



Telematic Applications for Static Transport

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ABSTRACT

At rest, the transport is a factor that significantly affects the life of the city and limits its further development. The expansion of the motorization brings the need to solve the static transport. The number of cars is still rising and the car is parked 90% of its lifecycle time. Motorization is evolving faster than urban centres that just missed the trend for such a short time to respond. Nowadays, the quality requirements are still growing and therefore facilities and mechanisms, which operate in these transport systems, should be improved. The telematic systems in this area are mainly applied in parking guidance systems with connection to the Control Centre, systems of parking automats and their connection to the Control Centre, information systems in parking garages and also to the technological equipment in the car parks. There is a need to be aware of the affecting practically all the people who live in the city territory with the parking and solutions of the parking systems are highly critical monitored and evaluated by the public. Automated parking systems are solutions, which offer effective solutions in congested urban areas and the historic city centre. Parking places, which are using automated parking systems, cover approximately a half of the volume compared to conventional parking houses. From an operational point of view, they are less difficult for maintaining, offering the comfort of parking for each car, fully using the parking capacity and providing a high security. In our paper, we would like to describe a possibility of intelligent static transport solution in the cities especially that provided to automated parking systems, which have a high priority in congested cities.

KEYWORDS: Parking policy, Individual traffic regulation, Electronic payments.

1. Introduction

The long-term sustainable mobility is an adequate degree of balance that guarantees quantity and quality services at sufficient level that should be kept in the future if surrounding conditions are unchanged. The main elements of mobility that can be affected include: parking, urban transport, road infrastructure and land use.

The main causes of critical traffic situation are:

- Enormous/uncontrolled increase of motor road transport
- Unsystematic approach to solving traffic problems in towns
- Lack of basic instruments for solving urban mobility that are responsible for the careful urban planning and for sufficiently

detailed traffic-engineering part that deals with transport relationships and their satisfying

- Insufficient legislation that does not allow to design and to use the necessary regulatory measures in the motor road transport
- Inconsistency and benevolence of checking of applied regulatory measures
- Insufficiently staffed and equipped departments of public and state administration that control and decide things related to transportation
- Insufficient number of experts and insufficient scientific-research base across the transport sector

Despite the introduction of management measures there is generally expected increasing individual transport in a few following decades. The main reason is an increasing demand

for access into inner-city areas by consumers and visitors. Trend related to strategies of urban mobility is recently focused on limiting of car access to town centre. Achievement the objective largely depends on increasing urban transport capacity and on offering services of higher quality. General access opportunities to town centres must be increased by all means in favour of economic prosperity. Parking policy must also take into account the need for overall balance between all modes. During the last decade in the development of our society, focused on transportation, there were manifestly exceeded all valid and expected trends. Enormous increase in individual traffic, increasing number of road accidents attended by its increasing severity and health damage of road users, significant air pollution caused by road traffic, increase congestion in urban areas, collapse of rail transport, a decrease of public transport performance, all is side-effect of transformation of the society. The costs of road-network maintenance and reconstruction in rural and urban area have been growing enormously. Slovakia will not avoid expansion of road transport and demand for private usage of vehicles as well as growth transport performance on the road-network. Therefore Slovakia can manage the growth of individual transport only by the consistent implementation of telematic applications [3].

2. Parking Policy Contributes to Solving of Urban Transport Problems

Solution to the question – how to ensure in towns both good access roads of necessary quantity and maintain acceptable urban environment – is the sustainable development of transport policy, which includes integrated parking policy along with well-equipped and efficient public transport system. Having a direct impact on traffic motion and on the level of traffic volume in the inner-city areas, the parking policy plays a key role [2].

Traffic measures, such as public transport preference and closure of the city centres to vehicles, will be successful only if: the park areas that should meet the requirements of connection to the pedestrian zones or to limited access zones is built; there are the access permissions for company cars to the stores for commercial or operational reasons; and also, if there are alternative forms of entry of sufficient quality and quantity.

Parking policy is a compromise among freedom of movement, accessibility and quality of life. Parking is not an autotelic action; it is always derived from some other need. For that reason parking should be included in every urban policy, which deals with mobility and accessibility. Parking and parking management are the essential part of public mobility. They represent services that are necessarily involved in ensuring of public transport.

But the balance among parking availability, traffic flow and quality of life is different in various towns. It is because of different conditions that influence the choice of the best solution.

From this point of view parking is a result of the services and therefore must meet the requirements of various drivers including: buyers (recreational and/or active), visitors/tourists, residents, etc.

There are several parking solutions meeting the needs: street parking, off-street parking, multi-storey car parks, and underground car parks [4].

2.1. Parking Management

Solving management mobility, the local government officials have to establish the policy proposed to urban centre and the means of achieving the objectives. It depends on historical development of urban structures and on the road system, which is often in conflict with the actual needs of the modern world. Optimal use of existing road can lead to need for replacing street parking with off-street parking, for reducing the access to pedestrians and cyclists or the access permissions to motor cars.

Parking at different locations corresponds at least to a 2/3 of annual operation of the car. Effective parking management can reduce overload of the roads in town centres and, as a result, negative externalities (noise, accidents, air pollutants, congestions...)

Driver's finding a free parking space on the street is common cause of unnecessary traffic in the city centre, which increases overload of the roads. Motor car drivers, who try to find parking lot, will keep traffic overloaded as long as street parking is unregulated, without charge or too cheap. The right parking taxes on the streets, that are market designed to provide a certain number of parking lots (or to have about 85% occupancy), eliminate the problem without significant impact on the number of parked cars.

Removal of unpaid or unregulated street parking and subsequent replacement of street parking with off-street parking reduces "Search" traffic and allows returning space to pedestrians or to non-motor traffic. In this way it can solve the growing of public transport as well.

General criteria for street parking could be:

- Reservation of street parking for a limited time only for "active buyers" or customers, who use the parking lots for their needs only for a short time (e.g. max. 30 min.).
- The introduction of higher parking taxes for street parking in comparison with taxes for off-street parking
- Encouraging local residents to park their cars in off-street parking lots
- To locate parking facilities for disabled people
- To disable physically the illegal parking (where is possible)
- Strictly enforce street parking regulations

Provision of parking place itself is not sufficient. Parking lots must be managed on professional level, or controlled parking won't help overall urban mobility. The parking management is combination of several aspects. Each of these aspects is important from the point of view of ensuring parking of good quality and of improving of traffic in centres.

The need for high quality multi-storey car parks, underground car parks and other parking lots is taken for granted. However cheap or well-located parking lots of a low quality will never be

attractive enough to drivers of motor vehicles. Therefore ensuring the quality parking is a key to improve life in the town.

First of all, demand for parking lot is determined by destination of the drivers of vehicles: urban shopping centres, commercial and administrative premises, leisure centres, traffic irregularity, etc. Fees for parking influence a choice of traffic user and the length of parking. The choice is influenced by destination and relationship between supply and demand for parking. Restricted access vehicle can afford only towns with high quality secured centres and good alternative access forms.

The off-street parking can be provided in the form of aboveground and underground parking. It does not matter whether the parking place will be used as public parking or as a special-purpose parking, attention should be paid to application of economic principles. The economic return on supply of parking is conditioned by "type" of a particular demand for parking.

If the parking lot weren't able to operate from economical point of view, it wouldn't be necessary abolished. Insufficient economic operability can be direct consequence of local policy, such as parking taxes. When fees grow, or even when parking lot is intended to be abolished, there are some ways such as support in the form of free public spaces, low-interest credits or grants. Evidence indicates that drivers of motor vehicles are willing to pay adequate parking fees if there are quality services and if they can park their cars near the destination. Present technology of parking system allows differential rates systems which can satisfy various demands of customers and commercial activities.

Off-street parking can be less harmful to the environment and compatible from the point of view of the town, since it contributes to urban renewal programs.

Because of management of parking and traffic flow, efficient transport as well as policy of regulatory of areas reserved for parking requires constant control and enforcement of relevant laws and other regulations. The primary objective is to ensure to be held in accordance with relevant regulations and thus with the traffic management policy as well, and not because of income for the town [1].

2.1. Parking Guidance System

Guidance system to park and ride system is one of the subsystems of parking management. Its integration into superordinate control system allows monitoring of parking lots and then creating measures in traffic management. Parking guidance system can be divided according to used vertical traffic signs and possibilities of variable traffic information into:

- Static guidance of vehicles. It means guidance by unchanging vertical road signs. In principle there are used combinations of information signs D11a "Parking lot" and supplementary traffic sign, where are information as: name, distance and direction to the nearest parking lot, or there can be information about type of relation-connected public transport and travel time to the town centre. The disadvantage of static system is impossibility to adapt to sudden changes in capacity of parking lot (filled the parking lot). In that case system will not

be able to react and there will be no changes in direction of the route of other drivers on a free parking lot.

- Dynamic guidance of vehicles – is a part of the transport-telematic system and uses traffic variable message signs and unchanging signs. Thanks to them driver gets important operational information about nearest parking lots, their occupancy, distance to them and the system recommends, for example, optimal route to the nearest parking lot with free space.

Generally the system has to meet following requirements. The system should provide always relevant, exact and complete information about places, free capacity and optimal route to the nearest parking lots not only on slip road, but also for example on important junctions. The guidance system to free parking lot should remain working even when there were crowded one or more parking lots. The traffic light control should respond to the occupancy of the parking lots in the affected area, so that the way to the occupied parking lot won't be overcrowded. The proposed system has to be clear and integrated in the whole area, and must be open for further development. The information system must be designed in accordance to the current legislation. The role of the guidance system is to inform drivers about nearest vacant parking spaces with necessary operational information and to suggest an optimal way to recommended destination. The guidance systems are used not only in P+R parking systems, guarded parking lots, but also in multi storey car parks. Local systems of parking lots need to ensure monitoring the number of entering and outgoing cars, so that the movement of the vehicles in the parking lot can be described and the occupancy of the parking lot can be determined (it can be ensured via detectors that count the number of entering and outgoing vehicles, or via sensors that enable monitoring of the vehicle movements). The information must be transferred to the control system that makes data processing and calculates the number of the vacant parking places. There are traffic variable message signs along the communication that give information about current status of parking lots. The traffic variable message signs are controlled from the control centre or only from the parking lot. The local system makes data collection from individual parking lots, their evaluation, and controls displaying on the traffic variable message signs. Data transmission among the parking lot, the traffic variable message signs and control system is necessary to convey via permanent connection to ensure current information and reliability of the system. From the point view of proper placement of the traffic signs it is necessary the drivers will be inform about crowded parking lots in advance, so that they can change their route smoothly and without redundant manoeuvres (turning of the vehicles etc).

3. Conclusion

The telematic application of parking systems ensures monitoring of parking lots in the whole town and optimal navigation vehicles to the free capacity with the goal to reduce unnecessary running kilometres. It supports the work of Park and Ride. The integrated

approach from the point of view of safety is necessary as well (fire, exhalation). The purpose of the parking systems is to facilitate driver's orientation and to guide him to parking lots. Properly working system has an impact on reducing the traffic volume.

The system is appropriate to introduce because of the following reasons:

- To reduce the traffic volume on urban roads and to decrease exhalation produced as a result of unnecessary driving while finding free parking place.
- When guiding on P+R parking lot at the edge of town there is reduction in number of car-trips leading to the centre (public transport is used)
- Vehicle guidance has also an impact on traffic safety on the roads. If the driver is informed, he won't make sudden manoeuvres that result in increasing risk of road accidents, etc.

On the basis of experiences at Slovakia and abroad, I can say:

- Parking policy is the instrument for regulation of the use of space therefore it is inseparable part of municipal policy. Elaborating and approval of the parking policy is the role of towns and villages. The starting point for elaborating of parking policy is knowledge of objective demand of the population and visitors, but also knowledge of capacity and demand for operation of the space
- Parking activities in our towns are provided by various ways and organizations. If there is lack of coordination of these activities with other functions of the town, work of the regulation of parking is endangered.
- Charging for parking is an important part of the regulation of parking
- If the conditions of parking weren't respected, road traffic safety would decrease, there would be often unable to service the area, especially in emergency situations.

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