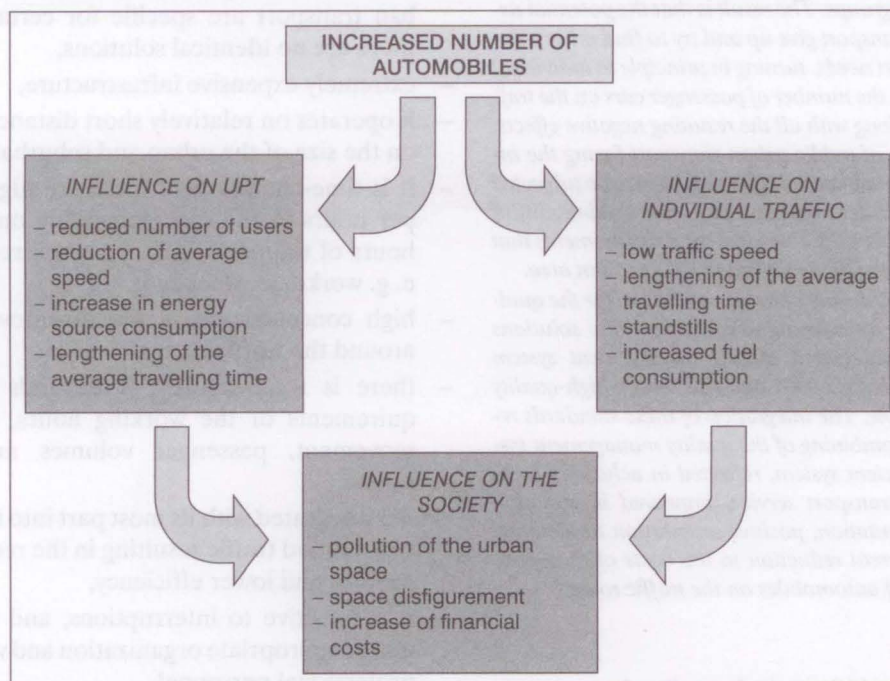


Figure 1 - Closed circle of problems caused by increased number of automobiles in urban environment

Focusing on attracting a certain part of the passengers from individual traffic into public urban transport is the basic goal that has to be the basis of the traffic policy and to ensure the quality of living of the population in big cities regardless of whether it refers to the urban transport excellence or ecology. Figure 1 shows the closed circle of the problems caused by the increase in the number of automobiles in urban environment.

### 3. PUBLIC URBAN TRANSPORT REQUIREMENTS

Public urban traffic requirements are not as a rule equal everywhere, but they range within a quite narrow interval of differences. The public urban traffic itself has to be studied from three aspects. The possible differences in interpretation cannot feature greater deviations since this is a specific area with widely known requirements. By classification into the mentioned three aspects, the PUT requirements can be characterized and described as service, social and ecological ones. This rough division has to be done from the requirement of the entire urban population according to the requirements that can be considered through these three segments. It is impossible to separate one from the rest and still make PUT realize the set goal based on the relation towards the total or at least majority of the population.

Figure 2 shows the public urban traffic requirements through a cross-section of three basic segments.

The development of societies that as a rule do not always move in the positive direction, leads to the occurrence of certain anomalies, both in the transition countries and in the countries of the developed West. The result can be seen in the increasing disintegration of the society, which brings along the unsolved problems and by excessive development destroys itself.

One of the resulting problems is pollution, and it cannot be avoided without greater efforts of the entire society. The world trends are based on the attempt to correct certain negativities in order to save that part of the nature that can still be saved, and all this with the so-called sustainable society development.

The negativities that result from automobilization are now coming due and one of the ways of fighting this problem in the big cities is good organization of public urban transport. For such an organization which operates in the conditions that are everything apart from simple, to join the possible struggle against traffic illogicalities and problems, it has to have certain assumptions on which it will be based, and will be able to perform the set task regarding the public urban transport requirements.

Through the introduction of international standards ISO 9000 and ISO 14000 the incentive is given to the needs of solving the service and ecological segment and in that case the integrated approach to problem-solving is used, whereas the remaining third part has to be solved by the local community at the interest level with the set goal for every potential user to have the possibility of access and usage of public urban transport. This part is solved by a regional approach, depending on the environment, but it depends most on the economic power of the community itself. It should be noted that social standards will never be written, since there is no room for them in the liberal capitalism.

The trend of adopting international standards, especially from the ISO 9000 group, which are based on the quality of service, has extremely advanced and has become generally accepted, but the occurrence and accumulation of ecological problems has resulted in the need to integrate the ISO 14001 standard into the ISO 9001 standard, so that apart from the management system, the environment management system is being introduced as well.

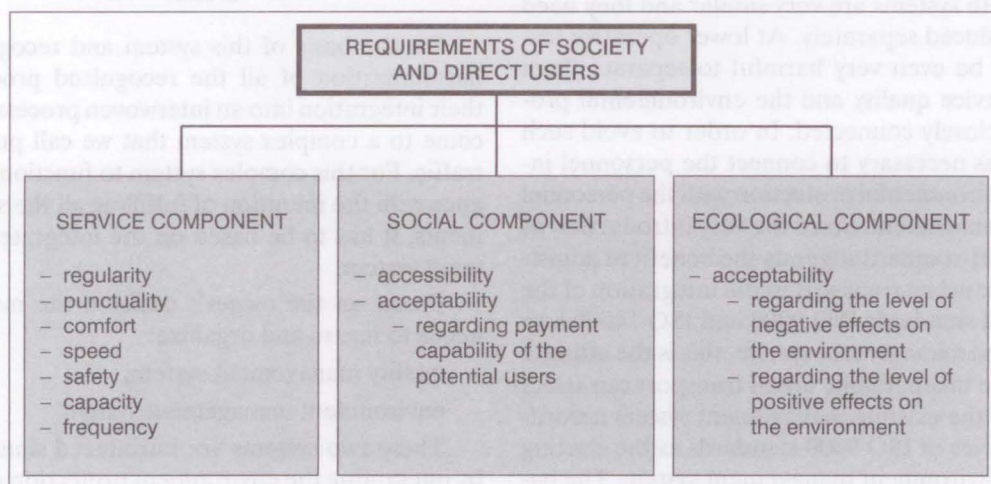


Figure 2 - Traffic requirements through the cross-section of the basic three segments

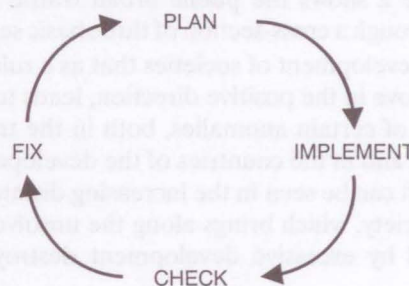
#### 4. INTEGRATING THE QUALITY AND THE ENVIRONMENT MANAGEMENT SYSTEMS

In order to achieve compliance of several standards for a more efficient and financially more cost-effective system, and at the same time to reduce the volume of documentation it is necessary to develop the integrated systems. The ISO 14001 and ISO 9001 standards are structurally very similar and the very requirement of the society to be oriented to environmental protection is an additional incentive to make efforts in accepting both standards with the aim of increasing the quality of living which is the clear goal of both standards. Out of all the standards that have been formed in the developed societies, especially highlighted is the ISO 14001 standard which meets the orientation of the society to the reduction of environmental pollution and restricted living areas that have been already destroyed to a great extent. The ISO 9000 standards set the requirements for the service in public transport whose quality will satisfy the service users regarding their need for transport and will insure the confidence that the service will be in compliance with the set and accepted requirements. In case of environment management, apart from the service users, the current quality management is expanded to a very wide circle of interested parties that have vital interest in a visible qualitative shift. The ISO 14001 standard takes to a great extent the approach to quality assurance from the ISO 9001 standard and the public urban carrier expands the organization approach to integral operation with the aim of environmental protection recognizing the legal frames and introducing all the interested parties into the system. This approach introduces the integrated approach to introducing quality and apart from the very service quality it takes increasingly care of the environmental issues. The advantage of the very integration is based on the facts that both systems are very similar and they need not be introduced separately. At lower operative levels it would be even very harmful to separate them since the service quality and the environmental protection are closely connected. In order to avoid such mistakes, it is necessary to connect the personnel involved in environmental protection with the personnel of quality management. Since the very introduction of the ISO 14001 standard suggests the benefit of adjusting the public urban transport to the integration of the international standards ISO 9000 and ISO 14000 into the integrated management system, this is the attitude that has to be taken. Public urban transport can select the usage of the existing management system according to the series of ISO 9000 standards as the starting basis of its environment management system. The basis is in the direct interest of the potential user in the

quality of public urban transport service and high-quality system of environmental protection in which the user now appears as the user of the living space. Those parts of the standards that cannot be integrated, i. e. those parts for which there is no connection with the ISO 14001 requirements are treated as a separate system.

#### 5. PROCESS APPROACH OF INTEGRATED MANAGEMENT SYSTEM

Public urban transport has the need to organize an integrated management system of PUT based on the requirements of the standards ISO 9001 and ISO 14001. For the system to start operating the decision of the company owner is necessary, based on the adoption of the quality management system as the strategic goal of business operation. Based on the requirements of urban population and potential users is also the decision on the introduction of the integrated management system which is based on the systemic approach. Such approach is based on the division of responsibilities of every single organization member regardless of his/her hierarchical place in the organization of such a complex system. Naturally, the level and the volume of responsibility will be adjusted to hierarchical levels where the main thesis is that every member knows his part of the job and takes exclusive responsibility for what has been done. The system relies on the closed circle system that is based on four crucial ideas.



On the basis of this system and recognition and harmonization of all the recognized processes and their integration into an interwoven process system we come to a complex system that we call public urban traffic. For this complex system to function in compliance with the intention of fulfilling all the set requirements, it has to be based on the integrated management system.

Based on the owner's decision the management needs to insure and organize:

- quality management system,
- environment management system.

These two systems are introduced simultaneously by integrating the environment protection system into the quality management system.

### 5.1. Resource management

The organization has to organize and ensure the necessary resources in order to establish the sustainable integrated management system. It is necessary to organize competent staff based on high-quality education and experience in working with quality and environment management. The organization insures and maintains the infrastructure in order to achieve its harmony with the beginning of process realization of providing and performing the transportation services.

Figure 3 shows the organization of integrated management system in public urban transport based on the quality management system ISO 9001.

### 5.2. Implementation of the process of service realization

The system implements the planned processes and realizes them as transport service in public urban traf-

fic. The requirements set based on the integrated approach to the service provision process are based on the requirements of the ISO 9001 and ISO 14001 standards. The development of organization and planning are based on the significance of the process and judgement areas based on the criteria and methodology that have to be clearly set.

### 5.3. Checking the service realization process

The organization must follow the process of service provision, recognize the non-conformities and permanently improve the system in preventing the re-occurrence of disharmonies both in quality management and in measuring the characteristics of the activities that have and may have significant impact on the environment and introduce corrective and protective activities with the aim of permanent system improvement. The part of the process that cannot be integrated is implemented as a separate system.

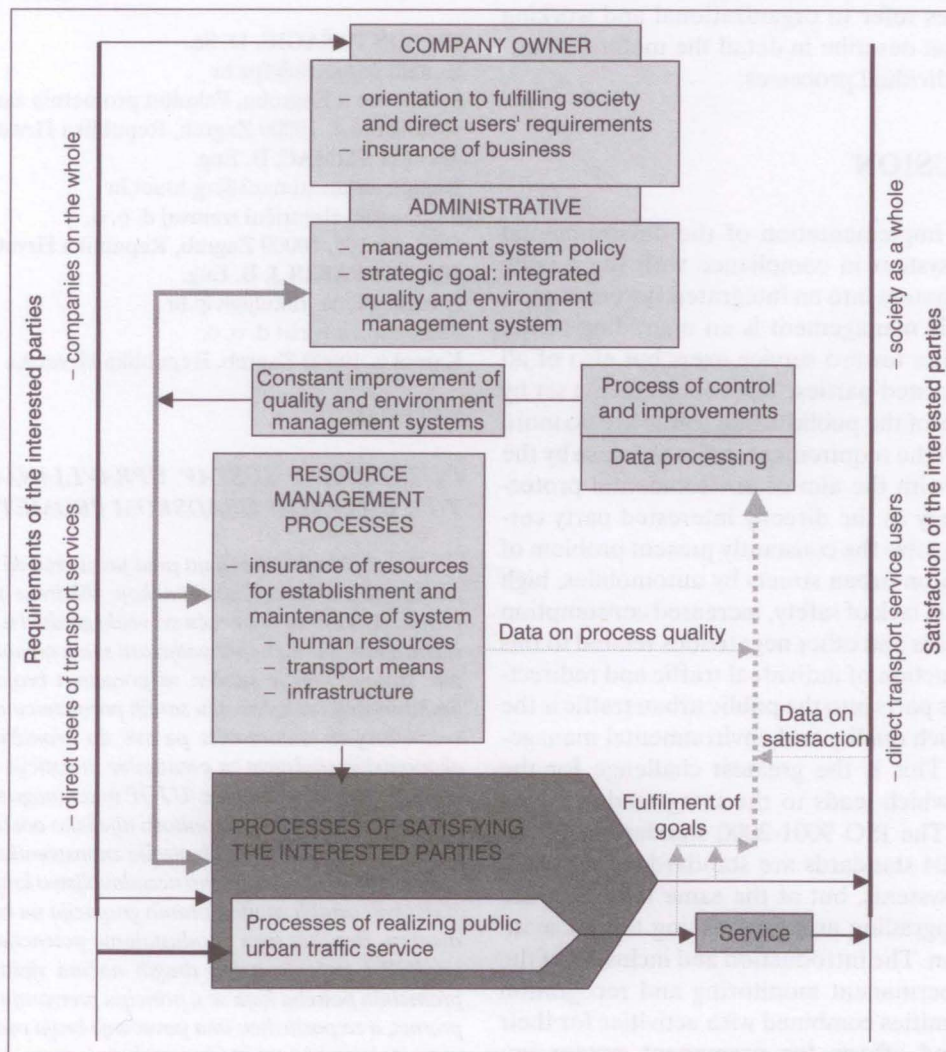


Figure 3 - Process approach of integrated management system

#### 5.4. Documenting of integrated management system

Documentation of the integrated management system is composed of the following documents:

- management system manual,
- QMS procedures,
- EMS procedures,
- organizational instructions,
- working instructions,
- forms.

The basic document is the management system manual and it harmonizes the management system with the requirements of the ISO 9001-2000 and ISO 14001-2004 standards. The manual describes the main processes and basic relations within the system. The manual calls on the documented requirements of the QMS procedures and EMS procedures. One of the essential things is the recognition of individual processes, way in which the process is implemented and nomination of the owner, i. e. process carrier. The very procedures refer to organizational and working instructions that describe in detail the method of implementing individual processes.

#### 6. CONCLUSION

Successful implementation of the environmental management system in compliance with the quality management system into an integrated system of public urban traffic management is an upgrading of the previous relation toward service users but also of all the other interested parties. The requirements set by the direct users of the public urban traffic are no more important than the requirements set in this case by the entire society with the aim of environmental protection. The society as the directly interested party certainly wants to solve the constantly present problem of the congestion on urban streets by automobiles, high pollution, noise, lack of safety, increased consumption of energy sources and other negativities related to this issue. The reduction of individual traffic and redirecting of one of its parts into the public urban traffic is the basic aim of such quality and environmental management system. This is the greatest challenge for the management which leads to the integrated management system. The ISO 9001-2000 standards and the ISO 14001-2004 standards are standards of different management systems, but at the same time they are suitable for upgrading and establishing a joint management system. The introduction and inclusion of the processes of permanent monitoring and recognition of non-conformities combined with activities for their elimination and efforts for permanent system improvement are making great progress towards fulfill-

ing the set requirements of public urban traffic thus leading to the solution of a large part of the problem pressing the modern society and this very society had not been able to find a high-quality answer to it until now. The new European standards CEN/TC 320 for the transportation services that are being accepted will significantly contribute to the very organization of public transport in the part which underestimates the significance of public transport that has been considered until now very lightly, and has not been attended with necessary care. Although one may claim that public transport does not manage the environment directly, its role is all but negligible, regarding the difficulties that the ecologically oriented society has in the urban centres. With high-quality and selective organization of the transport service the already existing bans on individual traffic are avoided, which is quite common in the developed European countries, and all because of great emission of exhaust gases caused by the absence of a clear strategy according to the position of the public transport compared to individual transport.

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#### SAŽETAK

#### INTEGRIRANI SUSTAV UPRAVLJANJA KVALITETOM U JAVNOM GRADSKOM PROMETU

*Zahtjevi koji se stavljaju pred javni gradski promet (JGP) temelje se na specifičnostima koje diktiraju same zahtjeve. Problemi s kojima se susreću svi veliki gradovi u JGP su veoma slični, a kreću se od neprihvatljivosti same organizacijske strukture sustava koji je suočen sa porastom broja stanovništva, limitiranošću i zakrčenošću samih prometnica opterećenih sve većim brojem automobila pa sve do kroničnog nedostatka ekonomskih sredstava za eventualne investicije koje bi stvorile uvjete za pozitivne pomake. U JGP ima mnogo slučajnih parametara čije statističke zakonitosti nije lako odrediti i to je često predmet istraživanja raznih profila znanstvenika. Uvijek je prisutno zadovoljstvo, odnosno nezadovoljstvo krajnjeg korisnika JGP i svih ostalih zainteresiranih grupacija na koje se to implementira. Rezultat toga je odustajanje potencijalnih korisnika od JGP i traženja nekih drugih načina rješavanja vlastitih prometnih potreba koja se u principu pretvaraju u individualni promet, a za posljedicu ima povećanje broja osobnih vozila na prometnicama i sve negativnosti koje iz toga proizlaze. Složeni sustavi JGP suočeni sa sve većim zahtjevima za povećanjem*

učinkovitosti moraju biti podložni određenim promjenama kako bi se uopće postigla fizička održivost prometa i zadovoljili ekološki zahtjevi koji se pojavljuju kao protuteža zagađenju urbanog prostora.

U cilju dosezanja optimalnih uvjeta za kvalitetu usluge, a uvođenjem prihvatljivih prometnih rješenja kombiniranih sa integriranim sustavom upravljanja kvalitetom baziranim na normama ISO 9001 i ISO 14000 otvaramo put prema kvalitativnim pomacima. Integracijom ovih normi dolazimo do racionalnog spajanja sustava upravljanja kvalitetom u jedan učinkoviti sustav koji se očituje u postizanju kvalitetne prometne usluge, poboljšanom protoku informacija, jedinstvenoj dokumentaciji, pozitivnoj orijentaciji prema okolišu uz istovremeno smanjenje troškova resursa, energije i broja automobila na prometnicama.

## **KLJUČNE RIJEČI**

*javni gradski promet, ISO norme, kvaliteta prijevoza, ekologija*

## **LITERATURE**

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