Public Urban Passenger Transport as Important Factor in the Development of Cities

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Abstract—In the year 2007, it has been statistically noted, that the number of persons living in the cities has exceeded 50% globally. In accordance with this trend of growth of city residents, by the year 2030, 6 out of 10 people will be living in the cities and this number will increase to 7 out of 10 by the year 2050. The questions of optimal functioning, sustainable growth and quality of urban life are now more important than ever and the city traffic system has a crucial role in it. The optimal contribution of the city’s traffic system in the functioning and development of the city, especially with the expansion of its population, is only possible by acquiring the technical, technological, organizational and compatibility and complementarity of the transport systems in supplying the demand for transport.

Index Terms—city traffic system, compatibility, complementarity of the transport systems, growth, development

I. INTRODUCTION

Today, the cities are home to more than 50% of the world’s population. The urbanization of the human population is a constant and an unstoppable process, which demand that ever more difficult challenges from the cities transport system be met. The constant growth trend of the urban population is an important factor of development of the human civilization. The cause of such intensive process of urbanization can be found in the human being itself, as a social being, it experiences an ever increasing development through the community and its synergy (see Fig. 1). With the increase of the size of the cities, the complexity of their functioning also increases, for example, life in a two-times bigger city usually brings a higher standard of living (the consequence of a more intensive economic activity) shown by a 15% higher salaries, but also requires additional 15% more hiring of police personnel because of 15% more crime etc. Life in a bigger city also implies a higher average speed of pedestrians due to a more dynamic city life.

Urban passenger transport represents the basic assumption for the functioning of urban agglomerations, since it facilitates normal social functioning and smooth economic development. [1] Public urban passenger transport forms an exceptionally significant service enabling normal social functioning and undisturbed economic development. According to Banković, the increase in the size of cities results in an increased need to include an increasing number of subsystems of public urban and suburban passenger transport. [2] This means that it is important to achieve full integration and coordination of active subsystems into the system of public urban and suburban passenger transport. [3] This means that it is important to achieve full integration and coordination of active subsystems into the system of public urban and suburban passenger transport in order to realize synergic effect of optimal functioning of an integral transport system in meeting the demands for transport services. [3] In the functioning of a system of urban passenger transport particular emphasis is on the technical and technological compatibility of its subsystems, and mutual organizational and tariff harmonization. It should be noted that there is strong connection of the realized or desired level of quality of the transport service and its price, and that the traffic system affects directly the efficiency and effectiveness of the economic and overall social system. [4]

Along with the growth of the city the significance of the city’s traffic system also grows proportionally for its
normal functioning and intense economic development. The city's traffic system can often be compared to (especially when the subject of the matter is a metropolitan area with large cities with multi-million population) a "global" traffic system of its own kind, so it is necessary to observe its functioning and development from the perspective of a integral traffic system as a whole. The efficiency of the transport system (shown by the number of transported passengers or executed transport work in a unit of time) and the business efficiency (shown as a financial result) is necessary to observe and analyse within each transport system. [5]-[10]

The necessity of an integral approach to the functioning of a city traffic system comes from the complementarity of transport systems which function within other systems, because of their different technical and technological attributes and accordingly different transport capabilities, environment effect and the concept of sustainable development of each transport system. [11]

The basic factor in the process of modeling of management and development of the traffic system is the existing and forecasted demand for transport which is met by engaging certain transportation systems. [12]

II. COMPLEMENTARITY AND COMPATIBILITY OF TRANSPORT SYSTEMS IN THE CITY’S TRAFFIC SYSTEM

The traffic system consists of all the traffic subsystems, that is transportation systems which are in function in a certain space and time. The purpose of the traffic system is to enable the functioning of the people's community, as in its normal functioning and also its undisturbed and as quick as possible total social development.

The goal of the city's traffic system is to meet the demand for transport which exists in its area with the appropriate transport supply of a certain quality of service.

The compatibility of transport systems is a basic assumption of optimal contribution to the city's traffic system in its functioning.

Cities with elaborate public passenger traffic, depending on different factors (geographic location, historic circumstances, terrain configuration and the level of city's development), have multiple traffic subsystems existing at the same time.

Scientific problem is oriented on analyzing the harmonization of relation between the traffic values from the area of traffic supply and the trends and dynamics of passenger transport demand indicated by the number of transported passengers in the system. Traffic planning is determined by the need for continuous increase in the capacities of the traffic system in order to satisfy the increase in the transport demand.

The focus of attention of the transport planners and managers is not just to anticipate and insure the necessary traffic infrastructure and superstructure, but rather also its maximal usage with priority recognition of the transport service users’ requirements.

1 The ground level is used by tramways, buses and taxies, the stops are linked on the ground level to the rail (city and intercity passenger transport), road system, the metro system is located on levels -1, -2 and -3 below the ground level.
The transport modeling often represents a significant part and basis of the business decision-making process in the optimization of the transport system.

The dominant transportation system in cities with up to 100,000 residents is the bus transportation system, with the increase of city's size and thus a greater transport demand, due to the limited capability of the bus transportation system, the dominant system becomes the city's tramway transportation system. After the tramway, in cities with more than a million residents, the city's metro system is the primary transportation system. In every city, all of the present transportation systems act together in supplying the demand for transport.

The complementarity of transportation systems which function within the public transportation system (hereafter: PTS) is the most important assumption and requirement in creating a synergy which the system offers to its residents as a whole.

The transportation systems which exist in a certain city accomplish their complementarity by, first of all, their technical, technological, organizational and economic compatibility.

The technical compatibility is comprised of, for example, use of joined infrastructure, or in the points of connection enable a fast, secure and simple transfer of passengers from one to the other transportation subsystem (see Fig. 3, Fig. 4, Fig. 5, Fig. 6).

The technological compatibility is comprised of joined technological factors in terms of preparation, execution and ending the transport process (joined devices for ticket purchase, safety of passengers, frequency of departures, comfort level, accuracy, speed), and also of supplying the transport demand in the exchange of transportation subsystems (see Fig. 7).

The organizational compatibility consists of spatial (points in which the exchange of transportation systems occurs) and time coherence of complementary transportation subsystems. The economic compatibility is present in a unique tariff system within the PTS, and the price of the service which is stimulating enough in relation to individual transport (see Fig. 8).

III. CONCLUSION

An integral approach to modelling and managing the development and functioning of the city's traffic system comes from the complementarity of the existing transportation systems. A significant factor in all of this is the influence on the environment, that is the application of concept of sustainable growth of each individual transport system. If the necessity of an integral approach is accepted in analyzing, functioning and contribution of the traffic system considering its purpose of supplying the demand for transport, then the requirement for
compatibility between transportation systems become significant. The basic factor in the process of modelling of management and development of the traffic system is the existing and forecasted demand for transport which is met by engaging certain transportation systems. An important criteria of dimensioning an individual transportation system is the required level of transport service quality. Practice shows that each transportation system has its place and significant role in the functioning of an integral traffic system, so except for the competition that is always present between them, their complementarity is most important for the system as a whole to fulfill its mission of supplying the demand for transport with minimal total average cost per transported passenger and with the appropriate quality of the transport service.

REFERENCES


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Ph.D. Rajko Horvat was born in Čakovec, Croatia, 21st 02.1961. At the University of Zagreb, Faculty of Transport and Traffic Sciences 1987 years has gained vocation graduate engineer of road traffic. 2004th year at the postgraduate scientific study acquires academic degree of Master Transport and Traffic Sciences, 2012 years at the University of Zagreb, Faculty of Transport and Traffic Sciences gained a his PhD. Since 1988-1990 years doing in the company “Autoprevoz Dvor” in Dvor na Uni, on the organization of transport of passengers and goods, and on the affairs of technical director. Since 1990, in driving school “Auto Stop” in Čakovec, performs lecturer traffic laws, train candidates for drivers of motor vehicles and the president of the examining board exam knowledge of traffic regulations and driving a motor vehicle1993 he worked at the Ministry of Interior of the Republic of Croatian, Police Department mediumurska where performs prevention in road traffic. Since 1995 to 2007 worked in the Police Directorate in jobs Deputy Chief of the Department for the prevention in road traffic and then a Head of Department for road safety. Since 2007 he has been working at the Faculty of Transport and Traffic Sciences, University of Zagreb as assistants. Since 2012 he works in jobs of senior assistant. His scientific activity takes place in the scientific field of technical sciences scientific field of Traffic and Transportation, scientific branch road and rail traffic. On the scientific research that takes place through the Ministry of Science, Education and Sports, called the “Internalisation of external costs of transport and methodology of prevention”, and scientific - research project under the Croatian Academy of Sciences and Arts as “Complementary transport policy”. Ph.D. Horvat, R. published a number of papers. Ph.d. Horvat, received many awards and prizes and the annual award of the Ministry of Interior for the results achieved in road safety, recognition of Croatian Automobile Club for the 2006th year, and special gifts of the Ministry of the Interior for a high level of professionalism that is particularly conducive security situation of Croatian.Also He is a member Croatian Chamber of Transport Technology, Vice President of the department road traffic, and President the examination committee, department, road traffic.

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