

Comparison of road freight charging in Visegrad Group countries in the context of sustainable regional development
Komparace zpoplatnění silniční nákladní dopravy v zemích Visegradské skupiny v kontextu udržitelného regionálního rozvoje

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Annotation

Road transport plays an important role in the social and economic development of the state and regions. On the other hand, road transport is a source of emissions, noise and vibration and causes health and safety risks to humans. Road freight charging is being introduced for reasons of road freight transport restrictions. The article aims to make a comparison of the road freight charging in the Visegrad Group countries in the context of sustainable regional development. The article uses a comparison method, which belongs to the category of logical scientific methods. The websites of road transport charging operators are the source of the data in the individual countries of the Visegrad Group countries. The results of the comparison of road freight charging in the Visegrad Group countries are given for each country, with particular emphasis on the legal framework, toll rates and toll payment method in the specific country.

Key words

road freight transport, Visegrad Group countries, road freight charging, sustainable regional development

Anotace

Silniční doprava hraje důležitou roli v sociálním a ekonomickém rozvoji státu a regionů. Na druhé straně je silniční doprava ve vztahu k životnímu prostředí zdrojem emisí, hluku a vibrací a způsobuje zdravotní a bezpečnostní rizika pro člověka. Zpoplatnění silniční nákladní dopravy je zaváděno z důvodů omezení silniční nákladní dopravy. Článek si klade za cíl provést komparaci zpoplatnění silniční nákladní dopravy v zemích Visegradské skupiny v kontextu udržitelného regionálního rozvoje. V článku je využita metoda komparace, která se řadí do kategorie logických vědeckých metod. Zdrojem dat jsou webové stránky provozovatelů zpoplatnění silniční nákladní dopravy v jednotlivých zemích Visegradské skupiny. Výsledky komparace zpoplatnění silniční nákladní dopravy v zemích Visegradské skupiny jsou uvedeny za každou zemi zvlášť s důrazem na právní rámec, sazby mýtného a způsob platby mýtného v dané zemi.

Klíčová slova

silniční nákladní doprava, Visegradská skupina, zpoplatnění silniční nákladní dopravy, udržitelný regionální rozvoj

JEL classification: R48, R42, M21

1. Introduction

Transport has an important role in human evolution (Kučera, 2017). Road transport is one of the most widely used modes of transport. Road freight transport is largely irreplaceable because it is used by the entire industry. Road transport plays an important role in the social and economic development of the state and regions. However, on the other hand, in relation to the environment, it is the source of emissions, noise and vibration and causes health

and safety risks. The negative effects of transport on the environment are conditioned by the increasing transport requirements of the company in connection with the globalization process, which is also reflected in the demands on regional transport infrastructure. Continuous problems are in the development of transport infrastructure and the issue of financial charging of the infrastructure at regional level (Nidziy, 2017). The share of taxes and charges is different on the total cost of carriers. Their proportionality varies from country to country. The different types of taxes and charges relate to the different production factors of road transport operators. Some of them are related to traffic routes, used road infrastructure and others are related to vehicle operation or vehicle crew (Konecny, Semanova, Gnap, Stopka, 2018). The total and marginal costs of road use, excluding congestion and other external costs, usually take into account two sets of factors (Martin, Thoresen, 2015) such as impact on road haulage operators in terms of operating costs and impact of heavy vehicles on road infrastructure.

There are several studies on the economic consequences of road freight charging, be it in terms of fuel, or some form of differentiated road charging (Lo, Hickman, 1997; Barker, Kohler, 2000). Road charging is considered as an instrument to deal with the externalities of traffic congestion (Vandyck, Rutherford, 2018; Cavallaro, Giarretta, Nocera, 2018; Chang, Tseng, Hsieh, Hsu, Lu, 2018). The importance of sustainable regional development is widely accepted and discussed at present time (Hou, Liu, Zhang, 2019; Khan, Sandano, Pratt, Farid, 2018; Li, Tang, Han, Bethel, 2018). Litman (2008) states that the concept of sustainable regional development is based on three pillars, economic, environmental and social. Road freight charging is being introduced for reasons of road freight transport restrictions and their impact on sustainable regional development. Charges may be time or power.

The article deals with the comparison of road freight charging in the Visegrad Group countries. This group includes countries such as the Czech Republic, Slovakia, Poland and Hungary. These neighbors in one block have a similar historical and cultural past and economic structure (Kijek, 2017; Palečková, 2017; Lengyel, Kotosz, 2018; Ivanova, Masarova, 2018; Ulbrich, 2018; Uryszek, 2018). The paper is also based on the results and findings obtained from expert studies of charging, fees and costs in road transport (Konecny, Gnap, 2017).

2. Aim, methods and data

The article aims to make a comparison of road freight charging in the Visegrad Group countries in the context of sustainable regional development. The article will use the comparison method, which can be integrated into the logical category. Hall (2013) mentions that before any judgment on a solved scientific problem is made, scientists try to determine what is the same as the objects already known and how they differ from them. Marder (2011) argues that comparison can be described as a process of identifying the signs of consensus and dissimilarity of an object under investigation and confronting it with other objects. The method of comparison is of great importance in clarifying the processes of change, development, dynamics of the examined relationship, revealing the tendencies and patterns of its development. For the effective use of the comparison method, the rules are used to compare only one-to-one phenomena. The websites of road transport charging operators are the source of the data in the individual countries of the Visegrad Group countries.

3. Results and discussion

The toll is a charge that is levied on the use of different types of roads, tunnels or bridges. Each of the Visegrad Group countries shows the results and discussion separately with the impact on region.

3.1 Toll in the Czech Republic

The use of motorways and selected I. class roads by vehicles with a tonnage of more than 3.5 tons is subject to toll payment, as shown in Figure 1. These vehicles are not obliged to have a time coupon but use an electronic toll system. Vehicles using this system shall be equipped with an electronic device communicating with the toll system (IODA, 2016).

Fig. 1: Toll road sections in the Czech Republic



Source: Myto CZ (2019)

Legal Framework

Road haulage operators and their drivers must abide by the rules that determine the legal framework and the practical implementation of performance charging in the Czech Republic.

Obligations are stipulated by act no. 13/1997, as amended by acts no. 80/2006, no. 347/2009 and no. 196/2012, its implementation is regulated by implementing regulations such as Government regulation no. 484/2006., amendment 272/2007., 26/2010., 415/2010, 243/2011, 354/2011 and 352/2012; Decree of the Ministry of Transport of the Czech Republic no. 470/2012.

Toll rates in the Czech Republic

As it is a performance charge (the cost of using the transport infrastructure depends on the realized transport performance – the number of kilometers traveled by the vehicle), this is very important in the toll rate charge list, which is shown in Table 1.

Tab. 1: Toll rates in the Czech Republic

Emission class		EURO 0 – II			EURO III – IV			EURO V			EURO VI		
Axles		2	3	4+	2	3	4+	2	3	4+	2	3	4+
Toll Rate (CZK)	Motorways (Friday 15–20 h)	4.24	8.10	11.76	3.58	6.87	9.94	2.33	4.46	6.46	2.12	4.05	5.88
	Motorways (other time)	3.34	5.70	8.24	2.82	4.81	6.97	1.83	3.13	4.52	1.67	2.85	4.12
	I. class roads (Friday 15–20 h)	2.00	3.92	5.60	1.69	3.31	4.74	1.10	2.15	3.07	1.00	1.96	2.80
	I. class roads (other time)	1.58	2.74	3.92	1.33	2.31	3.31	0.87	1.50	2.15	0.79	1.37	1.96

Source: Authors based on Myto CZ (2019)

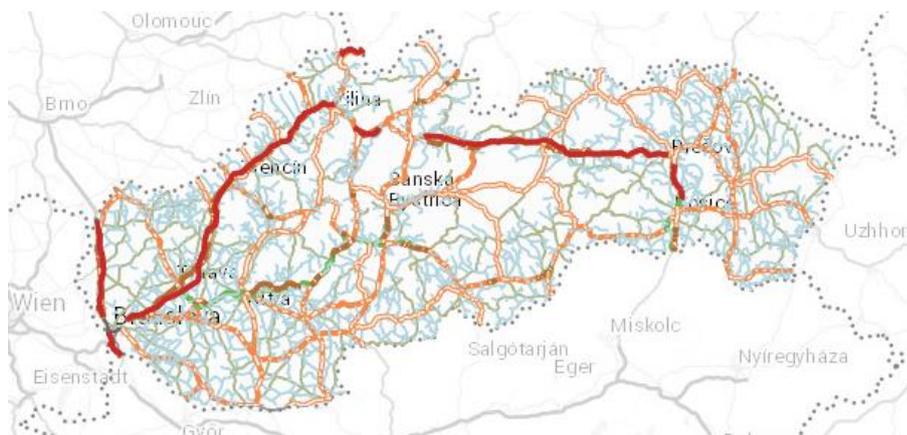
Toll payment method

There are two ways to pay tolls. The first method is based on pre-pay, or second, on post-pay.

3.2 Tolls in Slovakia

Tolls must be paid not only on motorways and expressways, but also on many I. class roads that are subject to the most advanced satellite technology, see Figure 2. This technology works on the principle of GPS navigation, i.e. recording the position of a road vehicle through a navigation device. Every car must be equipped with this device. This is the so-called on-board unit.

Fig. 2: Toll road sections in Slovakia



Source: Myto (2019)

Technology for toll system utilization

The Slovak electronic toll system uses newly introduced on-board units that integrate three technologies such as GPS satellite technology for positioning (secures the collection of data on the use of demarcated road sections); GSM/GPRS technology for communication within mobile networks (used for data transmission between the on-

board unit and other information subsystems within the electronic toll system) and DSRC microwave technology for short distance communication (used to control toll payers as part of the toll collection process).

Legal framework

The basic legislative regulation is act no. 474/2013 on the collection of tolls for the use of certain road sections and amending certain laws in full.

Also included are the following decrees and regulations such as Decree of the Ministry of Transport and Construction of the Slovak Republic no. 475/2013, laying down sections of motorways, expressways, I. class roads, II. class roads and III. class roads toll collection classes; Government order no. 497/2013, which lays down the method of calculating tolls, the amount of toll rates and the system of toll discounts for the use of specified road sections; Decree of the Ministry of Transport and Construction of the Slovak Republic no. 476/2013, of implementing certain provisions of the act on toll collection for the use of specified roads and on amendments to certain acts.

Toll rates in Slovakia

Toll rates are adjusted annually, always on 1 January, these rates are shown in Tables 2 and 3. The rate is also granted for the categories of vehicles such as vehicles with a maximum permissible gross vehicle weight of 3.5 tons to 12 tons depending on the EURO vehicle emission class and irrespective of the number of axles intended for the carriage of more than nine persons including and for vehicles not intended for the carriage of passengers; vehicles with a maximum permissible gross vehicle weight of 12 tons or more depending on the EURO emission class of the vehicle and irrespective of the number of axles intended for the carriage of passengers; vehicles with a maximum permissible gross vehicle weight of 12 tons or more depending on the EURO vehicle emission class and the number of axles not intended for passenger transport.

The type of road also determines the toll rate:

- Defined sections of motorways and expressways.
- Defined sections of I. class roads parallel to motorways and expressways.
- Defined sections of I. class roads that are not parallel to motorways and expressways, defined sections of other I. class roads.

Tab. 2: Toll rates for the use of motorways and expressways; restricted I. class roads and roads that are parallel to motorways and expressways

Vehicle categories		Emission class			
		EURO 0 – II	EURO III, IV	EURO V, VI, EEV	
Road freight vehicle	3.5 tons – to 12 tons		0.108 €	0.098 €	0.085 €
	12 tons and more	2 axles	0.231 €	0.209 €	0.181 €
		3 axles	0.244 €	0.220 €	0.190 €
		4 axles	0.253 €	0.228 €	0.198 €
		5 axles	0.244 €	0.220 €	0.190 €

Source: Authors based on Myto (2019)

Tab. 3: Toll rates for the use of restricted I. class roads and roads that are not parallel to motorways and expressways

Vehicle categories		Emission class			
		EURO 0 – II	EURO III, IV	EURO V, VI, EEV	
Road freight vehicle	3.5 t – to 12 t		0.085 €	0.076 €	0.066 €
	12 tons and more	2 axles	0.181 €	0.164 €	0.140 €
		3 axles	0.190 €	0.172 €	0.147 €
		4 axles	0.195 €	0.176 €	0.150 €
		5 axles	0.190 €	0.172 €	0.147 €

Source: Authors based on Myto (2019)

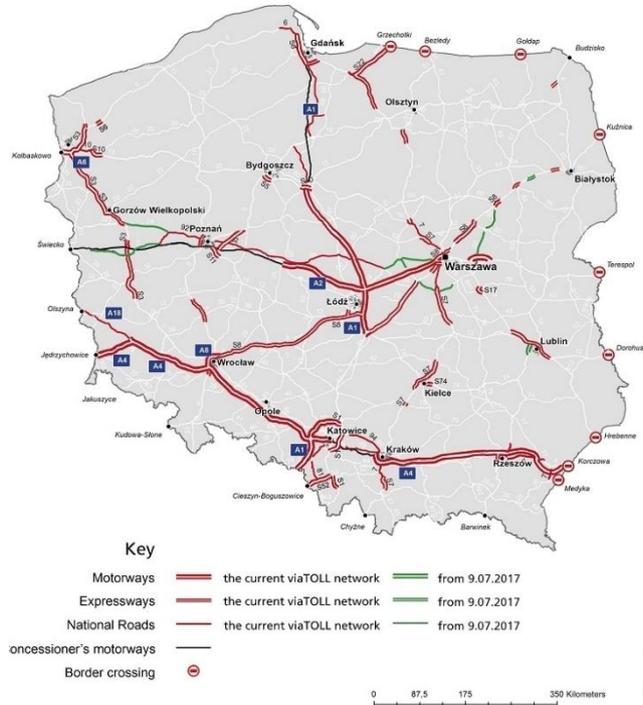
Method of payment

Prepaid toll payments can be made in cash, by bankcard or by fuel card at a contact or distribution point. Only on the fuel card, the publisher must be approved by the toll collector. The minimum amount of prepaid toll in cash is EUR 50 including VAT and the minimum balance can be EUR 12 including VAT. In the post-toll posting mode (on invoice), a bank transfer, fuel card issuer or contact points can be used to pay.

3.3 Toll in Poland

For road haulage operators over 3.5 tons, they are obliged to use the viaTOLL electronic toll system. Every road freight vehicle must have an electronic device in the vehicle for this system. The toll is automatically deducted from this device from the prepaid credit. Operation is also possible via a mobile application. Figure 3 shows toll road sections in Poland.

Fig. 3: Toll road sections in Poland



Source: Viatoll (2019)

Toll rates in Poland

The viatoll system is mandatory for all vehicles with a maximum permissible gross vehicle weight of over 3.5 tons and buses, regardless of their maximum permissible gross vehicle weight. All viatoll revenues go to the Polish state road fund account and are intended for further investment in the Polish road network and for upgrading existing road infrastructure. The electronic toll rates are shown in Tables 4 and 5.

Tab. 4: Electronic toll rates for class A and S national roads or their toll collection sections

Vehicle category	The vehicle classes in EURO depending on the exhaust emission limits			
	Max. EURO II	EURO III	EURO IV	Min. EURO V
1	2	3	4	5
3.5 tons – to 12 tons	0.40 PLN	0.35 PLN	0.28 PLN	0.20 PLN
12 tons and more	0.53 PLN	0.46 PLN	0.37 PLN	0.27 PLN

Source: Viatoll (2019)

Tab. 5: Electronic toll rates for GP and G class roads or their toll collection sections

Vehicle category	The vehicle classes in EURO depending on the exhaust emission limits			
	Max. EURO II	EURO III	EURO IV	Min. EURO V
1	2	3	4	5
3.5 tons – to 12 tons	0.32 PLN	0.28 PLN	0.22 PLN	0.16 PLN
12 tons and more	0.42 PLN	0.37 PLN	0.29 PLN	0.21 PLN

Source: Viatoll (2019)

Technology and method of payment

The viatoll system is based on short-range wireless communication technology. This system consists of several elements and its operation is best imagined as follows:

There are tollgates above the toll roads, which are equipped with antennas. Antennas allow communication between the system and the viabox in the vehicle. Each time a vehicle with a viabox passes under a tollgate, the driver is charged a passage for a particular section of the toll road. The driver receives one signal from

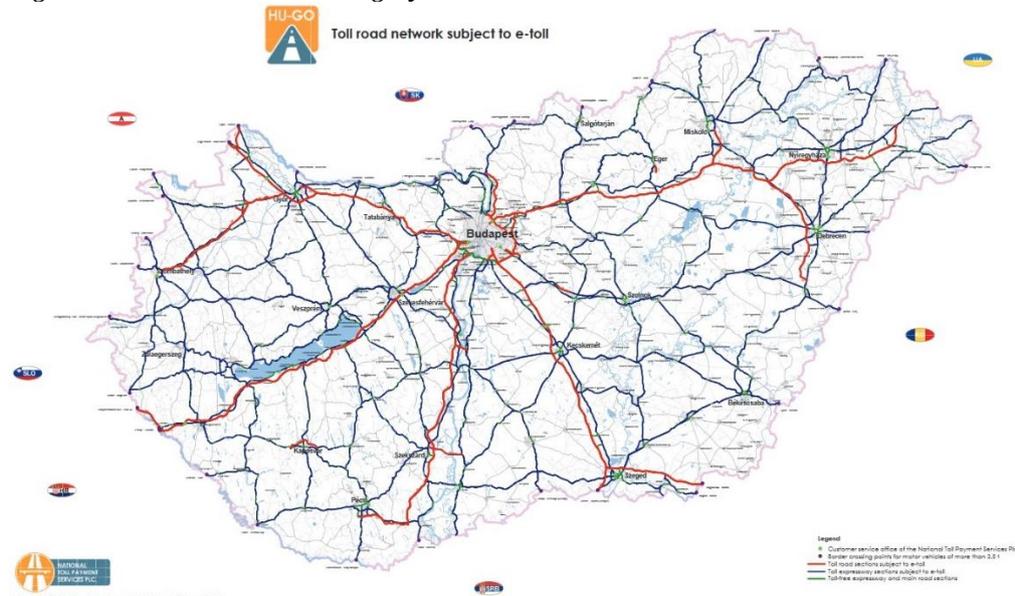
the viabox. The process of reimbursement is fully automatic without the need to slow down or even stop the vehicle.

The viatoll system is also running on toll sections of state motorways and vehicles that are equipped with a viabox electronic unit can use the designated electronic toll stripes.

3.4 Tolls in Hungary

The use of motorways and expressways by road freight vehicles with a gross vehicle weight of more than 3.5 tons is subject to tolls, as shown in Figure 4. The toll covers a total of 6 513 km of marked area (Hu-Go, 2019).

Fig. 4: Toll road sections in Hungary



Source: Hu-Go (2019)

Toll rates in Hungary

The amount of paid tolls proportional to the distance covered depends on the type of road used, the category of road freight vehicle and its classification according to the emission standard, see Table 6.

Road freight vehicle breakdown category:

- Category J2: Road freight vehicle with a gross vehicle weight of over 3.5 tons with 2 axles.
- Category J3: Road freight vehicle with a gross vehicle weight of over 3.5 tons with 3 axles.
- Category J4 Road freight vehicle with a gross vehicle weight of over 3.5 tons with 4 or more axles.

Tab. 6: Toll rates in Hungary

Vehicle categories	J2		J3		J4	
	Motorway	Main route	Motorway	Main route	Motorway	Main route
A (≥ EURO V)	47.12 HUF	20.04 HUF	66.11 HUF	34.71 HUF	102.34 HUF	63.84 HUF
B (EURO II – IV)	55.44 HUF	23.58 HUF	77.78 HUF	40.83 HUF	120.40 HUF	75.10 HUF
C (≤ EURO I)	63.76 HUF	27.12 HUF	89.45 HUF	46.95 HUF	144.48 HUF	90.12 HUF

Source: Authors based on Hu-Go (2019)

In this system, road haulage operators can subscribe to the toll obligation through the on-board instrument or by using a pre-purchased ticket.

Road haulage operators who often use toll sections in Hungary often use the use of on-board equipment or the use of intermediary services. It is a comfortable solution based on fleet tracking. Users can subscribe to their prepaid debit and then charge them for the use of toll roads.

Road haulage operators have to purchase a section ticket before using a charging road section (maximum 30 days before use). The ticket purchased in advance is valid for two days, the validity of the purchased ticket just before the use of the toll road section is until the end of the following calendar day, in any case in both cases for single

use only. The advantage of this system is that road haulage operators have the possibility to pre-plan their route in the HU-GO interface available on the Internet or in established points of sale. To do this, road haulage operators need to enter the starting and ending points (up to four waypoints) and the most important vehicle-related data (license plate, nationality mark, number of axles, maximum permissible weight).

4. Conclusion

Transport is one of the key factors in the development of every modern society, and is not an end in itself but a means of economic development and a prerequisite for achieving social and regional cohesion. Road freight transport is the most used mode of transport in the Czech Republic, Poland, Slovakia, Hungary, but in other countries too. It is characterized by speed, availability and relatively low costs compared to other modes of transport. The total cost of running international road haulage operators is heavily influenced by the operative cost of vehicles and by the use of road infrastructure. The article aimed to make a comparison of the road freight charging in the Visegrad Group countries in the context of sustainable regional development. The comparison shows that there is very often a similar effort to charge the most important roads in selected Visegrad Group countries. There are differences such as legal framework, toll rates and toll payment method, but on the other hand, there is an attempt to charge road freight transport for environmental protection and regional impact.

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