

ANALYSIS OF THE POSSIBILITIES OF BUILDING A TOLL SYSTEM IN KOŠICE

Richard Palinský

SBD II. Košice, Bardejovská 3, 040 11 Košice, Slovak Republic, palinsky@sbd2ke.sk

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Abstract: Of course, transport has also the adverse effects that cause the costs to society and the economy. Therefore, charging for transport must better reflect the actual cost of shipping. The external costs associated with the use of infrastructure vary depending on time and place e.g. traffic congestion, air pollution, noise and accidents. Applying differentiated fees is a way to take these changes into account. Public acceptance will probably be one of the biggest problems in implementing the Košice tolling system. It will depend on how the system will be presented, whether as a separate measure without a system specification and without explanation, where will the incomes go or what other measures will be related to the system. However, most of the people probably would oppose its introduction. Probably the most appropriate strategy of introduction of the toll system in Košice will be the strategy of improving overall traffic situation in the city. If this system will be fair, beneficial and transparent for all participants, the chance of acceptance is much higher.

1 Introduction

The enormous increase in passenger car traffic, an increase in the number of major traffic accidents, significant air pollution for road transport, the growth of congestion in urban agglomerations, a decline in mass passenger transport performance, these are just some of the transport impacts on society. The costs for maintenance and reconstruction of the road network in the extravilan and intravilan are enormously rising. The city of Košice has not escaped the expansion of road transport and the demand for private use of vehicles, as well as the growth of transport performance on the road network. Transport is a major employer in transport-related economic sectors (services, equipment, infrastructure) and increasing the competitiveness of transport operators is a guarantee of maintaining employment in the transport sector. The transport system has been subject to major changes due to further market opening and innovation. Transport services are essential for economic activity and have an impact on quality of life. Well-organized transport contributes to effective action and strengthens cohesion by allowing economic operators, including peripheral regions, to have better access and gain more benefits from the European Union's (EU) internal market.

The aim is to analyze the key ways of implementation of the city's toll system in the city and to indicate the potential direction that the city of Košice could take to solve the complicated traffic situation in the city.

Even standard procedures for the direct provision of parking facilities require new approaches with financial and implementation involvement of the private sector as well as of the future users. With limited area and financial options, the city can involve private service providers – construction and operation of car parks and parking garages in select locations. The selection of sites and conditions is based on the transport concept of the city of

Košice, in terms of bearing carrying-capacity of the area as well as the transport structure [1].

The article focuses on analyzing different forms of dealing with the negative impacts of transport as well as analyzing the potential implementation and introduction of toll system. From the analysis of traffic problems follow the conclusions, in what direction the transport problems could be tackled, which could be a major priority for the city of Košice, which could help improve the transport system.

2 Goals and direction of transport policy

The basic documents of the European transport policy are a White Book and a Itinerary Transport 2050. These documents outline the basic strategic vision that should be fulfilled in the coming period in the transport sector. The goal of a comprehensive strategy is to introduce a competitive transport system in Europe that would increase mobility, eliminate the biggest bottlenecks in key areas and promote growth and employment. [2] The White Book, after the completion of the internal market in 1985, included a recommendation for the freedom to provide services and set the main directions of the common transport policy.

In November 1985, the Council adopted three main objectives [2]:

- creation of a free market (without quantitative restrictions) no later than 1992,
- reduce bilateral restrictions,
- increase community quotas and eliminate unequal conditions of economic competition.

The Council also adopted a "framework plan" containing these objectives:

- development of infrastructure in the interest of the Company,
- simplification of border controls and formalities,

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- improve safety.

On 2nd of December 1992 the Commission adopted the White Book on the future development of the Common Transport Policy. The most important measure was the opening of transport markets.

The Green Book of Commission from the 20th of December 1995 called "For fairer and more efficient transport prices" focused on the external costs of transport. Discussed were particularly fiscal measures in this field. In the following White Book of 22nd of July 1998 entitled "Fair payment for the use of infrastructure", The Commission drew attention to the wide variation in charging fees in traffic between Member States. [3]

In the White Book "European transport policy for 2010: time to decide" The Commission first explored the problems and the roles of European transport policy, especially considering the planning of the enlargement of the EU towards the East of the Europe. The White Book predicted a significant increase in traffic, which will be accompanied by congestion and traffic overloading, particularly for road and air transport. Thus, the Commission presented a set of 60 measures, which were intended to resolve problems resulting from the economic growth and prevent uneven growth of certain types of traffic:

- to make rail transport more efficient,
- support for maritime and inland waterway transport,
- strengthen the link between individual transport modes. [2]

Itinerary transport 2050

The main objectives to be achieved by 2050 are as follows:

- no vehicles with conventional fuels in cities,
- 40% use of sustainable low carbon fuels in air transport,
- 50% movement of roads to medium distances in intercity passenger and freight transport from road to rail and waterborne transport.

These measures will contribute to a 60% reduction in transport emissions by 2050 [2].

3 Objectives of the Transport Policy of the Slovak Republic

Transport is one of the key sectors of the economy not only of the European Union but also of the Slovak Republic. Demand for transport of persons and goods is increasing and the role of the state is to create legal and economic conditions for the provision of public transport services but also for transport business and the corresponding transport infrastructure related to transport needs. Another important measure is to set traffic systems so that they would prefer those types of transport which are environmentally friendly and can be covered by the public budgets of the Slovak Republic. This chapter discusses the current state of the problem that is addressed in the final work. These are the different starting states, input values,

current output values, operating conditions, data model, current calculations, carrier formulas, and value and variable calculations. The transport policy of the Slovak Republic after the accession of the country to the European Union is linked to the objectives and the length of the European Union's transport policy period. The key documents relating to the transport policy of the Slovak Republic is a material called "Transport Policy of the Slovak Republic" [4]:

- Creating transparent and harmonized conditions for competition in the transport market.
- Ensuring the modernization and development of transport infrastructure.
- Ensuring adequate funding in the transport sector.
- Reducing negative impacts of transport on the environment.
- Improving the quality and development of transport services.
- Increasing transport safety and security.
- Promoting research and development in transport.
- Addressing the effects of transport globalization.
- Continue with activities in the area of possible extension of the performance fee to other roads in state and regional administration, possibly in municipalities, and the possibility of extension for other categories of vehicles
- Installing intelligent transport systems on major highways.
- Ensuring road network development with respect to international commitments.
- To consistently require and control statutory driving times and rest periods for truck drivers, to consistently control legally prescribed truck driving regulations during weekends, holidays and overloading of automobiles.
- Monitoring compliance with regulations for road transport of dangerous goods.
- To create legal conditions and gradually introduce measures for the possibility of effective regulation of individual car traffic by, for example, charging parking and entry into selected areas.
- Introduce new rules for training of applicants for driving license, including the tightening of rules on the testing of professional competence for driving a motor vehicle.

4 Traffic congestion in the cities and suburban areas of the Košice city

The trend in recent decades is urbanization and it is expected that it will continue. Urban expansion is a major problem for urban transport, as it increases the need for individual types of transport which causes the overloading transport, infrastructure and environmental problems. Urban transport is responsible for 40% of CO₂ emissions and 70% of other pollutant emissions. Traffic congestion, which occurs mainly in agglomerations and in their access

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roads, is a source of high costs in terms of time losses and higher fuel consumption (Figure 1). Despite the introduction of regulatory measures, an increase in individual car traffic in urban agglomerations is expected in the coming decades. The main reason is the increasing demand of visitors after access to inland localities. The urban mobility strategy trend is currently focusing on limiting vehicle access to urban centers, and one of the possible solutions is to "calm down" traffic through urban toll [5].

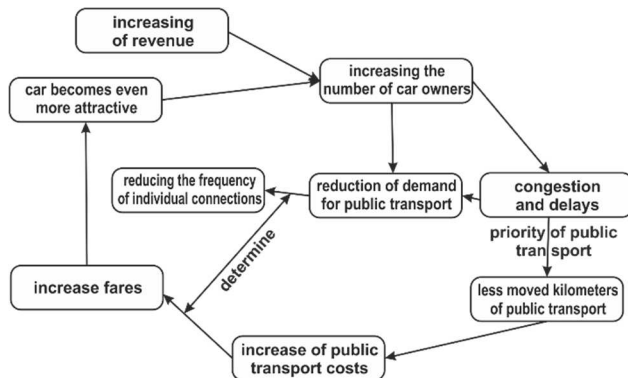


Figure 1 A vicious circle of public transport

Source: ORTUZAR, J. D. D. & WILLUMSEN, L. G. (2001) Modelling Transport: Third Edition

Road infrastructure charging based on the use of infrastructure (toll) is an important element of traffic control as well as a new source of funding for transport infrastructure. By gradually introducing external costs into performance charging allows in the Košice city to decrease the imbalance between individual types of transport. The introduction of an electronic toll collection system on Košice's road infrastructure could achieve a fair charging of users directly proportional to the number and type of vehicles, to obtain new resources for the modernization and development of the transport infrastructure, to solve the increase of transport performances and to ensure the efficient use of the infrastructure. The toll rate takes into account infrastructure costs (construction, operation and maintenance costs with the possibility of including congestion costs), the impact of vehicles on the environment (emission classes) and damage to infrastructure (axle load).

5 Transport routes in Košice and Košice-surroundings

All highways, highway feeders, high-speed roads are owned by the state and in the territory of Košice their administration and maintenance is ensured by the National Highway Company Inc. I. class roads that are in the city of Kosice are in state ownership, their management and maintenance is provided by the Slovak Road Administration. II. and III. class roads that are in the city of Košice I. – IV. Are under administration of the

Municipality of the City of Košice – transport department. The network, of II. and III. class roads, provides transport services of the area and accessibility of the population to the areas where the highest civic amenities are available. On 1.1.2004, the II. and III. class roads of the Košice – surroundings were moved under the organization with the name Administration of roads in Košice Self-governing Region. Administration of roads in Košice Self-governing Region is a budgetary organization set up by the Košice Self-governing Region in order to ensure the administration, maintenance, modernization, reconstruction and construction of roads within the jurisdiction of the Košice Self-governing Region. It is formed by the Chief Executive Officer and five internal organizational units. The subject of its activity is defined by the classification charter [6].

There are about 43 thousand people from all districts of the Košice Region and from the Prešov Region that daily travel to Košice, as the center of KSK, for work and schools. The analysis of the exit to Kosice was carried out on the basis of census of population, houses and flats [7].

The following conclusions follow from the analysis:

- in the district of Košice – surroundings live approximately half of all the people travelling to Košic for work and school (a total of approximately 22.2 thousand inhabitants),
- The second half of all passengers are living in the Prešov Self-governing region,
- on the territory of districts Košice – surroundings, Trebišov, Michalovce, Gelnica and Prešov live 77% of all the people that travel to to Košic,
- the most powerful center of the exit to Košice is Prešov, Moldava nad Bodvou, residents of the district Košice-surrounding (villages Valaliky, Čaňa, Gyňov, Seňa... and others),
- A relatively large number of people travel from relatively distant districts of Košice and Prešov region (Michalovce 583, Bardejov 555, Humenné 537, Spišská Nová Ves 470, Poprad 419), greater part of the territory of Prešov region has relatively strong bonds to exit for work to Košice than to Prešov; it refers to districts and cities: Poprad, Kežmarok, Stará Ľubovňa, Levoča, Stropkov, Medzilaborce, Humenné and Snina; in case of Vranov nad Topľou predominates exit to Košice, especially from the district city [7].

Based on the available information on the national transport census of previous years in Košice, located on the web portal of the Slovak Road Administration [9], [10], it is possible to estimate the number of dynamically moving vehicles in Kosice to around 42,000 cars during peak periods together on all sections within the territory of the city of Košice. The curve of the estimated number of motor vehicles (Figure 2) before the introduction of the tolling system is shown by the blue curve 'Now' and the black curve 'Then' shows the estimated number of motor vehicles after the introduction of charged toll zones in Košice. At

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the same time, the graph below shows that the largest percentage representation of transport in the city of Košice

(Figure 3). have vehicles in the group others with a vehicle registration number outside the eastern Slovak region.

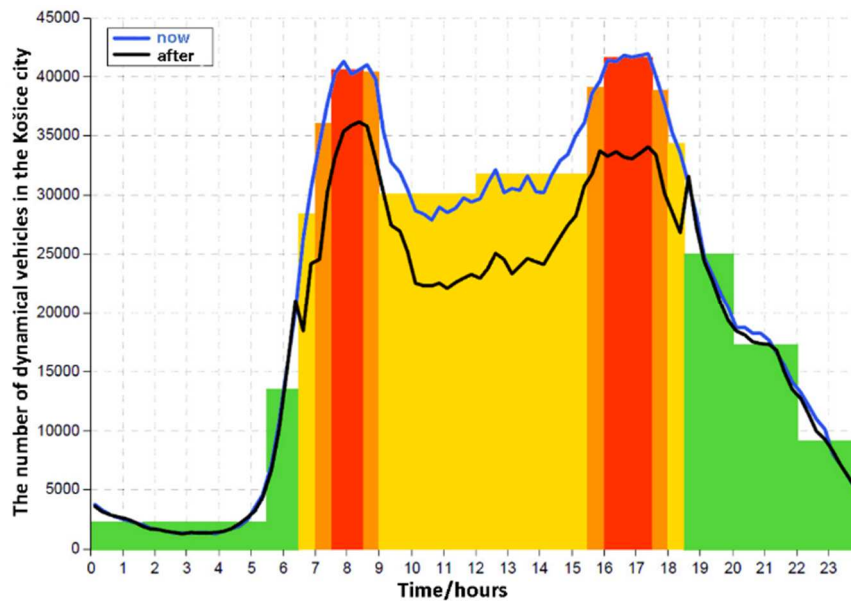


Figure 2 Estimated number of dynamic vehicles in Kosice

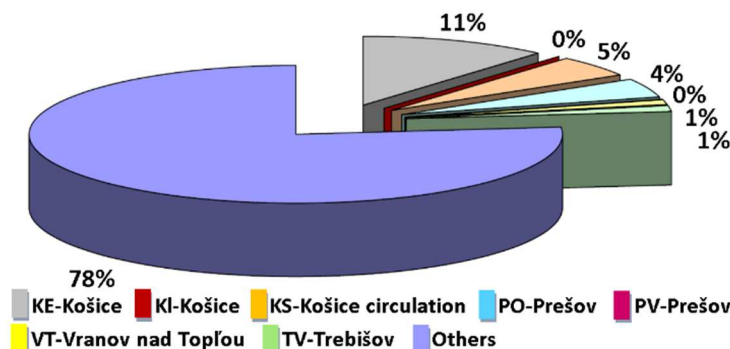


Figure 3 Percentage representation of external transport according to EČV
Source: <http://www.ssc.sk/files/documents/prieskum/kosice.pdf>

6 Analysis of the road network

The road network (Figure 4) hierarchically links to the internationally advanced routes and functionally forms the basis of an intraregional (inter-circuit, inter-district) street network. It is, so-called, basic communication system (ZÁKOS) that is stabilized in a more detailed solution of ÚPD and General of city transport. On the whole-district scale, the basic communication network is created of I. and II. class roads as a road strains ensuring the interregional and inter-district road strains, also international (cross-border) flow with planned sections of speed roads. [8]

The main super-regional road network of speed character (D1, R2, R4) tangles the territory of Košice district from the southern and eastern side in the form of the so-called external traffic circuit. Inner-radial radial-circular network based on internal circuits continues in the radial direction to this traffic bypass (circuit). This is based on the concept of preference of speed higher-quality

standard of city deferment (given by the proposal of ÚPN-HSA Košice and by the supplement of the General Transport Plan) on the D1 highway. Its route is determined by communications: north highway feeder – Prešovská cesta – Južné nábrežie – Nižné Kapustníky – junction with crossing “Červený rak” with a connection to the road I/50 (Moldavská cesta). The given axial transport artery of the city is considered as intermediate step of building ZÁKOS of the city, which is completed by completing the transport hub intersection Prešovská/Sečovská – Južné nábrežie – Palackého street.

In addition to the overhead network investment, the city's basic communication network (ZÁKOS) needs to implement other important transport investment projects:

- Shifting of road II/552 south of the village of Krásna Hornádom and increase the capacity of roads section Slanecká.
- Reconstruction of Štúrova street, Liberators square, Palackého street with grade-separated

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connection of bus station and railway overpass over Palackého street.

- New communication link of Masarykova street – Lavobřežna street – Trieda Ludvíka Svobodu (Furča).
- Reconstruction of Hviezdoslavova and Masarykova streets, including the reconstruction of tram line to the railway station.
- Construction of left-bank communication in links of the streets Severné nábrežie and Južné nábrežie.

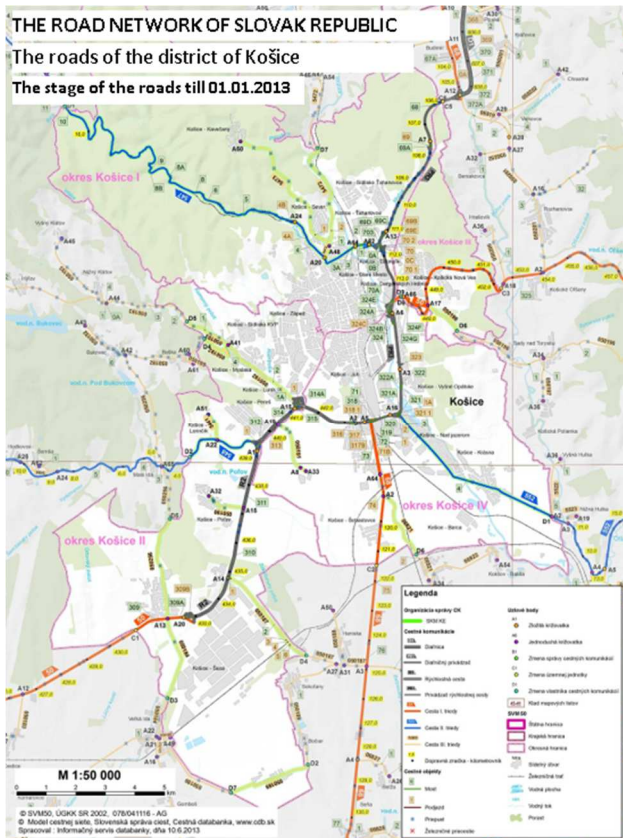


Figure 4 Road network in administration of SKM KE
Source: <http://www.scksk.sk/img/full/Mapa2big.jpg>

7 Conclusions

Of course, transport has also the adverse effects that cause the costs of society and the economy. Therefore, charging for services must better reflect the actual cost of shipping. The purpose of including external costs is to allow users to bear the costs they create, prompting them to change their behavior and thereby reduce these costs. The main economic instruments that lead to the inclusion of external costs in practice are taxation and toll. These economic instruments are already used to varying degrees depending on the type of transport and the costs involved. The external costs associated with the use of infrastructure vary with time and place (e.g. traffic congestion, air pollution, noise and accidents). Applying differentiated fees is a way to take these changes into account.

Public acceptance will probably be one of the biggest problems in implementing the Košice tolling system. It will depend on how the system will be presented, whether as a separate measure without a system specification and without explanation, where will the incomes go or what other measures will be related to the system. However, most of the people probably would oppose its introduction. The strategy for improving the overall traffic situation in the city will probably be the most appropriate toll-pricing strategy in Košice. If this system will be fair, beneficial and transparent for all participants, the chance of acceptance is much higher.

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