

## **Implementing ETC system on Hungarian motorway network**

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### INTRODUCTION

In the enlarged European Union the transport sector faces many problems, especially the road sector. The increasing traffic volume, the parallel deteriorating traffic conditions, and the growing need of financial resources in the road sector force out several changes as in the European and in the national transport policies as well. Road charging is one of the problems to be solved by implementing changes. Importance of this measure can be proven by revenues come in from road tolls, which are good alternatives of mainly lacking central budget sources in infrastructure development, furthermore, by tolls which can be accurate measures of demand management towards solving capacity, congestion and environmental problems.

Before the start of transition in 1989, Hungary missed a developed motorway network. After the structural change from the planned economy to the market one, the country played an important role in the NAS (Newly Associated States) region in the last decade concerning the private sector's involvement into financing road infrastructure development. The region's first two concession motorway projects (among a few public ones) had been realised in Hungary. Therefore, the extension of national motorway network could be started by involving private capital. This development process resulted various forms in road tolling regimes and toll collection on the Hungarian motorways at the end of the 90's. The interest of the country was in need of a unified tolling system. In 2000 the government started the implementation of the country-wide vignette system; the last step in this process was taken in 2004. But this vignette system is unable to solve the financial problems of road sector, moreover it causes social stress due to its unfair and inequitable attribution (favouring regular users and HGVs contrary to casual users and PCs, which latter produce less external costs). The way ahead can be applying mileage based pricing system. Benefits of applying this approach are generally accepted in the world, as the European regulations also discuss this topic seriously. This mileage based pricing system demands an appropriate toll collecting system, which meets the requirements of arranged toll principles. Among these, the most important principles are equity, effectiveness and efficiency. Electronic Toll Collecting (ETC) systems are an appropriate solution to solving charging problems in various ways according to the different kind of systems.

This set up the most important objective, the correct and precise, valid settlement of revenues-expenditures and traffic data, which is the fund of the marginal social cost based pricing. But this new approach carries uncertainty among the infrastructure users, because they do not know and do not understand its meaning and scope. There are many barriers, which set back the fair and efficient implementation and use of this measure (Johansson et al., 2003) and influence the behaviour of different groups or stakeholders towards it. These barriers can be sorted on different reasons, i.e. on which level for the policy institution are the defects of implementation. Therefore, the two main groups are the institutional and the acceptability barriers.

It is important to mark that the media is more and more important and stronger actor of the acceptability process. There are a few conceptions that label the media as an equal actor to the customers, the politicians and the industry, so this contribution will also focus on the effects of media system.

In this resolution there is four main differentiated stakeholders' acceptability of pricing policy: the providers', the politicians' and regulators', the public's acceptability and the role of media in this problem (Schade & Schlag, 2000). This contribution in its first part is focusing particularly on acceptability barriers.

After this analysis and utilisation of its results, the existing Hungarian vignette system on motorway network and the new planned mileage based ETC system are evaluated while focusing on acceptability issues. Some conclusions are drawn towards a desired successful implementation and efficient operation of this new system in the future.

## GENERAL METHODOLOGY OF MEASURING AND CLASSIFYING ACCEPTABILITY OF PRICING INSTRUMENTS

### *Providers' acceptability*

The provision enterprises are mostly involved in financing (because of the lack of national budget) and in operation (effectiveness) of infrastructure. This is proven theory that comparing public versus private operated infrastructure, in case of private operated it is more financially efficient than a public one because of market approach, a private investor wants to get the best interest for its invested money. Furthermore, the providers are more interested in the infrastructure development if their risks can be mitigated through governmental guarantees, i.e. the regulators warrant the expected level of revenues with financial help (in several forms) to prove their profit maximisation (Tanczos & Kong, 2001). Therefore, the providers manage their information sources according to the principle of service and consideration.

### *Political/regulatory acceptability*

There is a significant difference between the political and public behaviour regarding acceptability. While the public stakeholders want to get fair road pricing based on traffic management and environment protection issues, the politicians and regulators are instead focussing on their own careers and their party interests, by concentrating on public voters and a successful (re)election process (Tanczos et al., 2004).

The results of previous studies stated, that the political stakeholders manage less the topic of traffic by comparing to the most highlighted level, for example the sustainable development of economic or the financial problems (Tanczos et al., 2004). However, their personal acceptability in appreciation of pricing policies is positive due to its fair properties. The reasons of the low socio-political acceptability (based on behaviour of political stakeholders) is identified, which on one hand, the marginal cost based road pricing is not fully accepted in the professional sphere (politicians representing their interests). On other hand, they prefer to justify their policies in terms of practical arguments, rather than in terms of arguments regarding efficiency and equity (fairness) benefits at a general level (Rothengatter, 2003). Further reasons include the less sufficiently featuring the positive effects of the pricing-measures to the politicians' action and these positive effects (like environmental benefits) promise less success than other policy issues (like employment or regulation policies).

To improve the political acceptability it may be a better solution if the pricing policies are implemented by politicians who consider the needs of politically influential groups, and they allocate the revenues to these stakeholders, and they spread out the costs to groups who has less political potential or who are not well organised in validation of interests. There is a good example the situation of foreign customers in case of vignette based charging system on road, in which situation they are loaded relatively more regarding expenditure than the domestic customers (Timar, 1998).

#### *Public acceptability*

Most problems affecting people are principally appearing in areas with high population density, where people do not have enough living space to reach their individual goal of living in family houses, and are therefore pressed to live in block houses (Milne et al., 2001). An extremely high density can be evolved into the city area, which causes standard traffic congestions, parking problems and lack of capacities in peak-hours. These are the mobility-related problems. Other problems arise involving highways, bridges and tunnels, but these infrastructures cannot be built-up in one day or moved away, so their problems need policy-related solutions, rather than a regular capacity development. Fortunately there are various possibilities to moderate the effects of these propositions, but in case of few measurements it is necessary to make a relationship between the success of policies and the public acceptance. Namely, the concerned public stakeholders are certainly not involved in questions and solutions of mobility problems (Tanczos et al., 2004), but the great majority of measures, including, strangely the pricing-measures, have an effect on voting population related to expenditure changes.

The social perception of mobility-related problems has two layers: the first one is built up with the straight problems according the traffic volume (congestion, parking), the second one contains the collateral problems as the impositions of environment (noise, air pollution). People tend to not think that road pricing is an appropriate solution in solving straight problems. This means they reject the pricing-measures, also after focusing on other positive effects for implementation of road pricing, such as reducing congestion costs and lost time. They only feel that added taxes and charges are good possibilities for the decision-makers to get more money for other political aims. Several studies reached the important result that the level of incomes mainly does not influence the acceptability of road pricing, but naturally the level of charge does (Steg & Vlek, 1997).

According to the current stand of sciences there is no proven relationship between social norms and acceptability. But if it is possible to attract attention on responsibility for causing the straight and collateral problems, and they feel that they have possibility and voice in solving these problems, than finally it seems to have more positive acceptance on pricing-measure than negatives in case of feeling individual utility maximisation. The main aims are the effectiveness, equity and fairness (Viegas, 2001). This kind of knowledge is very important in the well implementation of pricing; it cannot be underestimated the role of the conscious education of people on protecting the environment and the need of traffic demand management issues, as we have to underline the role of media as well. Other researches demonstrated the need of equity regarding the well acceptability of charges, because on one hand the customers want to get what they paid for, and on other hand they feel the importance of considering the unequal situations, which means the different treatment in the case of different needs and abilities (e.g. cars and lorries). Some studies focused on the acceptability regarding the characteristic of pricing system, and they assessed that the customers are preferring rather simply, known fixed charge, i.e. open charging structures than difficult and complex, time or distance based, closed charging systems (Tanczos & Bokor, 2004). On the whole it can be established that the public acceptance of road pricing is hanging on the presentation of reasons and issues for implementing the pricing-measures.

Finally it is important to analyse not only the effects of the customers' expenditures, but also the allocation of taxes and the revenues from road pricing (Tanczos & Bokor, 2004). There are two main dimensions which must be focusing on: the demonstration of people on the allocation fields for using revenues and on the decision-makers' side the impact of guarantees to allocating the revenues in those fields.

### *The role of the media*

The media theoretically stands between politicians and the public stakeholders (voters), independently on both sides. However, some people opinions are that there is an interaction between the media and the political decision-makers, which is not proven yet (Schlag & Schade, 2000). The media has the power to inform the public about the decisions in (pricing) policies and about their impacts on their own discretion (or consciously not to inform them), so it is very important to both sides to have a good relationship with the media. From its role it can decide on problematic questions to either side, depending on which side can influences it. Recently, in all dimensions of media, there are different groups who stand for their interested stakeholders, so theoretically the market of media represents a balanced field in topic of acceptability. Naturally, there are more and less powerful media sources, additionally the governmental or politically interested media sources can get easier place to inform their customers. Their aims are as good as the audience maximisation due to maximise their budget or profit. The media enterprises take care on effectiveness, equity and fairness only if these are important for their audience. Aggregated it needs to be focused on the importance to have good relationship with the media to have accepted pricing policies with the stakeholders (Tanczos et al., 2004).

## IMPLEMENTING THE COUNTRY WIDE THE VIGNETTE SYSTEM

In the beginning of 1999, there were 6 different motorway operating companies in Hungary. In that year the government decided that motorway users have to pay only for the operation

and maintenance costs while the construction and financial costs should be covered from the state budget, a unified vignette system was introduced first on the M1 and M3 motorways in January 2000, cancelling the existing toll systems up to that time. Although the aggregated general toll rate was reduced by 50%, this step produced social dissatisfaction towards the vignette system, especially by the casual and mainly short section users. Despite, the traffic volumes on concerned motorways rose significantly with about 30%. The yearly revenues from toll collection dropped back by 35%.

It is general that weekly vignette users represent more than 50% of the total traffic, while monthly vignette users are about 10% and yearly vignette users are between 30% and 40% of the total traffic, depending on time and section.

In 2003 a new section of M3 motorway, the new M30 motorway and the reconstructed M7 motorway joined the vignette system. In March 2004 the last element of the Hungarian motorway network, the M5 concession motorway also joined the vignette system (after negotiations and modification of the concession contract between the government and the concession company). This step allowed motorist to use more than 540 km motorways with a relatively cheap and simple tool.

## THE DESIRED FUTURE

The above detailed solutions were the consequences of mainly politically driven, professionally unfounded decisions. In the past decade, this resulted in four types of toll categorisation, three kinds of toll collection system, two types of technology and high differences in the fee levels on a network of only 650 km. The politicians recognised that they cannot disregard the professional argues about a consensus based national toll policy.

The first step of the elaboration of the toll policy has been the determination of the “Toll Policy Principles” which were accepted by the Ministry of Economy and Transport in February 2004. The document and other publication (Siposs, 2004) cover that the vignette system like user charging is not recommended for use after 2006 as this type of fee collection gives unjust advantage to the frequent (e.g. companies) and long distance (e.g. transit traffic) users over the infrequent (e.g. private persons) and short distance (e.g. local) users. Using these resources for financing of the operation and maintenance of the network cannot be ensured in this system mainly because of the significant network expansion planned in mid term (2,000 km by 2015). The growing network means wider accessibility, the growing personal incomes mean higher yearly running of cars, which shift demand for yearly vignettes resulting in lower income per vehicle mileage and per motorway length.

The mileage based tolling is recommended from 2007 as in this system all users pay according to the real use of the pavement or to the load share of capacity. The objective of toll collecting can also be the management of traffic demands according to place or time, besides providing financial resources. This solution gives the basis of balanced charging (Siposs, 2004). With the application of mileage based tolling, funding the financial resources and keeping the real value necessary for operation and maintenance of the year by year increasing network can be better provided for.

For roads with limited access, the introduction of toll can be justified right at the first opening of the excess capacity. In this case, the toll of a 2x2 lanes expressway, or a 2x1 lanes expressway could be linked to that of the motorway. These rates have to be precisely determined in the detailed Toll Policy. Otherwise, when introducing toll collection only at the final motorway level construction, problems will arise with the municipalities due to traffic transfer (Siposs, 2004).

The basic objective is to introduce the new policy in all categories at the same time, but the technical solution chosen as a result of international, technologically open tendering should also make it possible, that this deadline would be later in case of passenger cars (Siposs, 2004). In this case, on the other hand, the new system should be able to control 100% the vehicles using vignettes but should be able to handle mileage based tolling for those who chose it. Nowadays significant part of the vignettes is bought by infrequent users, but new surveys should be conducted to determine the frequency of these infrequent users in the various sections.

Further surveys are needed to split the costs between vehicle categories, tolled/toll free sections, determination of the toll categories and multipliers and determination of the socially affordable toll level. It is important that the decision should be made on political consensus, while it is inevitable to have long term strategic decision.

The second step of implementing the new tolling system was the detailed social discussion of the principles in 2004. The up to date interoperable electronic toll collection can be up and running in January 2007 the earliest, following the tendering, and construction of the chosen technology.

The partial reason of the formerly missing public understanding of the essential aim of tolling was that in Hungary there was never elaborated a clear cut marketing strategy and public relation background in this field. The accountability of toll incomes, the way and reason of spending will be in centre of the future communication campaigns (Siposs, 2004). This statement is also proven by other national (Tanczos et al., 2004) and international studies.

## CONCLUSIONS

The main conclusion is that it is important to search for and find good practices. One of the most important factors in successful implementation of transport policy measure is the stakeholders' acceptability. If the customers are informed in high level about the reasons and expected results of pricing, there will be higher public acceptability. Accordingly, the emphasis should be rather placed strongly on true reasons of pricing and the advantages of additional financial resources. Furthermore, the pricing policies can be very effective solutions for environmental and congestion problems as well. The public stakeholders reach the public road network without charging, therefore there is a strongly acceptability barrier if they have to pay for it. But after implementing this measure, it could be a high effectiveness of transport pricing (on the side of decision-makers), naturally it depends on the well definition of objectives. Last but not least it is very important that the transport issues from pricing policies must be well transmitted to the public, thus they must also believe that their positive attitude on policy implementation assists in reaching conclusions to these issues. The ITS means are adequate to help this process.

On the side of regulators, the most important issue is to provide appropriate guarantees to the public and the providers as well. That means the government has to create the legal framework to implement pricing-measures, from the tendering of infrastructure until the collection of charges. It would be mitigating risk if there were a well-balanced risk allocation between government and the industry. Also, it causes a higher acceptability within the public if they are involved in determining the reason and expected results of pricing policies. In case of implementing the vignette system these elements missed from the government's store of measures. At preparation of the new mileage based pricing system, politicians learnt these lessons.

The providers' acceptability also will be on higher level if in the planning phases there is a thoroughly preparation and analysis of the financial questions, and independent groups are involved assessing the economic conditions and traffic forecasts. Using intelligent systems during the operation can improve the data collection and forecasting processes for precise evaluations, as in case of the new tolling system.

The media plays the linking role between the politicians and the public stakeholders, thus it is necessary to have good relationship with all dimensions of media. With help of media the public acceptance of toll policy and especially of the new pricing system can be on a high level.

## REFERENCES

JOHANSSON, L.O., FALKEMARK, G., GÄRLING, T., GUSTAFSSON, M., JOHANSSON-STENMAN, O. (2003): "Political Acceptance of Road Pricing: Goal Conflicts in Municipality Decision Making". In SCHADE, J. & SCHLAG, B. (Eds.), *Acceptability of transport pricing strategies*, Amsterdam, October, pp. 269-278.

MILNE, D., NISKANEN, E., VERHOEF, E (2001): "AFFORD Final Report". VATT Research Report No. 78, Helsinki, October.

ROTHENGATTER, W. (2003): "How good is the first best? Marginal cost and other pricing principles for user charging in transport". *Transport Policy* Volume 10, Issue 2, Amsterdam, April, pp. 121-130.

SCHADE, J. & SCHLAG, B. (2000): "Acceptability of urban transport pricing". Helsinki: VATT Research Report No 72.

SCHLAG, B & SCHADE, J. (2000): "Public acceptability of traffic demand management in Europe". *Traffic Engineering + Control* 41, London, pp. 314-318.

SIPOSS, Á.G. (2004): "Special Aspects of the Tolling on the Hungarian Motorway Network". 4<sup>th</sup> European Congress on ITS – Moving Towards an Integrated Europe, Budapest, 24-26 May.

STEG, L., VLEK, C. (1997): "The Role of Problem Awareness in Willingness-to-Change Car-Use and in Evaluating Relevant Policy Measures". In ROTHENGATTER, VAYA (Eds.), *Traffic and Transport Psychology*, Amsterdam, pp. 465-475.

TANCZOS, K., KONG, G.S. (2001): "Experiences of Using Toll Road and Possibility for Public/Private Partnership with Special Respect to Eastern Europe and Some Asian Countries". European Transport Conference, Cambridge, 10-12 September.

TANCZOS, K., BOKOR, Z. (2004): "Analysing domestic implementation conditions of modern transport pricing system" in Hungarian. *Scientific Review of Transport*, 2, pp. 50-57.

TANCZOS et al. (2004): TIPP, Task Report 4.4 "Political history / acceptability of private financing in Hungary as an accession country". TIPP – Transport Institutions in the Policy Process, EU-project funded by the European Commission, 5th Framework Programme

TIMAR, A. (1998): "Road projects in transition Europe". *Transportation Equipment and Infrastructure Review Volume 5*, Essex, p. 19.

VIEGAS, J.M. (2001): "Making urban road pricing acceptable and effective: searching for quality and equity in urban mobility". In *Transport Policy Volume 8*, Issue 4, Amsterdam, October, pp. 289-294.