ELECTRONIC TOLL SYSTEM IN THE SLOVAK REPUBLIC AND RATIO OF BYPASSING VEHICLES

Miloš Poliak[1]

Introduction

Electronic toll collection represents a system of charging the users for using segments of road infrastructure. This system will replace the current vignettes-based charging that does not allow charging the users according to the distance travelled on the road they use. With the electronic toll collection, the hauler bears cost of infrastructure according to the distance actually travelled and thus one can consider this system to be more just compared to the system based on vignette purchase.

Germany, Austria and Czech Republic have introduced electronics toll. Electronic toll collection represents a system of charging the users for using segments of road infrastructure. With the electronic toll collection, the hauler bears cost of infrastructure according to the distance actually travelled and thus one can consider this system to be more just compared to the system based on vignette purchase. Slovak republic predict introduction electronics toll since 1. January 2010. Toll rates are ratified in Slovak republic on the present and our rates are ones of the most highly in the European Union [1].

The aim of this paper is to describe to tolls change in Slovak republic and to state impacts of toll collection introduction on haulers.

Current and prepare status of charges for use of roads

At present, the payment for use of selected segments of highways, high-speed roads and 1st class roads is derived from the gross weight of a vehicle and validity period of a highway vignette. Topical payment rates related to use of roads by heavy vehicles are presented in Table 1 and are stated to the Act No. 428/2008 Col.

[1] doc. Ing. Miloš Poliak, PhD., University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Road and Urban Transport, Univerzitna 1, 01026 Žilina, Slovakia, email: milos.poliak@fpedas.uniza.sk

The current vignettes-based charging does not allow charging the users according to the distance travelled on the road they use thereat this system will replaced the electronics toll in Slovak republic since 1. January 2010.

Vignette type	Total vehicle weight	
	3,5 - 12,0 t	more than 12 t
Nine month	495 €	810 €
One month	55 €	90 €
One week	24 €	40 €
One day	8,60 €	10 €

Tab. 1. Payment rates for use of selected segments of highways, high-speed roads and 1st class roads.

The Act No. 25/2007 Col. on Electronic toll collection for use of selected road segments sets a precondition that the toll rate for 1 km of a selected road segment is set separately for the vehicle category from 3.5 t to 12 t (gross weight), 12 t and more (gross weight) and motor vehicles designed for transport of more than nine persons, including a driver. Moreover, the manner of toll rate calculation must also take into account alt least the EURO emission class and the number of axles of the vehicle.

The toll rates are set to the Act No. 350/2007 Col. that appoints to toll rates for use of selected road segments. The Act No. 350/2007 Col. sets special toll rates for highways and high-speed roads (table 2) and special lower toll rates for 1st class roads (table 2).

Vehicle	Vehicle's category	highways and high-speed roads			1st class road		
		Euro 0 - II	Euro III.	Euro IV, V, EEV	Euro 0 - II	Euro III.	Euro IV, V, EEV
Trucks	3,5 t - 12 t	0,093	0,086	0,083	0,070	0,063	0,063
	> 12 t - 2 axles	0,193	0,183	0,179	0,146	0,136	0,136
	- 3 axles	0,202	0,193	0,189	0,153	0,146	0,143
	- 4 axles	0,209	0,199	0,196	0,156	0,149	0,146
	- 5 axles	0,206	0,193	0,189	0,153	0,146	0,143
Passenger cars	3,5 t - 12 t	0,090	0,086	0,083	0,066	0,063	0,063
	more than 12 t	0,186	0,176	0,173	0,139	0,133	0,110

Tab. 2. The valid toll rates for highways and high-speed roads and for 1st class roads.

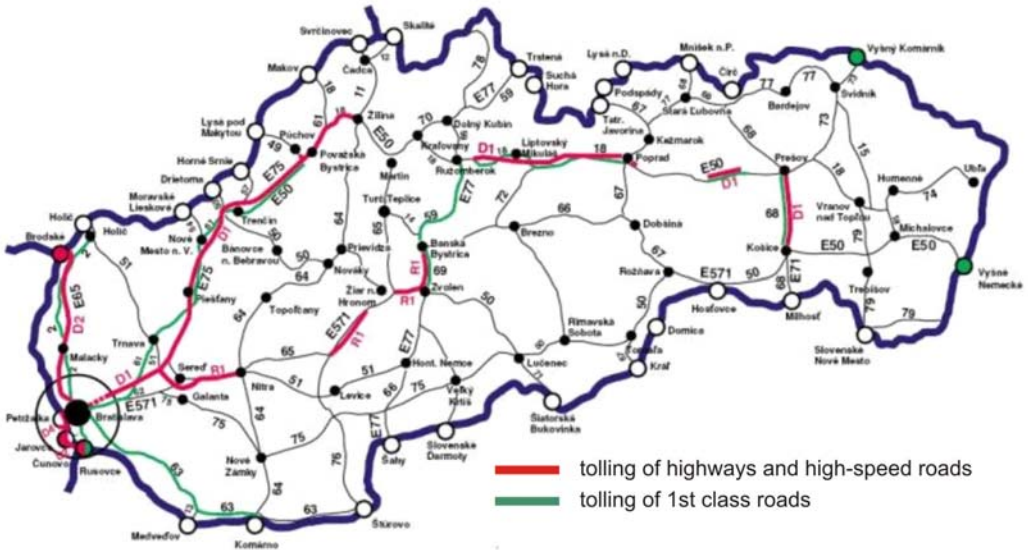

Fig. 1. Current tolling scope (on the 1. January 2009).

Change of cost of haulers will induced to change volume tolling of roads in Slovak republic too. On the present are tolling 715 km roads (figure 2), after implementation of electronic toll will be tolling about 2 400 km roads (figure 3). It is increase to tolling about 336 per cent.

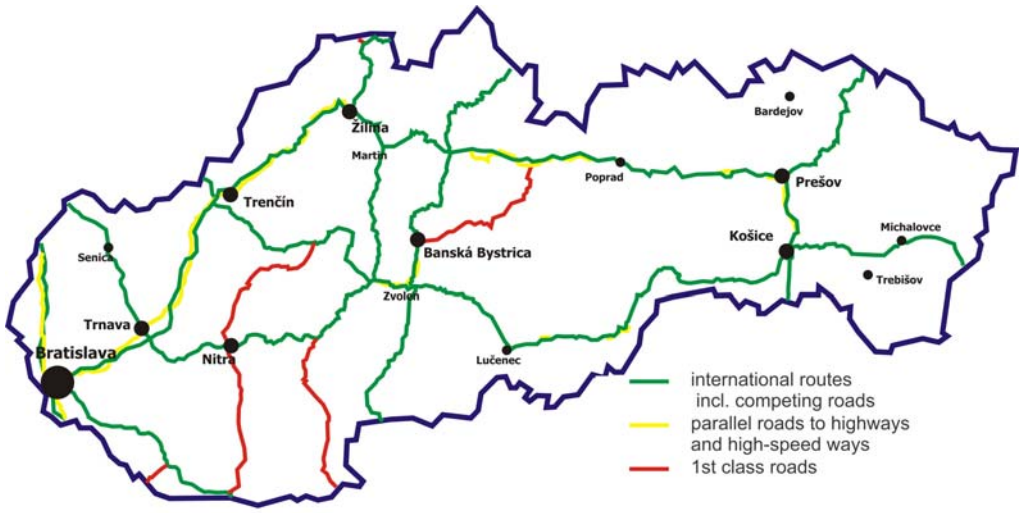

Fig. 2. Tolling scope after implementation of electronic toll.

Ratio of bypassing vehicles

The actual share of vehicles bypassing the toll-liable roads after the electronic toll collection system introduction can exactly be determined only once the tolling system is launched. The share of bypassing vehicles will be dependent upon:

- Toll rates for the use of roads (toll amount),

- Availability of an alternative route (how much the haul and transportation time is increased),
- Hauler's cost per 1 km travelled by the vehicle and per 1 hour of vehicle operation.

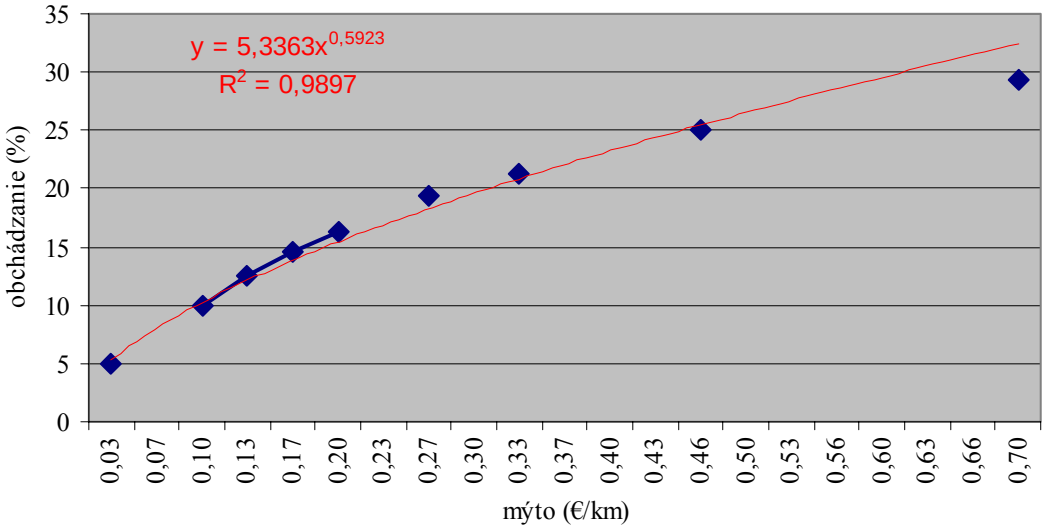

Fig. 3. Ratio of bypassing vehicles with vehicle operating cost of 20 € per hour in relation to individual toll rates.

The probability that a hauler will bypass the toll-liable road will go down with the increasing distance of bypassing route and rising hauler's cost per km travelled. The same applies to transportation time. A hauler will use an alternative route if the time necessary for transportation is longer only in the case that cost per hour of vehicle operation is reduced. This means the longer the transportation time via the alternative route, the lower is the probability of bypassing toll-liable roads. The assumed share of vehicles likely to bypass toll-liable roads in relation to the toll rate amounts and hauler's cost was estimated by a collective of authors in the Project 1F51D/119/120 "Modelování dopadu ceny a rozsahu zpoplatnění pozemních komunikací na silniční síť s využitím dopravního modelu ČR a návazné evropské sítě" (Modelling the price impact and toll-liability extent impact upon road network with the use of traffic model of the Czech Republic and the follow-up European network). Analysis of evasion is developed for the entire road network in the Czech Republic that is comparable with the road network in the Slovak Republic and so its results can be applied to conditions in Slovakia.

The probability of toll-liable road evasion is produced based on the research results for a vehicle with the cost per 1 hour of operation to be 20 € (see Fig. 3). The figure shows that if the toll amount is 0,17 € per km, the evading vehicles represent 14.5 %. With the hourly cost of 13 € per hour (smaller vehicles), however, the share of bypassing vehicles rises up to almost 18 % (see Fig. 4).

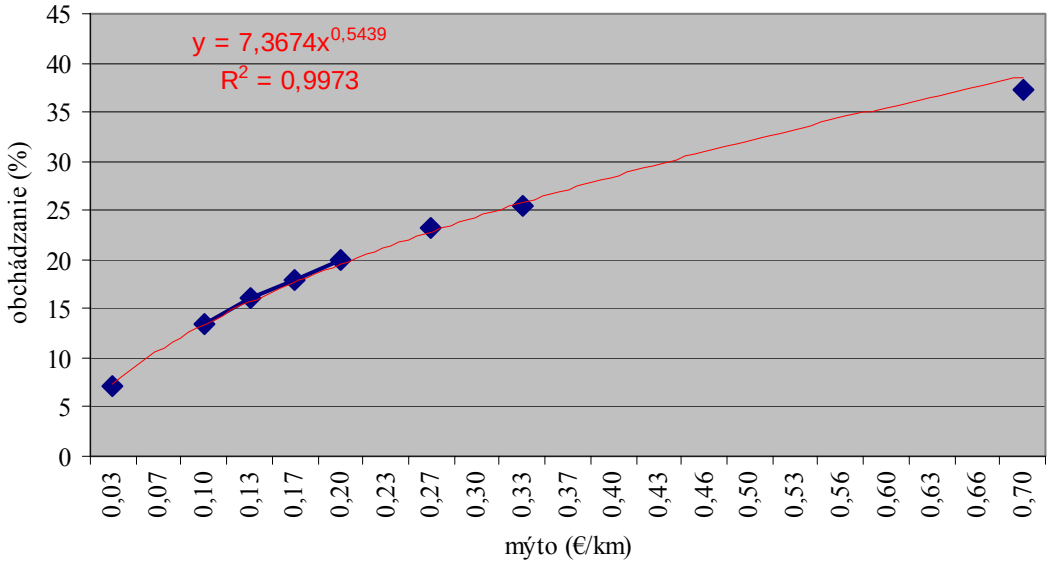

Fig. 4 Ratio of bypassing vehicles with vehicle operating cost of 13 €/h in relation to individual toll rates

Conclusion

For the conditions of Slovakia, we can define the share of bypassing vehicles based on the average toll amount for vehicles with the weight over 12 tonnes, using a graph (Fig. 3) with the cost of operation of 20 € per hour and for vehicles of up to 12 tonnes in the case of which the cost of operating hour is lower, i.e. using the graph on Fig. 4, which is produced for operating cost of 13 € per hour. Stemming out from the above analysis, the share of vehicles bypassing toll-liable roads can be stipulated for the conditions of the Slovak Republic as outlined in Table 3.

Category	Average rate	Evasion ratio
Up to 12 t	0,083 €/km	12,13 %
Over 12 t	0,189 €/km	14,95 %

Tab. 3 Ratio of vehicles evading toll-liable roads in Slovakia

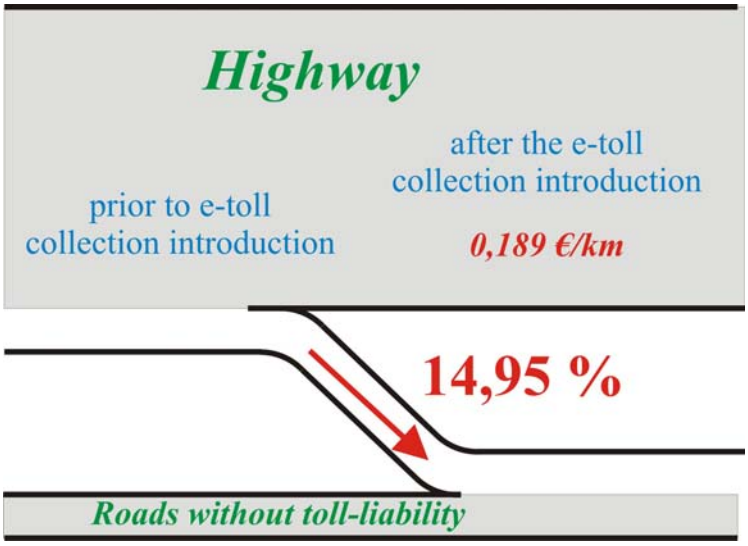

Fig. 5 Ratio of vehicles evading toll-liable roads in Slovakia under toll 4.73 SKK per km for category vehicles over 12 t

Literature

[1] GNAP, J. – KONEČNÝ, V. – POLIAK, M. – ŠTETINOVÁ, A.: Electronic Toll System in the Slovak republic – Tolling Scope and Impacts; special study executed by University of Žilina, Faculty of Operation and Economics of Transport and Communications, Department of Road and Urban Transport, 2007

[2] KONEČNÝ, V.: Rozsah spoplatnenia cestnej siete a jeho determinanty v súvislosti so zavedením elektronického mýta v SR; Národohospodářské aspekty dopravního systému – 7th international scientific Conference of Ústav ekonomiky a managementu dopravy a telekomunikací Fakulty dopravní ČVUT v Praze, 28. march 2007. – Prag; FD ČVUT, 2007; ISBN 978-80-01-03706-5.

[3] PÁNIS, M. – KALAŠOVÁ, A.: Car monitoring information systems; Transport systems telematics – 8th International Conference; November 5-8. 2008; Katowice-Ustron; Poland; ISBN 978-83-917156-9-7; s. 59-64

[4] POLIAK, M.: Predpokladaný vývoj sadzieb elektronického mýta v niektorých európskych štátoch a jeho dopady z hľadiska dopravcov. Emisné zóny.; Proceeding of 11. special seminary Aktuálne problémy v podnikaní v cestnej doprave – CEDOP 2009; Agroinštitút – Convention hall; 4. – 5. 2. 2009; Nitra; ISBN 978-80-8070-975-4; s. 144-155.

[5] ŠTETINOVÁ, A.: Freight transporter's delay and loss of society, 7-th European conference of young research and science workers; Žilina June 25-27. 2007; Slovak Republic; Section 2: Economics and management - part 2 (L-Z).; Žilina; University of Žilina, 2007.; ISBN 978-80-8070-707-1; p. 141-144.

[6] Act. No. 25/2007 Co.

[7] Act No. 413/2007 Co.

[8] Act No. 350/2007 Co.

Referee:

Prof. Ing. Alica Kalašová, PhD., University of Žilina

Enter to publishing: **29th October 2009**