Directions and Benefits of Using Traffic Modelling Software in the Urban Public Transport

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Abstract. The swelling of urbanised areas and separation of areas functions related to housing and at the same time commercial and recreational functions concentration – are the main factors increasing mobility of cities residents and average distance of travelling. Therefore, the transport factor is becoming the main determinant conditioning the development potential of large cities and the quality of life in the city. The public sector, which is responsible for meeting the essential social needs should effectively use available resources and strive for high quality services fulfilling social expectations. It requires using professional tools, especially computer software, which becomes more and more powerful. From this point of view, current and long-term transport offer managing is one of those areas which are essential. Therefore, the article presents costs and benefits of using by public urban transport organisers professional software for traffic modelling and demand forecasting.

Keywords: public urban transport, traffic analyses, traffic models, demand forecasting.

1 Introduction

Urban public transport in Poland and world-wide, with few exceptions, is considered to be a part of public service sector, and – besides the income from sales of services – is financed to a greater or lesser degree by public means. Substantial involvement of public means, in the financing of both current activities, and investments in urban public transport, should in parallel force the implementation of solutions, which assure efficient use of those funds. Many tools can be listed, which enhance and improve the efficiency of service provision [1,2], among the more important ones are innovations, including the implementation and making use of possibilities provided by IT-based management systems [3,4,5].

IT systems cover various spheres of activities, and their application generates various benefits. This paper is going to focus on making use of urban traffic forecasting systems, and mainly upon the costs and benefits of applying those systems.
Areas Where Traffic Modelling Can Be Used for Public Transport Purposes

Urbanisation ranks among the most important processes, which have been of economic, spatial, political, and social significance over recent years. At present about a half of the world’s population lives in towns and cities, whereas some 200 years ago only 3% of the total population lived there. In European Union member states some 76% people live in towns and cities, that is forecasted to increase [6], by 2050, to about 84%. Big cities imply high population density, longer distances to commute, less and less pedestrian traffic, significant conflicts concerning locations.

The increasing number of city and town dwellers, coupled with expectations concerning good living and transport conditions there, is a challenge for urban transport, as transport is one of the factors enabling the development of towns and cities. Thus, along with many other activities, both current functioning and development of transport systems in cities is crucial, mass transit systems included, which in turn requires proper tools. One should depart from quantitative development of transport, especially road transport and individual ownership of vehicles, in which approach the increased demand for transport, increasing number of vehicles and trips by means of private cars entails growing funds targeting the construction and modernisation of roads, as well as financial means in household budgets supporting individual car ownership and use. Transport management systems should have ever increasing application, including also the use of traffic modelling when planning transport network and the offer of transport services.

The history of traffic modelling and forecasting, with the use of formal mathematical models, reaches of few dozen years back in time, however, the practical applications – due to the complexity of the problem and the necessity of making numerous calculations – of traffic models have become more widespread with the development of IT and data processing devices, namely in the 1960s and 1970s.

The methods of developing models and forecasting urban traffic, ending with distribution of traffic into specific sections of the road and street network, are a highly specialised discipline, so far there have been only a few centres dealing with that in Poland, mainly offices dealing with planning of road systems, as well as universities, and publication in that field are far from numerous. Substantial input in the development and popularization of traffic modelling is owed to the Instytut Kształtowania Środowiska (Institute for Development of Environment) in Warszawa later named Instytut Gospodarki Komunalnej i Przestrzennej (Institute of Spatial and Municipal Economy) and Politechnika Warszawska (Warsaw University of Technology) [7,8,9]. Large studies, organized by Biuro Studiów i Projektów Komunikacji in Katowice (Bureau of Studies and Transport Projects), were also conducted in the central part of the Silesian Province in years 1986 – 1988. What is more, the barriers for the universal use of traffic models include limited availability of data, or absence of some data, indispensable for the development of forecasts, or time consuming and costly acquiring of such data. Also the necessity of updating the data in a systematic manner is significant. Generally speaking, traffic models result from human activities,