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TRAFFIC AND PLANNING ASPECTS OF PUBLIC URBAN TRANSPORT

ABSTRACT

Public urban transit system is of special significance in the traffic and economic system of big cities. Continuous lagging behind of the public transit system development compared to the city development can be noticed as a consequence of the traffic policy and the fascination by the passenger cars. Planned orientation of the urban traffic systems is of a recent date. This paper tends to give incentive to the need for a more complex urban planning and planning of traffic in a unique multidisciplinary process within the urban planning system.

KEY WORDS

urban transit, traffic planning

1. INTRODUCTION

Public urban passenger traffic is of great significance for the functioning of lives in the cities. Its role is to meet the traffic needs of the general population, caused by various motives such as going to work, to school, shopping, cinema, theatre, sport events, recreation, and other needs that require travelling over distances, and that cannot be done on foot.

The traffic development in the cities has been going on more or less parallel with the development of the city itself and the needs for mass transport of passengers. Since this refers to extensive meeting of the transport needs of urban and suburban population (in our cities this includes more than 50% of the total transport demand), this issue deserves greater attention than it had received before. The public urban transport uses very expensive transport means, very expensive infrastructure facilities, which represent very big energy consumers and a significant factor in environmental protection, so that it is worth the efforts to deal with these problems in a more systemic and serious manner, to follow the issues, study them and to improve them. The aim is to optimally meet the transport demand regarding intensity, time and space, with minimum costs of organising and maintaining the entire traffic system.

Organised transport of passengers in the cities, in accordance with their development level, started in the second half of the last century. This period was marked also by the appearance of the passenger car and other transport means – railway, bus, tram, metro, etc. The cities developed often faster than the urban transit and other city infrastructure, so that during some periods the public transport represented a hindrance to further development of urban centres. Due to low accumulation and reproduction capabilities of public urban traffic, the city authorities only reluctantly invested in the public urban transit unless it became an obvious hindrance to further development of the city. Consequently, traffic plans were accepted and implemented that reduced to a certain extent the traffic problems in the cities, until the next development threshold.

Public urban traffic, as a complex system consists of several subsystems that can be considered from various aspects, and the classification is usually carried out regarding the means used or the used route. Thus, we distinguish bus, trolleybus, rail (tram, metro, railway) subsystems. Since the transport capacity of individual systems is different, they are combined in order to maximally satisfy the transport needs of the citizens.

2. DEVELOPMENT OF URBAN TRANSIT SYSTEM

Since the Sumerian invention of the wheel in the third millennium B. C., which rendered an even greater role to the combining function in the exchange of goods and information, the central value of traffic has remained constant – the speed at which people travel and which restricts the scope of action.

A new phase in the urban development started with the industrial development. The jump in speed, and speed within one century was increased ten to

twenty times, has led to the increase in the scope of action, and thus resulted in a previously unthinkable expansion of the city.

Moreover, in the second half of the century, the railway allowed for the first time axial expansion, motivated by linear access and provoking heated discussions on the future development which have continued until the present days.

The attractiveness of the city has increased, its medieval narrowness was shattered. The one-time wall, town wall, the traces of which can be still proven today, has become an avenue. The growth of the city, not controlled either by a target plan nor by legal regulations, generated new problems faced by the municipal authorities and the citizens.

At that time, almost simultaneously, two motor vehicles appeared. Two basic differences marked both of the motorised traffic means relevant to the present mobility.

The first difference results from the fact that in case of railways both the vehicle and the route it travels form one unity, whereas a car does not really require a special route to travel. The automobile was able to run also on those roads that served both the pedestrians and the horse-drawn carts.

The second difference lies in the availability of vehicles. Whereas railway is limited to rails and the schedule, allowing only indirect availability which depends on the arrival and departure and the line connections, in case of automobile direct availability and surface opening at the beginning are far from questionable. These two characteristics belong to those imminent properties of the automobile which in the twenties in the U. S. A., and after the Second World War in Europe, left a significant mark on the city growth, and created the conflict with the environment which has been present until today.

Further development of the traffic system, as well as the city development, were slowed down by the two world wars. Between these two wars, the main vehicle was the railways, which at the beginning of the century, by the construction of the new high-speed and underground railways gave incentive to the new development in urban traffic. However, this development stagnated during the twenties due to financial reasons. On the other hand, the fascination with automobile increased. The automobile became a social ideal and a status symbol of all the VIPs of that time. The possibilities of that vehicle surpassed all the limits and set requirements for the construction of a road network.

In the development that followed the year 1945, a number of phases can be distinguished, marking the traffic planning within the framework of the urban ideals.

The first phase – the automobile – encompasses the period of renewal, when the automobile was given clear preference and this period lasted until the mid-sixties.

Urban planning, that was revived again, saw its ideal in the divided and "less dense" city. Reichow looked for a city that would suit the automobile and in this formulation he found the term that has adopted today a frightening connotation, although he himself did not understand it in the way it is being used today. The traffic planners thought they had to compensate for what was lacking between the two wars, namely, to develop that element of the road traffic system which in the railway is a priori set by the connection between the travelling rail and the vehicle.

The automobile of the fifties became faster than expected the general symbol of welfare and a factor of mobility. The traffic planning of that time represented often pure planning of automobile traffic. Car-adequate city found its expression in the "urban highways" and "urban fast roads". The renewal of the cities and the simultaneous economic launch developed with the background of constant increase of motorisation that enabled the dispersion of the city concentration. The demand increased and brought to the fore the need to construct new roads, and to upgrade the road network. In the general traffic plans, systemic road networks were developed, and their concepts were strongly supported by the government subsidies. The construction and upgrade of the road network gave incentive to further structural changes, enabled space expansion of residents and company headquarters, thus initiating a cycle of events which eliminated the differences between the causes and the consequences. No isolated observation of individual cases can encompass the numerous interdependencies; an integral approach is necessary. The narrowness of the city hinders also the expansion of industrial and economic zones, universities move to *the campus*, and the transition from the primary to the secondary sector, with an increasing tendency towards the tertiary sector, leads to opening of new workplaces and to the disappearance of the traditional workplaces, which were reached, as e. g. in case of mining, on foot.

At that time, the construction and improvement of the urban local transit was rather neglected, more so since such projects received almost no subsidies in any of the countries. Since public traffic before the war and immediately after the war played a very important role – as a matter of fact with low automobile traffic, - there were many who believed that the existing routes i. e. networks and traffic means would be sufficient. Therefore, vehicles and routes were merely "brushed up", and the partly obsolete trams were replaced by buses.

The increase in traffic load meant also an increase in the negative impact of the automobile traffic. The greater noise, increasing danger for the residential en-

vironment, the increasing number of fatalities and injured in traffic, large usage of space, and emission of harmful substances, indicated with increasing clarity the disadvantages of the past traffic policy. The delays and the loss of time reduced the availability and in accordance with the mentioned negative impacts led also to structural drawbacks. The number of citizens in the city centres decreased steadily, and the social stratification increased, by the younger and more dynamic part of the population leaving the downtown area to the senior and poorer citizens.

The second phase started in the mid sixties after the warnings and requests to change the course. Many cities formed commissions of experts and developed studies with measures to improve the traffic conditions in the cities and in the counties, requiring integral planning and financial support from the government. Almost simultaneously, and with equal intentions, a report entitled "Traffic in Towns" appeared in England, written by a commission led by the urban planner Colin Buchanan. The report indicates the limits of motorisation in the city, residential area and the citizens, and, besides its positive attitude towards the car and the mobility, requires a new development. Buchanan stressed the conflict between the availability of the car and the burden imposed on the environment, and required a mid-term and long-term way to redesign the city by a division into the environment-zones. Buchanan cared a lot for the city in his proposals, he cared for the image of the town, urban life, and he cared less for the landscape, nature or ecology, with the aim of city reconstruction, not wanting to defame the automobile, but rather to live with that vehicle and to maintain the accessibility. However, the environment-zones were meant to allow entrance only to the traffic that had both its origin and destination there. This meant detour and speed reduction in the sensitive residential areas. It was an attempt at preserving individual mobility using the advantages of the system. Buchanan's report of the sixties was read and quoted, but the practical conclusions failed to appear.

Buchanan's proposals were reflected in the traffic calming, which was in the beginning restricted to certain streets that had to be relieved of the transit traffic and in which the speed was reduced to the speed of pedestrians by a number of obligatory measures such as alternate parking, paving, etc. This approach was inadequate for a comprehensive urban development, the mentioned and similar methods were too expensive, and neither could the line transit be integrated into such solutions. In this way the traffic calming was bound to fail. Its sense was redefined, in the attempt to come close to the Buchanan's concept, only when it was extended to the traffic calming over larger areas.

In urban traffic, the understanding developed that the traffic calming in the districts without adequate streets, feeder streets or bypasses was only conditionally possible. The problem was also often the issue of the extent to which the construction of the street network represents with its accompanying facilities a competition to the transit lines. The planning process was often delayed and thus made the solving of the traffic problems impossible. Even when the plan was developed, often there was a lack of the required financial means.

In the residential areas, in order to calm the traffic, the speed was limited to 30km/h, mainly by construction works (thresholds, humps, paving, "bottlenecks", etc.). This partly resulted in "furnishings" which disfigured the street and failed to comply with the intentions of the urban planners.

In the Federal Republic of Germany, at that time, the general traffic plans of the fifties and the sixties were abandoned, and in 1971 the law on urban transit financing came into force, after having introduced in 1967 the regulations on the allocation of state subsidies in the counties. Thus, it was in 1967 that state subsidies were introduced for the first time for the line transit, which resulted in a sudden jump in the motivation and investments into the public transit.

In the Republic of Croatia, by the decision of the Zagreb City Assembly, in 1978, the co-financing of the public urban transit was accepted for the first time, including financing of the tram network expansion, construction of the tram line in the south part of Zagreb and the construction of the electric power and service plants.

During the seventies the transition to a new phase started in Europe, in which the thesis of unrestrained growth was abandoned in favour of a better laid-out slower growth. Based on the understanding that automobile traffic should not grow uncontrolled, the promising systems of public urban transit experience their renaissance. Apart from the classical systems, intensive discussions were led about the new systems such as the singlee-rail trains, cable-cars and magnetic levitating trains.

In the next phase (environmental phase), due to the new course, with substantial investments into the public transit, the construction and upgrading of the suburban, underground and urban railway began. This led for the first time to the increase in the number of the carried passengers. The city, however, did not grow any more, but stagnated or became smaller. The forecasts led to the conclusion that further decline in the number of citizens could be expected, but the forecasts did not come true. The consideration of the development of the whole was turned more towards the proper development of the parts. This resulted in the development of the concepts for the development of the city districts; the focus was on the traffic calming in certain districts and their design. The traffic planners

accepted new ideas and transformed them into the guidelines and recommendations with the aim of purposeful usage of the automobile and first of all, raising the quality level of the residential environment. Still, no essential changes occurred in the relations between the individual and the public traffic, since the structure of changes continued, the settlements and industrial zones around the urban centre cores increased, expanded in space and prevented public transit to serve them by lines. The sector changes continued and imposed the knowledge that because of the already valid building plans, the structure of the settlements is irreversible or could be changed but only over a longer period of time. In public passenger transit, which acquired already clear priority, many optimistic plans were postponed since they could not be financed any more or more acceptable compromising solutions were realised.

Since the mid-eighties, the fifth phase has been obvious, which may be called the phase of a comprehensive change of the system of values. Numerous scenarios have been developed with the aim of reducing the emission of carbon dioxides and the noise as the consequences of the unstoppable traffic growth.

In spite of all the efforts made in the mentioned final phases since 1970, no adequate solution for the problems of the city and the traffic in it have been found. Along with the partly unusable planned approaches and frequent lack of the knowledge about the actual development of traffic, one of the reasons was also the frequent shifts in the way in which the situations in the city traffic policy were evaluated, very often with the intention of achieving maximal results within one mandate. Other significant reasons lie in the incorrect assessment of traffic behaviour and the possibility of influencing it and in the relation to numerous ways in which individuals react to various proposed or introduced measures. Discussions about the changes in the system of values have been still going on today.

3. PLANNING PUBLIC URBAN TRANSIT

Planning of traffic as a scientific discipline, as well as the systemic planning of public urban traffic in the process of traffic and urban planning appeared at the end of the fifties of the last century. Until the sixties, all the research, analyses and planning models were based on the optimisation of the street network and the increase of the throughput capacity for the passenger car flows. Planning of public urban transit was under the authority of the city traffic administration, which dealt with organisation, time-tables, tariff system, choice and purchase of vehicles, and construction of infrastructure facilities. This method of work and taking care of the public urban transit had continued until the complete traffic collapse in the cities, caused by the chaotic development and favouring of individual motorisation, i. e. passenger cars. It was only then that people started to consider more comprehensive traffic planning together with the urban plans of area allocation for individual functions of the urban activities and facilities. The first studies of traffic and surface allocation developed, including the public urban traffic as an object of planning subjected to model simulations and analyses. The planning of urban public transit has shifted thus from the authorities of the city traffic agencies to the institutions engaged in complex urban and traffic planning, thus becoming a multidisciplinary process within the urban system of the city. In such a planning process, the laws of phenomena and relations are studied and determined, searching for those solutions that optimally harmonise the traffic system and their environment.

4. TRAFFIC PLANNING METHODS

The first more systemic works in the field of traffic planning in Croatia appeared in the seventies. The traffic planning methods have been changing over time. The first method, in the greater part of Western Europe, mainly existed as a working method which was developed by Prof. Korte, and it had three basic phases: traffic diagnosis, traffic prognosis, and traffic therapy.

The authors of the subsequent studies and urban traffic plans mainly expanded the conventional working theory by Prof. Korte, and the majority mentions the following basic phases: information gathering, state-of-the-art analysis, defining of planning objectives, model development, introduction of possible working versions, choice of the optimal version, making decision on the choice of the version and development of instructions to realise the chosen version.

The differences in the methodology of today's planners are not essential, but rather caused by the scope or area of research and the technical possibilities of processing the data. The today's methodological approach was enabled by the theory of systems, which enables also the execution of numerous combinations by means of the known simulation methods.

The main characteristics of the modern methodology of traffic planning consist, thus, in an integral approach to solving the problems, by means of analysis and synthesis, which is also a requirement of continuous planning.

5. CONCLUSION

Urban passenger transit is of great significance for the normal functioning of the life in cities. Its role is ir-

replaceable in meeting the mass transport demands of the citizens. Public transit in our cities accounts for more than 50 per cent of all the journeys made by the citizens. Huge financial means have been invested into the systems of public urban passenger traffic (trams, buses, urban railway, metro, etc.) – in traffic means, infrastructure and other accompanying facilities. These systems are big energy consumers and important factors of optimal usage of urban traffic areas and in environmental protection. Due to the general traffic policy, low accumulation and reproduction capabilities of the public urban transit, the investments into the modernisation have always been insufficient, lower than needed and lagging behind. The cities developed faster than the public urban transit and the possibilities of satisfying the transport needs. The increase of the urbanised areas of the city increased also the average travelling routes of the city population. Planned directing of the urban traffic systems is of a more recent date. Systemic planning of the public urban transit in the process of urban planning started in the sixties of the last century. All the research, analyses and planning methods were based on the optimisation of the street network and increase of the throughput capacity of the streets and intersections, expressed in the number of vehicles passing in the unit of time, not in the number of passengers. The city traffic companies (authorities) were in charge of the planning of the public passenger transit. They dealt with the organisation and technology of the traffic process, tariffs, as well as with investments (vehicle purchase, construction of infrastructure facilities, etc.). This method of work and care of the public urban transit had continued until complete congestion of the cities by passenger cars. The past urban planning and favouring of the passenger car, neglect of the public urban transit system, led to the finding that the increase of street areas cannot satisfy the growing needs of using the passenger car and cannot solve the traffic problems in the cities and that a more systemic study, analysis and planning of public urban transit have to be undertaken. This resulted in the first studies of traffic and allocation of urban areas in which public urban transit became the object of planning, subjected to model simulation and computer testing. Planning of public urban traffic "moved" thus from the administration of city traffic companies to the institutions dealing with complex urban planning and traffic planning, becoming a multidisciplinary process within the urban area. Within such planning process, the laws, phenomena and relations are analysed, studied and determined, and those solutions found that optimally harmonise the traffic systems and their environment.

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SAŽETAK

PROMETNO PLANERSKI ASPEKTI JAVNOG GRADSKOG PROMETA

Javni gradski prometni sustav ima iznimno značenje u prometnom i gospodarskom sustavu velikih gradova. Primjetno je stalno zaostajanje razvoja javnog prometnog sustava za razvojem grada, kao posljedica prometne politike i fascinacije osobnim automobilom. Plansko usmjeravanje gradskih prometnih sustava novijeg je datuma. U ovom se radu želi potaknuti potreba za kompleksnim planiranjem prometa i prostora u jedinstven multidisciplinarni proces unutar prostornoga sustava grada.

KLJUČNE RIJEČI

gradski promet, planiranje prometa

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