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**EXPERIENCES OF THE HUNGARIAN ELECTRONIC TOLL
SYSTEM**

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1. INTRODUCTION

I spent my internship at an international forwarding and road carrier firm. My very first day could not be other than the 1st July 2013. This was not only an important day in my professional life but also in others' because this day was denominated as the introduction of the electronic toll system in Hungary. After almost 17 years of operation, the vignette system switched to e-toll and caused a change in the life of the road transport sector.

Transport is an essential sector in our everyday life. This sector of the economy went through radical changes in the last decade which was as well supported by the globalization. Road freight today is the major transport mode which having the advantage of flexible and door-to-door delivery also contributes to the damages made to the road network, to the environment and also in social aspects (like accidents etc.).

The European Union, in order to further integrate the Member States, wishes to improve the quality of the transport with regard to the environment. The electronic toll collection is one of this measures' tool.

The goal of my paper is to analyse the circumstances of its introduction in Hungary and to explore its impacts to the players of the domestic economy.

The analysis first presents a brief historical overview of logistics and its definition. Then the features of the road transport industry will be covered. Thereupon, the European Union's point of view will be discussed by introducing the development of the Common Transport Policy. Continuing the international perspective, I wish to introduce briefly the already existing and operating toll collection system in the selected five Member States of the European integration. After a closer look is to be taken at Hungary with an overview of the past and the present. The prerequisite of a comprehensive analysis is an international comparison of the electronic tolls which entails six tolling systems to see the differences from other side as well.

This is followed by the reaction of the economic players which supports finding the answer for the questions concerning the experiences learned from and the effects caused by the e-toll in Hungary during the four months of operation. These impressions are examined not only from the point of view of freighters operating in the transport sector but also other participant of the Hungarian economy including the most affected industries as well as the state and last but not least the consumers.

2. LOGISTICS & TRANSPORT

Logistics is today is a continuously developing and complex science which involves many activities. In this chapter, brief review of the logistics will be presented. Thereafter the transport systems and the main characteristics should be discussed in order to get a background for the last subchapter which covers what is happening today in general in the transport industry.

2.1. HISTORICAL BACKGROUND

According to Prezenszki (2006) the logistics – as a word – is originally Greek (logo = to think, logos = mind, logistikos = to think logically). The earliest references may have derived from BC 1st century, when an educator, Marcus Terentius Varro, who lived in the Roman Empire, dealt with 3 – 6 year old children, bringing up, with expression from that time ‘care’. In his work, Logisticon, he analysed the children’s full-scale care.

Later, in the roman army the ‘logistas’ took charge of the legionary’s accommodation and food supply. After, the next important step was around 1830. The Swiss Baron de Jomini, the general of the French army, denominated logistics as “those organizational measures which the general staff fulfil the concept of strategy and tactic.” After the turn of the century the methods and principles of Jomini are started to be used by the American and European army. (Prezenszki, 2006)

In the advanced countries logistics has become strategically important from the 1950s. The starting country was the United States of America, and then started to spread in Western-Europe, Eastern-Asia and after the change of the Soviet regime in the countries of Central and Eastern-Europe, such as Hungary. (Szegedi & Prezenszki, 2008)

Over the years, the definitions have changed a lot. There are numerous definitions of logistics, being an emerging, interdisciplinary science. According to the Council of Supply Chain Management Professionals:

“[...] logistics management activities typically include:

- inbound and outbound transportation management,
- fleet management,
- warehousing,
- materials handling,
- order fulfilment,

- logistics network design,
- inventory management,
- supply/demand planning,
- and management of third party logistics services providers.

To varying degrees, the logistics function also includes

- sourcing and procurement,
- production planning and scheduling,
- packaging and assembly,
- and customer service.

It is involved in all levels of planning and execution-strategy, operations and tactical decisions. Logistics management has an integrating function, coordinates and optimizes all logistics activities.”

(CSCMP, 2013)

2.2. TRANSPORT SYSTEMS – FEATURES OF ROAD TRANSPORT

After the overview of the evolution of logistics let's see what is happening in the field of transport nowadays, but first, the fundamental definitions and characteristics need to be covered.

What is transport?

“Transport is the movement of persons and objects which require the use of technical tools designed to cover geographical distances.”

(Szegedi & Prezenszki, 2008, p. 117)

Based on technical features and tasks one differentiates:

- railway,
- road,
- water,
- air,
- pipeline and
- combined transport.

During the transport process the freighter/carrier, the customer and the consignment are involved. The freighter is the person or company responsible for carrying out the

activity. The customer is the consigner and the consignee. The consignment is the product to be delivered.

In this process usually an intermediary, the forwarder, may join who creates the connection between the freighter and the customer. This party organizes the delivery with not his own means of transport for a freight charge as well as carries out related additional services, as well. (Hódosi, 2013)

According to Szegedi & Prezenszki (2008, pp. 120-121) “the general task of the freight systems are movement of raw materials, semi-finished goods, components and products from the place of production/mining to the place of use/consumption”.

There are different influencing factors of these freight systems which define the mode of the transport tasks to be completed, as

- the characteristics of the goods,
- the quantity of goods (consignment) to be delivered,
- the geographical location of the departure and the destination,
- the regularity and the frequency of deliveries,
- the requirements and limits concerning the duration and date of delivery.

According to these in the figure below the overview of the freight/forwarding systems is presented.

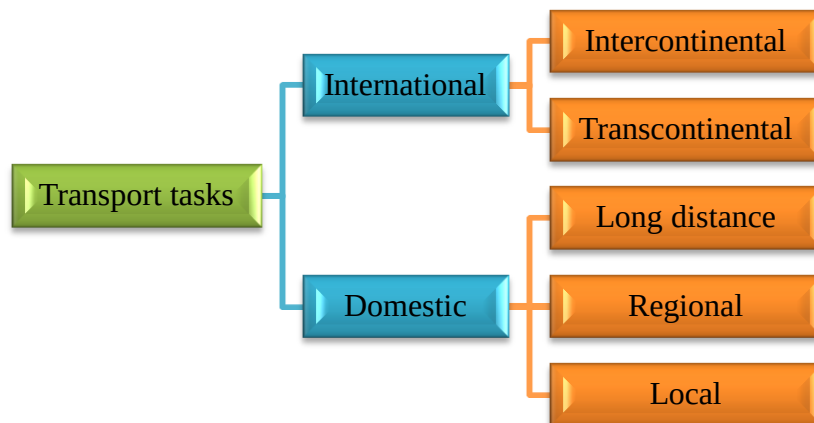


Figure 1: Overview of the freight systems

Source: Szegedi & Prezenszki, 2008, p. 121

The output of the transport activity cannot be held by hand like a product. The only result of this is called the freight output. This output can be measured by the tons of

products delivered by kilometre: weight of delivered products multiplied by the length of delivery. (Szegedi & Prezenszki, 2008, p. 121)

Nowadays, the most important mode of transport is the road transport. In the European Union it represents the 45.3% freight transport in ton-kilometres (see Figure 2).

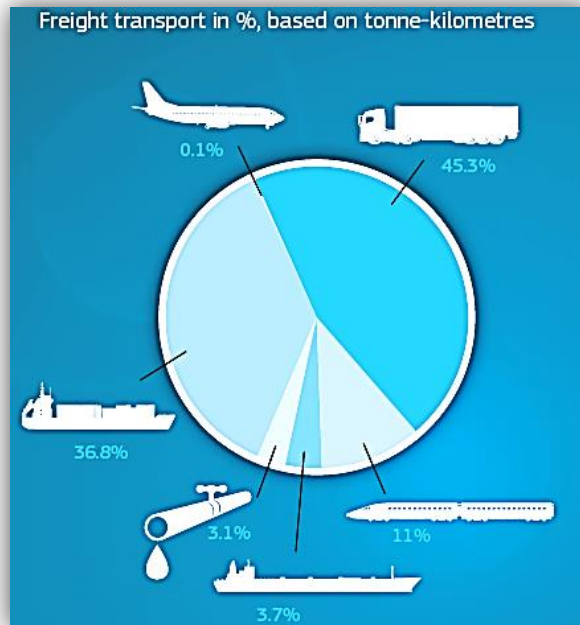


Figure 2: Proportion of methods of freight transport in % of ton-kilometres

Source: European Commission, 2013, p. 17

The reason of the dominance of using the roads for deliveries lies in its advantageous characteristics: it is appropriate for delivery of smaller quantities (even ordering a full truck or a single box) not only locally, but also regionally or internationally when at the same time is flexible and relatively fast solution at a reasonable price.

The major aim of this kind of transport is to fulfil the requirements of the consigner as fast and flexible as possible with minimal empty traffic.

The tools used for doing so are different kind of vehicles like truck for general purpose, self-unloading, dump truck, self-loading, semi-trailers, trucks with hangers, etc. (Hódosi, 2013)

As every transport mode, using the road has advantages and disadvantages, too. (Szegedi & Prezenszki, 2008; Dr. Prezenszki, 1998)

Let's review some of the benefits of the road transport:

- door-to-door delivery,

- the most dense route network,
- relatively short transit times, fast,
- flexible,
- direct: there is no need for transshipments,
- all kind of products can be delivered due to wide range of vehicles,
- rates can be tailor-made, flexible contract conditions,
- continuous traceability, etc.

The drawbacks are the followings:

- highly dependent from environmental effects,
- demands substantial energy (fuel) compared to for instance railway transport,
- heavily pollutes, environmentally damaging impact,
- accidents are frequent,
- route restrictions,
- in some cases it is not cost effective (like coal delivery), etc.

2.3. TRANSPORT TODAY

The development of each economic sector depends on the economic development of the world. In this section, I would like to briefly overview the situation of our world nowadays, concerning road transport. Today's transport is on the way of complete liberalisation led by the WTO (World Trade Organization).

On the Figure below, some data on the goods transported by road are presented by the World Bank where the performance of Member States of European Union is compared with the other, today, world leader countries.

On the graph the numbers of the United States and China are missing, just simply because it would make the readability more difficult as the products transported by road in case of the USA in 2009 was 2,126,581 million ton-kilometres, while in China in 2009 it was 3,718,882 million ton-kilometres while in 2010 this number increased to 4,338,967 million ton-kilometres.

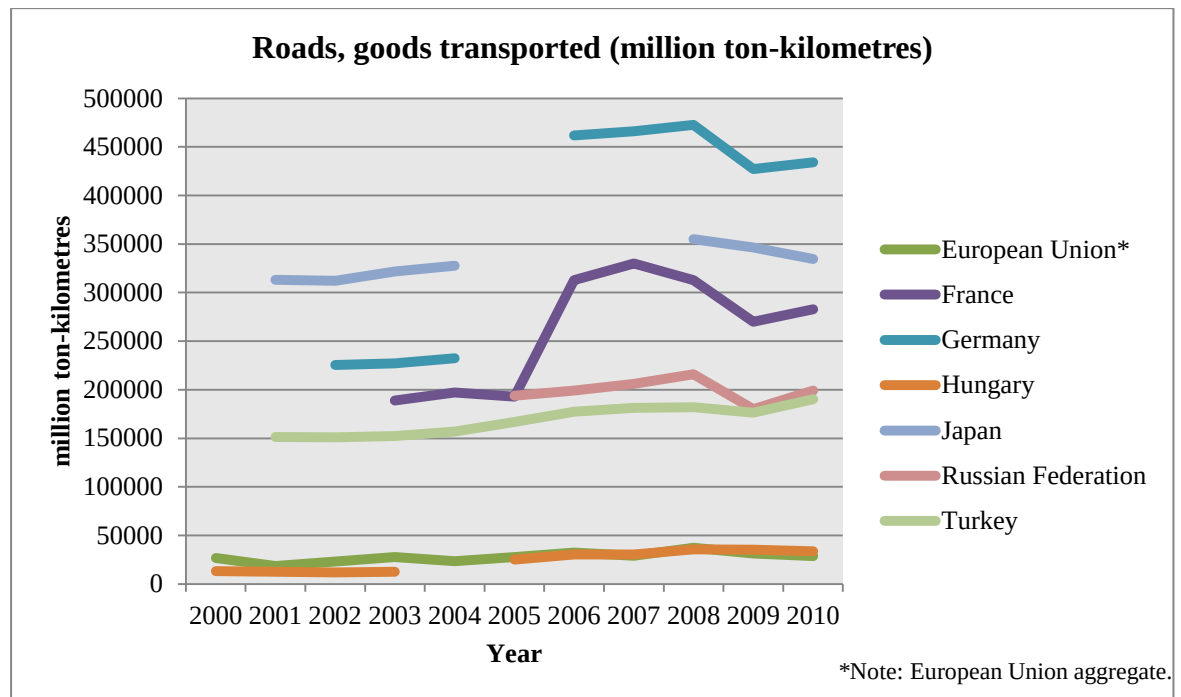


Figure 3: Goods transported by road

Source: based on data collected from World Bank (2013)

Since the world crisis of 2008 and 2009 the economies had to apply to the changes and effects different crisis management steps were taken. There is a broke in case of the international trade as well, but today, the economy as well as the trade slowly seems to recover.

On the chart, one can see that the Germany's and France's performance is notable which represents that this economic sector is very important for the European nations.

According to the European Commission, "the transport industry directly employs more than 10 million people, accounting for 4.5% of total employment, and represents 4.6% of Gross Domestic Product (GDP). Manufacture of transport equipment provides an additional 1.7% GDP and 1.5% employment." (European Commission, 2011)

The road sector employs (in 2010) in the EU27 countries employs around 3 million people. In case of Hungary, the total employment by all modes of transport in 2010 was approximately 219,800 people and from this almost 62,500 people work in road transport. The number of firms is also an interesting indicator to look at (European Commission, 2013c):

- all modes of transport:
 - EU27: 1,120,153 and in
 - Hungary: 30,731;

- road transport:
 - EU27: 581,462 and in
 - Hungary: 16,533.

Due to Hungary's geographical location, in our country the road transport is more important than the other modes of delivering products. The contribution to GDP of this sector is higher, too, 6%. (Karmazin, 2013a)

Unfortunately, the negative effects are perceptible as one of the drawbacks of road transport seriously harms the environment: the energy consumption of this sector is around 33% of all the energy consumed. The greenhouse gas emission of road transport from all modes of transport in 2010 was 72.1%, while 24.3% is the total transport share in total emission. In Hungary this number is shocking: road transport is responsible for 92.4% in case of transport! (European Commission, 2013c, p. 125)

The other negative factors stated above (among the drawbacks of the road transport) are also present. The road network is very congested, thus regulations had to be elaborated among others to reduce these externalities, and at the same time, to improve the quality of transport. The European Union's Common Transport Policy could be the response.

3. ROAD TOLL IN EUROPE

The evolution of road tolling systems is closely related to the European integration. In this section, a determining policy of the European Union called the Common Transport Policy and its development is covered. The road tolls are continuously introduced in the Member States. The operation of tolling systems is regulated according to different directives. I wish to introduce the framework of these, and then present the toll collecting systems in case of five countries.

3.1. BRIEF HISTORY OF THE COMMON TRANSPORT POLICY OF THE EUROPEAN UNION

In 1957, the Treaty of Rome drafted the substance of the Common Transport Policy (CTP) which was one of the only three existing policies: Common Agricultural Policy, Common Commercial Policy (and the common rules on competition). The Schaus Memorandum of 1961 introducing guidelines for the Community-wide action programme and the European Conference of Ministers of Transport (ECMT) were held as a forum for mainly negotiating on the possibilities and ideas. (Giorgi & Schmidt, 2002) Until the 1980s only slow progress were seen.

In 1985, the “European Court of Justice ruled in favour of the European Parliament, which had brought a case against the Council for failure to act.” (Horváth, 2007, p. 382) The preparation of the Single Market programme for intra-community transport required the harmonisation of the transport sector as well as the liberalisation of the transport services. The four freedoms could not be carried out otherwise. The enforcement of the CTP (the Trans-European Networks - TENs) was achieved by the Single European Act.

Between 1985 and 1991, numerous directives and regulations were elaborated by the Commission with an emphasis on the development of Community's railways, harmonisation of social legislation relation to road transport and liberalisation packages on air transport.

From 1992, by publishing a White Paper “promoting the observation of global aspects” (Horváth, 2007, p. 384), within the framework of an action programme for the period of 1995-2000, initiatives and legislation necessary were elaborated concerning national transport markets such as market access for road transport, freedom to provide services to maritime transport within Member States, etc. It became significantly more accessible to provide transport services within the Community. During the 90s, guidelines

were set out for safety, transport pricing and environmental sustainability. (Giorgi & Schmidt, 2002)

The idea of the Trans-European Transport Networks (TEN-T) had been already appeared in the Treaty of Maastricht with the aim of creating systems of transport infrastructure all over Europe, however, only in 1995 the first decision of 14 axes were made.

In 1994 and 1997 on the Pan-European Transport Conference need for completing the TEN-T appeared – due to the perspective of the enlargement of the EU – and 10 corridors, called, the Pan-European Corridors were defined mainly in Eastern Europe. The TEN-T was modified and extended in 2003, comprising now 30 axes.

The development of the CPT, due to the diversity of the national systems, has to face many barriers as the transport as such has very high costs, not only thinking of the construction of roads, railway networks, etc., but also operation properly these systems requires substantial amount of finances, not to mention some problematic issues, like burden-sharing and the question of “Who pays?”, interests of different groups such as national carriers who would like to defend their position, etc. (Dr. Meisel , 2012)

The White Book of 1998 - Fair payment for infrastructure use: A phased approach to a common transport infrastructure charging framework in the EU, emphasises the problem of the diversity in pricing systems among the Member States, and so the Sustainable Mobility Action Programme for 2000-2004 had been published. This issue had to be solved by 2004. Relevant to the road transport, the main long-term objectives were:

- to promote the efficient use of the road network,
- to promote sustainability of road transport and
- to encourage the investments in trans-European networks.

Hence, a comprehensive system of road pricing for truck and commercial transport had to be developed. Member States had to harmonise and adopt compatible systems for heavy vehicles, either through existing systems based on tolls, Eurovignette or developing kilometre based charges. (Commission Européenne, 1998)

In the September of 2001, the European transport policy for 2010 – time to decide White Paper describes the new challenges the European Union faced with: unequal growth in the different modes of transport: road 44 % of the goods transport market, congestions; harmful effects on environment and public health, accidents. (Bache & George, 2006) The Action programme proposed several different measures to achieve a sustainable transport throughout Europe by for instance

- shifting the balance between modes of transport,
- eliminating bottlenecks,
- managing the effects of transport globalisation, and so on.

This extensive Paper takes into account the future of the Community because of the enlargement of 2004. (European Commission, 2001)

The following stage in the development of the CTP is the strategic White Paper published in 2011: Roadmap to a single European transport area - Towards a competitive and resource efficient transport system, which is a policy agenda for the decade, and the part of the Europe 2020 strategy. In this manner the paper's most important message is: "a single European transport area should ease the movements of citizens and freight, reduce costs and enhance the sustainability of European transport." (European Commission, 2011a, p. 10) On the Figure the transport growth of the EU-27 can be seen, which underlines the need for more sustainable transport.

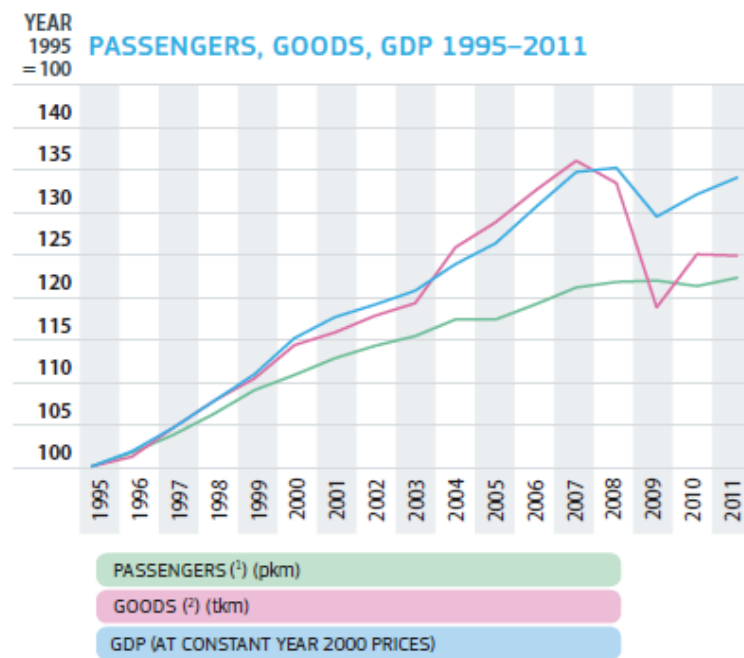


Figure 4: Transport growth EU27

Source: European Commission, 2013, p. 21

Challenging goals are defined and several initiatives are prepared to achieve these, such as:

- A single European transport area,
- Promoting quality jobs and working conditions,

- Secure transport,
- Service quality and reliability,
- A European transport research and innovation policy,
- Promoting more sustainable behaviour,
- Transport infrastructure: territorial cohesion and economic growth,
- A coherent funding framework,
- Getting prices right and avoiding distortions:
 - Phase I. up to 2016: restructuring transport charges to strengthen EU competitiveness while the polluter/user pays principle is valid,
 - Phase II. 2016-2020: “proceed to the full and mandatory internalisation of external costs” for all modes of transport (pollution, congestion, noise, etc.) (European Commission, 2011a, p. 29)
- Opening up third-country markets in transport services, products and investments.

Today the primary aim of the Transport Policy of the European Union is to promote efficient, safe, secure as well as environmental friendly mobility. The more comprehensive goals of the Common Transport Policy are divided according to the different modes of transport. Relevant to the topic, in the followings, the Transport Policy of Road transport will be highlighted.

The current aims of the CTP concerning road transport are to open up markets to cross-border competition, to integrate the road networks, to decrease pollution and improve safety.

The “policy objectives for road transport are therefore:

- to promote efficient road freight and passengers transport services,
- to create fair conditions for competition,
- to promote and harmonise safer and more environmentally friendly technical standards,
- to ensure a degree of fiscal and social harmonisation, and
- to guarantee that road transport rules are applied effectively and without discrimination.” (European Commission, 2013a)

The legislation in force establishes inter alia common rules on market access; determine minimal standards for professional road transport and annual vehicle taxes; sets rules for tolls and user charges for heavy goods vehicles; etc. (European Commission, 2013a)

Since the Treaty of Rome, the European Common Transport Policy went through a lot of changes and does it still today.

3.2. ROAD TOLL IN THE COUNTRIES OF EUROPE

Hungary, as being a member of the European Union for almost 10 years now, has to apply to the requirements of the integration. One of these steps was to implement the so-called electronic road toll. In this part, I would like to introduce how this toll works in the other countries of the EU. One of the challenges for the Member States of the European integration is implementing the rules and directives for tolls and charges for trucks.

The regulatory framework of road infrastructure charging is based on the Directive 1999/62/EC as modified by Directive 2006/38/EC and by Directive 2011/76/EU. These directives determine “common rules on distance-related tolls and time-based user charges (vignettes) for heavy goods vehicles (above 3.5 tons) for the use of certain infrastructure. These rules stipulate that the cost of constructing, operating and developing infrastructure can be leveraged through tolls and vignettes to road users.” (European Commission, 2013b)

This framework has two goals:

- “improving the functioning of the road transport internal market by reducing the differences in the levels and systems of tolls and vignettes applicable in Member States;
- taking better account of the principles of fair and efficient pricing by providing for greater differentiation of tolls and vignettes in line with costs associated with the road use.” (European Commission, 2013b)

The usage of such charges is not obligatory. If any Member State wishes to apply these, then, the Directives set rules concerning this issue.

The most important ones are:

- Tolls must be defined by the distance travelled and the type of vehicle;
- In case of vignettes, the charge is scaled – as they are time-based charges – in accordance with the duration of use made of the infrastructure and with the emission class of the vehicle.
- Imposing tolls and vignettes at once for the use of a single road section is prohibited (there are exception tolls for bridges, tunnels and mountain passes on networks where vignettes are used).
- The charges must be non-discriminatory, no rebates are allowed.

- Charging schemes should not impede the free flow of traffic.
- The maximum average tolls must be determined in connection with the costs of constructing, operating and developing the related infrastructure.
- “External cost charge” can be included into tolls which illustrates the cost of pollution, which has a maximum defined by the Directives.
- The revenue should be used for improving and developing the trans-European network. (European Commission, 2013b)

Through levying these charges for heavy vehicles, it is possible to use the principles of the “user pays” or the “polluter pays”. These mean that the costs of the deterioration occurred by using a given road or motorway or polluting the environment will be paid by those who are responsible for the created damage.

The Figure 5 below illustrates the charging heavy goods vehicles in the EU. Note that the map was prepared before the 1st July 2013, before Hungary launched its distance based electronic toll collection system, as well as Croatia is not presented as a Member State, yet, but I included in the list to be found below.

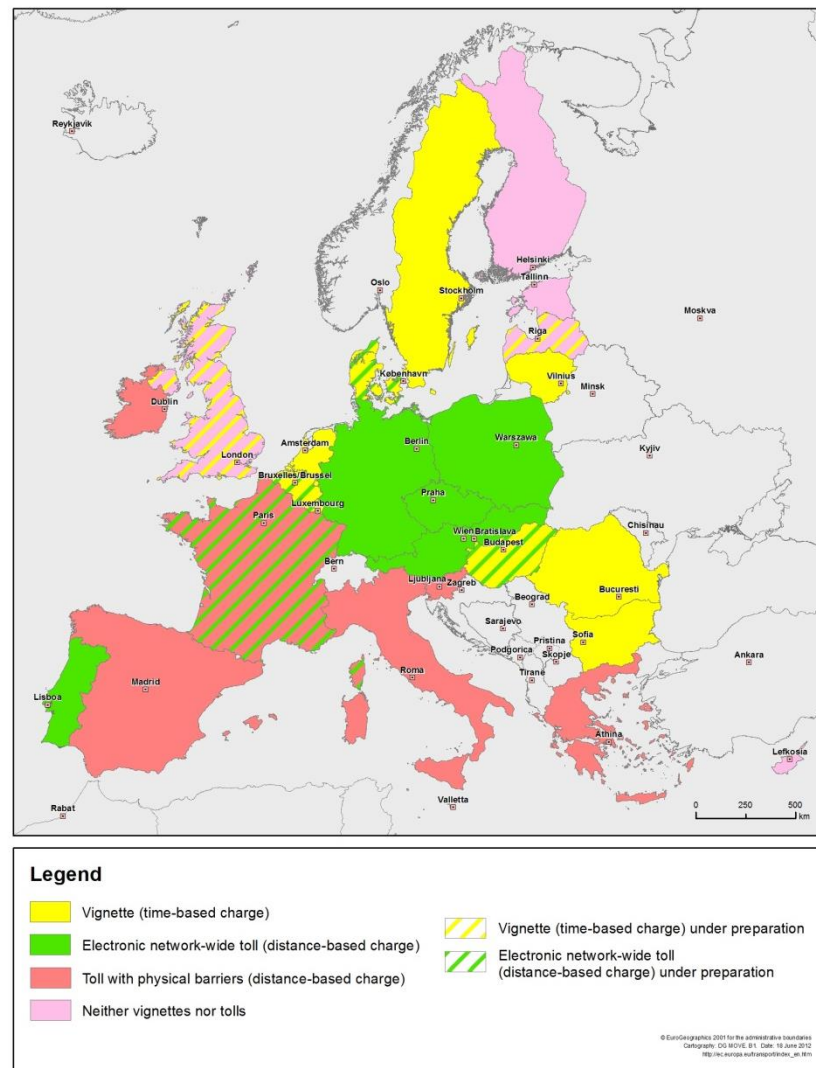


Figure 5: Charging heavy goods vehicles in the EU

Source: (European Commission, 2013c)

The map shows that there are three main types to be used at the moment among the Member States as follows:

- Vignette (time-based charge):
 - Bulgaria, Lithuania, the Netherlands, Romania, Sweden, Luxemburg,
 - Denmark and Belgium (e-toll under preparation).
- Electronic network-wide road toll (distance-based charge):
 - Austria, Czech Republic, Germany, Hungary, Poland, Portugal, Slovakia.
- Toll with physical barrier (distance-based charge):
 - Spain, Greece, Ireland, Italy, Croatia, Slovenia,
 - France (e-toll under preparation).
- Neither vignettes, nor tolls:

- Estonia, Finland, Cyprus, Malta,
- Latvia and United Kingdom (vignette under preparation).

What technological background can a country choose to collect the tolls with?
Today the electronic toll collection uses the following two technologies:

- satellite positioning (GNSS: Global Navigation Satellite System) through GPS-GSM (Global Positioning System - Global System for Mobile communications) and
- microwave technology (DSRC: Dedicated Short Range Communication).

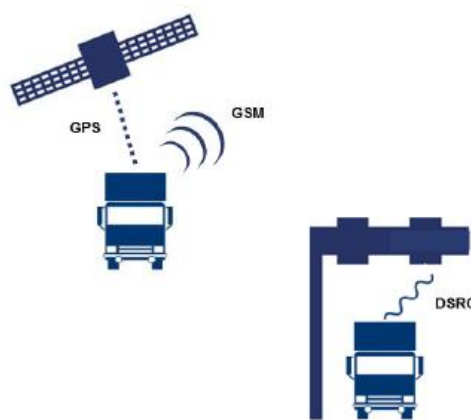


Figure 6: GNSS/GPS-GSM & DSRC system

Source: Dr. Schierhackl, 2012, p. 15

Both of these systems work with on board units (OBU): which “is a GPS-based tracking device [...] suitable for tracking the route travelled by the vehicle, as well as for forwarding this information to the logistic service provider.” (HU-GO.hu, 2013)

From the figure above it can be seen that in case of the satellite positioning (GPS navigation system and GSM networks), the satellite communicates constantly with the on board unit located/installed into the truck, which will send the information to the service provider of the current location of the vehicle subject to toll and the tolling will happen accordingly.

The DSRC system uses gantries which communicate with the on board units installed in the vehicle at crossing. There is no need to stop or slow down in any of the cases.

On the side of installation costs the DSRC system is more expensive while operating it is cheaper than the collection based on the technology of the satellite system. On the

other hand, the satellite system is more economical on main roads, while the gantry-system is more beneficial on motorways. (Portfolio.hu, 2012) The type of the implemented technology, though, not necessarily depends on the features of toll networks (motorways or main roads). In general, on the tenders there is technological neutrality declared.

In the following part I wish to introduce some of the operating systems in the country of Austria, Czech Republic, Germany, Poland and Slovakia.

3.2.1. Austria

On the motorways and expressways one has to pay toll since 1997 for vehicles up to 12 tons, for heavier ones there were already a similar system. On the 1st of January 2004, the distance based toll collecting was introduced for vehicles over a permissible gross weight of 3.5 tons on approximately 2,200 kilometres. The vehicles under this had to use the vignette system. (Schwarz-Herda, 2005) The responsible institution is the ASFINAG Maut Service GmbH.

The technological background uses microwave based DSRC (Dedicated Short Range Communication), a multilane free-flow system which was implemented in 18 months. Due to the communication between the toll gantries built along the road and the GO-Boxes installed in the vehicles subject to tolling. The GO-Boxes are on board units necessary to pay the toll. During this process, the toll is debited from the account of the user (according to payment terms agreed between the parties). There are nearly 800 gantries; from these points, several are used for enforcement purposes as well. Other enforcement stations – either portable or mobile – are employed against evaders.

In case of the Austrian system, there are three payment possibilities:

- pre-pay method: from the registered account the toll payable is deducted automatically during a crossing,
- post-pay method: by credit or petrol card,
- GO-Direkt: direct payment to ASFINAG.

Total revenue from the fully electronic toll payment by GO-box in 2011 was around EUR 1,062 million which – based on the EU directives – has to be spent on the road network. (Dr. Schierhackl, 2012)

Interoperability solutions

“Directive 2004/52/EC lays down the conditions for the interoperability of electronic road toll systems in the European Union. Interoperability shall enable road users to circulate

throughout the EU without having to be concerned by different charging procedures and without having to install equipment specific to the different charging zones, so that paying charges would be a seamless operation.” (European Commission, 2012)

The first implemented interoperability between toll systems of different countries had been achieved between Switzerland and Austria. Since the 1st January 2004, interoperability functions with the Swiss OBU, the TRIPON/EMOTACH. The Swiss Directorate General of Customs is responsible for the Swiss toll system. (ASFINAG, 2013d) This characteristic, which is highly appreciated and necessary, works under the following condition: the Swiss on board device should be installed into the vehicle and in order to the owner of the vehicle would be able to use the TRIPON/EMOTACH only if there is a contract concluded with the ASFINAG. (ASFINAG, 2013e)

The following step was to conclude such cooperation between Germany and Austria. As the traffic is significant between the two countries and taking into consideration that there are many firms which often use these networks, it was necessary sooner or later to have the interoperability realised. The Toll Collect GmbH's and the ASFINAG's offered service is available since the 1st September 2011. The method is similar to the Swiss one: the TOLL2GO OBU should be applied and registered. Then, an exchange of information and will be done by both of the toll operator and controls if the prerequisites are achieved. One should note that in Austria it is only valid for the post-pay method, thus by credit or fuel card. (ASFINAG, 2013a)

If the vehicle owner wishes, from the 6th November 2013 it is possible through the EasyGo+ service by the BroBizz A/S service provider by using the new on board equipment to pay the tolls in Austria, Denmark, Norway and Sweden. (ASFINAG, 2013b) This means, the devices applied should be replaced by a new one from the service provider. As this is such a new possibility, the new OBUs are only available from the Austrian and Danish toll service providers. (ASFINAG, 2013c)

I believe these steps for not using 5-10-15 or even more OBUs are crucial from the hauliers'. On the other hand, sometimes the costs of these advanced devices – naturally – higher, and if someone already possessed such equipment, and invested in them, it is not sure that they would consider replacing. The easiest and best solution would be to have only one or two OBUs, but the interest of service providers and nations are different, and these set the trends.

3.2.2. Czech Republic

The electronic toll system, the Myto CZ, in the Czech Republic was introduced in 2007 for vehicles above 12 tons maximum permissible weight, below the time-based vignette was in use. (Vladimir, 2008) Since the beginning of 2010, the vehicles weighing more than total 3.5 tons and buses are subject to e-toll and below an electronic vignette should be purchased. The length of toll roads had been increased during the years, at the moment one should pay on more than 1,300 kilometres including motorways, expressways and some first class roads, too. (RSD, 2011)

The technological background is similar to the Austrian solution: this is a microwave based DSRC, open, multi-lane free flow system. Toll amounts are not subject to VAT. OBUs installed in the vehicle are necessary for toll payments, and compulsory. There is a deposit of CZK 1,550 (around HUF 16,000, EUR 51) as a prerequisite and fully refundable. The operator is the Road and Motorway Directorate (Ředitelství silnic a dálnic ČR). (Mytocz, 2013a)

There are two payment possibilities (Mytocz, 2013c):

- pre-pay method: from an account the toll is deducted when crossing a gate, recharging of the account can be made by cash or fleet card at contact or distribution centres
- post-pay method: requires a contract with the toll system operator. During a travel, at a crossing the system makes a record of the route which will be invoiced later under the terms and conditions of the contract.

The enforcement is fulfilled with stationary gantries, portable and mobile devices by General Directorate of Customs of the Czech Republic. (Mytocz, 2013b)

3.2.3. Germany

In Germany toll is levied for vehicles starting from 12 tons of total permissible weight since 2005 on 12,000 kilometres of motorways and 1,000 kilometres of trunk roads. The toll is not subject to VAT. The operating system applies satellite positioning technology combining GPS navigation and GSM networks for the first time. (Toll Collect, 2013a)

The toll can be paid:

- manually:
 - by an online application,
 - on terminals by euroShell Card or Toll Collect cards, and
- automatically by using OBUs.

In case of the German solution of the e-toll, it is possible to book a trip and pay the toll accordingly and the Toll Collect gives the option of cancelling the trip booked. If one decides not to use the toll roads right away after the booking it is free of charge (within 5 minutes). If a part of the trip should be deleted or even an entire route, but later then the period mentioned above, then a charge of EUR 3 is payable for such a transaction and can be done at the terminals. (Toll Collect, 2013b)

One does not purchase the OBU, it remains the property of the Toll Collect GmbH, however, costs like the installation, removal of OBU, changing vehicle data, etc., which borne by the user. (Toll Collect, 2013c) The Toll Collect GmbH is in charge of toll collection. The Federal Office for Goods Transport (BAG) is the responsible body for enforcement which is made automatically through fixed control bridges and mobile devices. (Toll Collect, 2013d)

There is interoperability solution between Austria and Germany which is getting more and more popular among the road users.

3.2.4. Poland

In Poland, the viaTOLL e-toll collection system had been launched in 1st July 2011 for the vehicles weighing more than 3.5 tons as well as for buses on 1,890 kilometres. The toll is collecting by using DSRC system. This has been extended to now an overall 2,130 kilometres.

The Polish on board devices is called the viaBOX which is an essential part of the automatic toll collection which is done by using gantries as in the cases mentioned before. The operator of the system is the General Directorate for National Roads and Motorways (Generalna Dyrekcja Dróg Krajowych i Autostrad). (viaTOLL, 2013a)

The Road Transport Inspectorate fulfils controlling tasks during the toll collection. In Poland, apart from the enforcement devices installed in the gantries, other mobile and portable units support the control. (viaTOLL, 2013b)

In terms of payment – as well as in the other cases – there is an opportunity for pre-, and post payment. In both of the cases a minimum deposit of PLN 120 (around HUF 8,000; EUR 26) is required for each viaBOX. For pre-payment an account is needed, the amount will be deducted according to the trip travelled. Post payment is available by signing a contract at the Customer Points or with registered fleet card suppliers.

In the first year of operation, the toll collected was more than PLN 815 million, which is amounted around HUF 52 billion (EUR 170 million) (viaTOLL, 2012).

3.2.6. Slovakia

Since the January 2010, on 2,400 kilometres of the Slovakian road network (motorways, expressways, and roads) the vehicles with more than total weight of 3.5 tons and vehicles adequate the transportation of more than nine persons including a driver are required to pay electronic toll for road usage which is subject to VAT. (SkyToll-Myto, 2013a) The operator of the toll collection is the SkyToll a.s.

The technological background entails GPS-GSM satellite system which requires sections to be determined. Toll collection is carried out by using OBUs here as well. From the 1st October 2013 the only possibility for declaring toll is through the on board devices, ticketing was in use till 30th September 2013. (SkyToll-Myto, 2013b)

Payment methods are similar to the previous ones: prepayment (registered account) and post payment (fleet cards, contracts).

Enforcement activities are conducted mainly by the police using devices as mentioned before: mobile, portable equipment.

Last year (October 2012 – October 2013), an amount of EUR 15.56 million was received from toll collection. (Bódis, 2013)

4. ROAD TOLL IN HUNGARY

During my research, I had the opportunity to interview three professionals from each side:

- state:
 - state-owned corporation's manager,
- road haulage:
 - the Chairman of the Ethics Committee in the Hungarian Road Transport Association (MKFE – Magyar Közúti Fuvarozók Egyesülete),
- associate professor.

Thanks to these interviews, I could gather additional information for my topic, further opinions and recommendations of the road tolling system in Hungary from different point of views. Moreover, I attended the E-toll Benchmark Conference of Hungarian Logistics Association (MLE: Magyar Logisztikai Egyesület) on the 30th September 2012, where other participants of this sector presented their findings and impressions. These primary sources were used primarily in this section.

In this chapter, I wish to present how the road tolling system formed during the years in our country, then review the milestones, introduce the system itself and the events shaping the distance-based tolling.

4.1. PAST AND PRESENT OF ROAD TOLLING IN HUNGARY

Since the importance of transport of goods on road was not substantial, impose taxes for road usage was not necessary. As we could read above, starting from the end of the World War II, it won higher significance year by year. The first idea of introducing such tolls came into the minds of decision makers at the end of the 1980s which would have been required to be able to build more motorways.

After the change of the Soviet regime, the increased traffic caused damages into the road network, without necessary financial background, could not have been corrected or extended. In 1989, the first vignettes were already prepared for the road users, however, due to the society's "power", it did not happen.

In order to be competitive on the market and to develop the road network, the following years came with the solution of involving private capital into the road network construction. This way the motorway M1 Győr - Hegyeshalom section was created, and the M5 was renovated and extended. From the beginning of 1996, the tolling started on these sections with the aim of covering the costs of the investments, the operating

expenditures and the expected return on investment. The first operator of the toll collecting gates was the First Hungarian Concession Motorways Co. Ltd. (ELKMA Rt. - Első Magyar Koncessziós Autópálya Rt.) on the M1/M15, then Great Plain Concession Motorways Co. Ltd. (AKA Rt - Alföld Koncessziós Autópálya Rt.) became the responsible firm on some sections of the M5. The toll fees were so high – even though the concession contract determined an upper limit –, that these routes could not perform the expected revenues. By 1999, the operator company ELKMA went bankrupt, hence the state had to buy it out: the West-Hungary Motorways Co. Ltd. (NYUMA Rt - Nyugat-Magyarországi Autópálya Rt.) this way was established. The AKA could function only by state operating support.

Seeing this system is not satisfying and the situation of traffic worsened, changes had to be introduced hence in 1999 on the motorway M3 the flat rate tariff system with vignette solution started to work. In 2000, it extended to the M1 and M3, in 2003 to the M7 then in 2004 to the M5 motorway as well. The gates used in the previous system played the role of vignette selling and enforcement. In 2002, an electronic system started to be built, although the gates were not enough to be used as controllers, therefore these were demolished. Controlling purposes were fulfilled by mobile devices. The goal of the charging policy was that from the collected amount the operating, maintenance and renovating costs of motorways had to be financed. The expenditures of network's other parts had been covered from the state budget.

2007 came with a new step in the evolution of the Hungarian road tolling by extending the payment obligations to 42 main roads cannot to be avoided by the transit for the vehicles above 3.5 tons gross weight. Thus, the electronic vignette, time-based, system was in force until 2012 on 1,632 kilometres, from which 1,170 kilometres were motorway. (Közlekedésfejlesztési Koordinációs Központ, Díjstratégiai Iroda, 2009) (Dr. Mészáros, et al., 2012)

Table 1: Charging in the e-vignette system (gross HUF) from 2012

D1:	motorcycle and vehicle up to 3.5 tons gross weight including trailer				
D2:	vehicle from 3.5 to 7.5 tons gross weight including trailer				
D3:	vehicle from 7.5 to 12.0 tons gross weight including trailer				
D4:	vehicles not listed in the previous categories				
Category	1-day	4-day	Weekly/ 10-day	Monthly/ 30-day	Yearly/ 13-month
D1		1,650*	2,975	4,780	42,980
D2	3,375		8,255	13,970	123,975
D3	3,375		12,600	20,370	184,985
D4	3,375		15,875	25,785	234,950

Source: Own edition based on data from Útvonaltervező.eu (2012) and Közlekedésfejlesztési Koordinációs Központ (2011)

Due to our EU membership, our country has to apply to the legislative background of the integration, so the distance-based, fair road tolling system should be introduced sooner or later. In 2009, when the White Book: The Hungarian road pricing policy guidelines for 2020 were made by the institution of the Hungarian Transport Administration (Közlekedésfejlesztési Koordinációs Központ), the critical point were elaborated and was ready for decision-making but the issue remained dormant. However, it was not forgotten by the professionals, neither by the academics.

In 2004, Excessive Deficit Procedure (EDP) against Hungary started. The Treaty of Maastricht “obliges Member States to comply with budgetary discipline by respecting two criteria: a deficit to GDP ratio and a debt to GDP ratio not exceeding reference values of 3% and 60% respectively, as defined in the Protocol on the EDP annexed to the Treaty.” (Eurostat, 2012) The procedure includes several steps, in some cases, sanctions which may “motivate” the nation for improvement. (Eurostat, 2013)

The processes accelerated when the European Commission announced “EUR 495.2 million in cohesion fund commitments suspended” starting from January 2013, which is the result of long-term EDP, not meeting the requirements. (Council of the European Union, 2012)

The electronic distance-based road toll could mean a new a significant financial source for the state, which may put an end of the EDP and at the same time the compliance to the Directives would be fulfilled.

* The 4-day ticket was valid in 2011, in 2012 it had been terminated.

The decision had been made, and the governing Act and Ministerial Order was released on the 31st May 2012. In 2013, January it was not possible for the heavy vehicles (above 3.5 tons gross weight) to purchase yearly e-vignette. The overview of the operating system is presented in the next subchapter.

The government had serious economic targets to reach on time; therefore the electronic toll system had to start its operation on 1st July 2013.

In the fall of 2012, the State Motorway Management Company Ltd (SMMC) posted a public procurement tender for the activities of planning, construction and one-year long support with the date of launch of 1st July 2013. In spite of the short time and the accelerated procedure, numerous applicants competed. In the finish, on 15th December 2012, four of the competitors left, and the winner became the Geotronics Hungary Co. Ltd. with an offer of net HUF 34.89 billion.

In case of public procurement, if the second place is not announced, in case of not concluding the contract with the winner, it is not possible to negotiate with the second. In this tender, only the winner had been announced, but it was obvious that the T-Systems would have been the second.

The first date of contracting was declared for the 27th December 2012 which was postponed to the 15th January 2013, but the Geotronics asked for additional time to negotiate with its subcontractor. The firm got 30 days, however, three days later the Geotronics notified the SMMC that due to unusual market pressure withdrew from the tender. (Portfolio.hu, 2013)

As the second place was not announced, and there was not enough time for posting a new public procurement tender, and to evaluate, the government - insisting on the deadline – decided under state implementation. (Mandiner, 2013) Different advocacy organizations were trying to postpone the introduction of the toll, as in other countries years are required for installing such a system.

An idea for the proper solution for the problem came from the Clean Air Action Group (CAAG) (Népszabadság Online, 2013) who stated that thanks to the EETS system, it would be possible to join the Slovak toll system. This way, there would be no need for the installation and benefits were on both sides.

The winner of the tender for building the toll system conducted by the National Information and Communication Service Co. Ltd. was the i-Cell Ltd. and the contract was signed on the 19th April. (Kapitány Szabó, 2013)

Establishing such a system would need more time than 2 and a half months, but the deadline could not be changed. The enforcement gates and cameras, however, were not ready completely, but the system had been launched.

4.2. THE HU-GO SYSTEM

As of 1st July 2013, the electronic distance-based toll system started in Hungary. The sections where the heavy goods vehicle with a maximum total permissible weight over 3.5 tons are obliged to pay the toll is composed of motorways, highways, and main routes on a total of 6,513 kilometres. Vehicles below 3.5 tons of gross weight must use the e-vignette system.

The technological background, which is based on satellite positioning, GNSS, the road network had been divided into 2,075 toll sections at the introduction. In November in compliance with the request of associations the network of total toll roads decreased by 13 kilometres, to 6,500 kilometres and the toll sections increased to 2,243 to establish the more adequate tolling system and to achieve the more road usage based collection. (MTI, 2013a)

The three vehicle categories and the amount of the toll payable in each category according to emission classes are shown in the Table 2 below. Analysing the data, one can notice that the only preferable category A is starting from the Euro III emission class. This classification was elaborated in accordance with the domestic vehicle types. In the Hungarian domestic haulage market the tools are obsolete. Firms with profile of international transport are now not beneficiaries since their vehicles are usually more modern, Euro V or even higher categories.

Table 2: Categories and toll tariffs, gross price (with VAT of 27%)/kilometres, HUF

J2	Total permissible weight over 3.5 tons and with 2 axles					
J3	Total permissible weight over 3.5 tons and with 3 axles					
J4	Total permissible weight over 3.5 tons and with 4 or more axles					
Environmental Protection Class	J2 category		J3 category		J4 category	
	Motorway	Main route	Motorway	Main route	Motorway	Main route
$A \geq \text{EURO III}$	42.42	18.05	59.52	31.24	86.70	54.08
$B = \text{EURO II}$	49.90	21.23	70.02	36.75	108.38	67.60
$C \leq \text{EURO I}$	57.39	24.41	80.52	42.26	130.06	81.12

Source: HU-GO.hu, 2013

The parts of the system consist of the central HU-GO system which the following tools are joined to (Varga, 2013):

- EETS service providers,
- EETS on board units,
- GPS equipment,
- Prepaid ticket,
- for enforcement:
 - 101 fix control gates
 - 45 mobile control vehicles,
 - 60 police car,
 - 17 frontier inspection station.

The Toll Charger (TC) and the Bound Service Provider (BSP) was the SMMC Co. Ltd. As of 1st November 2013 – in accordance with the Government Decree 1600/2013. (IX. 3.) – the Hungarian Public Road Non-profit Co. Ltd. has taken over the State Motorway Management Company Ltd.'s public road management activities. From now on, the National Toll Payment Services Private Company Limited By Shares (NTPS) is responsible for toll collection and inspection. (MTI, 2013b)

To the BSP different service providers (SP) may join who carries out the toll collecting (through OBUs) and transfer the data and amount to the BSP. SPs can be fleet management firms or fuel card providers who are contractual parties with the BSP.

The Police are responsible for enforcement which is conducted continuously without a need for the stop the vehicle ensuring the obstacle free traffic by applying the aforementioned tools. The unauthorized use of roads (administrative infringement) entails a fine of HUF 140,000 to 165,000 (EUR 470-560).

Reporting the road usage can be done either by purchasing prepaid ticket each time for a given route (for occasional users and transit), or through an SP by using OBUs (for regular users). Buying a prepaid ticket is possible via internet (www.hu-go.hu) or at sales points (20 customer service offices, 3 key selling points, 940 reseller selling point from which 800 is petrol station, 300 BSP kiosk, 100 kiosk at resellers).

There are three ways for payment:

- Immediate payment: only for those users who does not have account,

- Pre-paid payment with accounts for users: during the registration an account is created, where an amount should be paid to. The toll payable will be deducted continuously from this account according to the road usage until the account last.
- Post-pay mode: possible by special contract with SP (today the payment term is usually 15 to 30 days by fuel cards).

Comparing the toll payable today to the time-based e-vignette system, a substantial cost increase appeared for the users: before the e-toll a lorry could travel unlimited amount of kilometres a day for HUF 3,000 but today's fairer system obligates to pay as much as road usage actually occurred.

To illustrate how the HU-GO works and the differences between the vignette and e-toll systems, a calculation was prepared based on a sample purchasing of a prepaid ticket. The HU-GO is adequate for simple calculations, too.

For the following example a Euro III emission class vehicle was used with a total permissible weight of 40 tons to travel from the border crossing of Hegyeshalom to Röszke. This route was selected because it represents the differences properly and equally for the domestic, international and transit users of the roads. I chose the Euro III category because this is the most frequent vehicle used in the inland transport and selecting an upper class truck would not change the anything in the amount of the toll to be paid, tough, knowing that in international relations generally more modern fleet carries out the journey.

The Table 3 below shows what exact data was used during the calculation (filling the fields with the sing × is obligatory). The distance travelled is assumed to be the same in both systems. The vehicle category does not require as much information for the computation in vignette system as now the HU-GO does. It is supposed that the truck purchased a daily ticket for gross HUF 3,375 (as seen in Table 2). This entitled the driver to use the motorways and some roads unlimited for one day. The daily ticket was selected for the comparison because it was relatively rare to buy yearly ticket. The most frequent could have been the monthly ticket. One has to take into account the agricultural seasonality, etc. Transit usually bought daily ticket as well.

Table 3: Example for toll calculation

Data required	HU-GO	Vignette
<i>Vehicle Category</i> ×	J4	D4
<i>Euro Category</i> ×	Euro III	
<i>Width</i> ×	2.5 m	
<i>Height</i> ×	4 m	
<i>Length:</i>	17 m	
<i>Total weight</i> ×	40 t	
<i>Axle weight:</i>	11 t	
<i>Full distance:</i>	342.08 km	
<i>Motorway:</i>	307.11 km	
<i>Main road:</i>	1.57 km	
<i>Total Cost (gross):</i>	HUF 26,713	HUF 3,375
<i>Total Cost (net):</i>	HUF 21,034	HUF 2,657
Difference:	Net HUF 18,377	

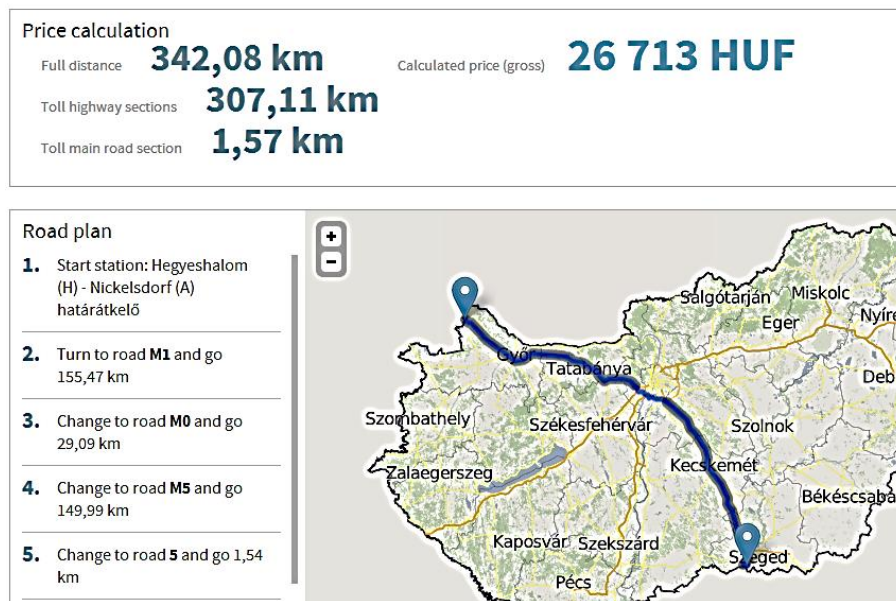
Source: own edition, 2013

The table shows using the previous system of vignettes were much easier as a regular road user had to purchase the ticket once which was valid for a given period. The calculation did not require further data than the total weight of the vehicle and the category. The result shows that the road users pay significantly more. Comparing to the daily ticket the toll is almost eight times more than before.

To sum up: the freighter pays approximately (gross) HUF 23,000 more electronic toll for a given trip from Hegyeshalom to Rösztke, from the 1st July than before the introduction for the potential unchanged amount of revenue expecting from the partner after 30 maybe 60 days ceteris paribus. This is the main problem or challenge for the freighters in Hungary had to face with. This toll was a long-needed provision supported by the entire road transport sector but this high fee level multiply exceeds the expectations.

The HU-GO system also shows the information pertain to the trip: a map of Hungary shows the route plan, on the left side of the screen instructions describe where on a chosen language where to go (see Figure below).

If the calculation is right and the trip is accepted, the further step (if we talk about purchasing a prepaid ticket) is to control the data entered and then to pay the toll. If a ticket is bought, and not used up there is no possibility for reimbursement. If there has to be a change of route during the trip, a new ticket should be bought the same way. The older ticket for the chosen sections cannot be refunded either.



Source: own screenshot, hu-go.hu, 2013

Figure 7: Example for toll calculation via HU-GO

Many websites and programmes are available today for toll calculations, but I would advise to use the HU-GO calculator, as this gives the exact and official data. Due to false calculations several misunderstandings may occur which may further complicate the processes, negotiations with partners what can be avoided by using official information and data. The website is available on several languages, however, still today, international freight companies are not aware of the system neither do those who travel to Hungary frequently. They do not know the opportunities, such as using the OBU instead of purchasing ticket every time. This both indicates the improper preparation from the side of the international road user, and can be derived from the poor communication to the international area.

The HU-GO system is improving continuously to serve the needs of the transport sector in a more adequate way.

4.3. COMPARISON BETWEEN THE HUNGARIAN AND THE EUROPEAN SOLUTIONS

In the chapter 3.2, Road toll in the countries of Europe, the features of several electronic toll systems in operation has already been discussed. Table 4 is aimed to represent the most important characteristics of tolling system in the analysed nations: Austria, Czech Republic, Germany, Poland, Slovakia and now, after the overview of the HU-GO, Hungary.

Among the Central and Eastern European countries there is a constant competition which is derived from the common historical background, the similar endowments, and these states joined the European Union in the same year in 2004. Hence the Czech Republic, Slovakia, Poland and Hungary could adopt the e-toll later than Germany and Austria. Nonetheless, Hungary does not lag as the other 6 countries have not implemented the electronic tolling system; however, our biggest competitors adopted these rules years earlier.

The Hungarian electronic tolling system is most similar to Germany and Slovakia in the sense of technological backgrounds. Each of them operates by using a satellite system. The other half of the examined countries collect road toll through gantries by working with the DSRC system.

The extensions of road networks, which one has to pay the tolls on, differ greatly. This peculiarity comes from the diversity of the road networks among the countries: the size of the entire public road network cannot be compared to each other as differences in the territories of these Member States are huge: Poland lies on an area of more than 320,000 kilometres², while Hungary only on approximately 93, 000 kilometres². (World Bank, 2013) The geographical features should be taken into consideration: for instance the mountains highly determine how the road network looks like, etc. It is notable that despite the aforementioned features the 2nd longest toll road network is the Hungarian with 6,500 kilometres, after Germany's 12,000 kilometres of motorways and 1,000 kilometres of roads. One can state that the Hungarian road toll possesses the most extended toll network among these nations.

Table 4: E-toll in Europe

	AT	CZ	DE	PL	SK	HU
<i>Year</i>	2004	2007	2005	2011	2010	2013
<i>Technology</i>	DSRC	DSRC	GPS-GSM	DSRC	GPS-GSM	GPS-GSM
<i>Toll roads (km)</i>	2,200	1,300	13,000	2,190	2,400	6,500
<i>Weight</i>	3.5 t +	3.5 t +	12 t +	3.5 t +	3.5 t +	3.5 t +
		bus			bus	
<i>System</i>	GO-Box	Myto CZ	Toll Collect	viaTOLL	Sky Toll	HU-GO
<i>Interoperability</i>	Yes		Yes			

Source: own edition, 2013

The table above also shows what is the minimum permissible weight limit which one is obliged to pay toll from on the given roads. In Germany the toll is payable for

vehicles above the total weight of 12 tons, while in the other cases this limit is 3.5 tons. In the Czech Republic toll vehicles also include the buses, in Slovakia vehicles which are able to transport more than 9 people have to pay as well.

Each country uses its own toll collection system which determines which type of on board equipment should be used as well. Between Germany and Austria there is interoperability by using the Toll2GO on board unit. Today, the other countries fail to adapt to this principle, however each of the systems is open, and thus the opportunity is given. (This is also regulated by the directives). The Clean Air Action Group in Hungary saw the opportunity of joining to the Slovakian system, but after all, this did not happen.

To get a more sophisticated view of the differences of the tolls the tariffs should be analysed. As the countries have different fee structure as well as vehicle classification, this comparison is not easy to make. For instance, the Polish system does not categorise the vehicles according to the number of axles, it is only based on the weight. All the others use the weight – axles – greenhouse gas emission (GHG) classifications to determine the different fee levels. I believe without seeing the tolls next to each other, the comparison cannot be complete, therefore I attempted to prepare a table containing the tolls of these countries (see Appendix 1), and then to make a graph for visible illustration, what can be seen in Figure 8. In the Appendix 2 the exact data of the toll and the average toll levels are included.

Note, that Hungary, the Czech Republic and Poland are not members of the Eurozone; therefore, deviance may occur due to the continuous fluctuations of the exchange rates. In each of the cases the official middle rates of exchange were used valid for 15th November gathered from the National Banks of the states. (Czech National Bank, Magyar Nemzeti Bank, and Narodowy Bank Polski, 2013)

The chart presents the tolls only in motorways, because in every nation the motorways are subject to tolls. To further support the easy readability, the data is given in Eurocents. The selected vehicle category is the truck with 4 axles; in case of Poland the equivalent are the vehicles above 12 tons. The main reason for choosing this type of vehicles is that in internationally, around 80% of the e-toll is paid by truck with 4 axles.

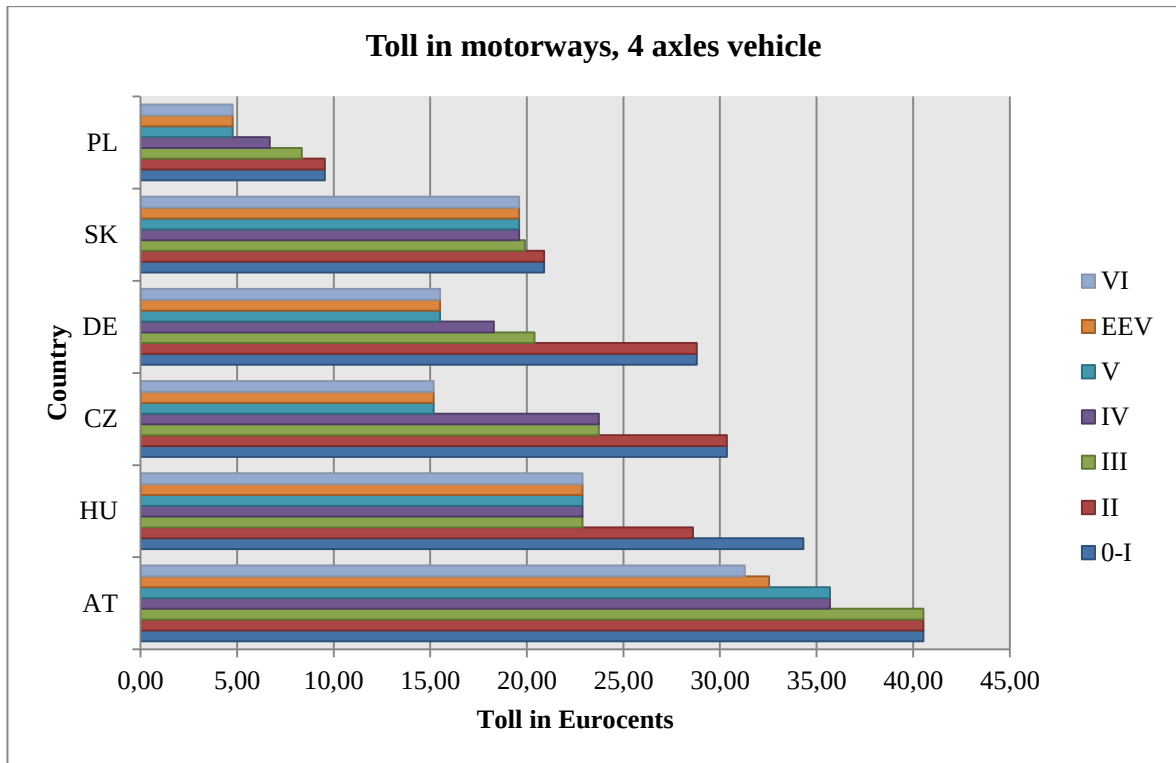


Figure 8: Road toll tariffs on motorways, vehicle with 4 axes, in net Eurocents, 2013[†]

Source: own edition, 2013

The figure shows the differences among GHG emission classifications and the related toll fees. In Poland, despite of the fact that the fees do not differ from each other substantially, those vehicle owners who transport the goods with Euro V trucks may enjoy a discount from the toll. On the Austrian motorways, preferable vehicle category is starting from the Euro IV trucks. In Slovakia, the situation is similar however there are no significant differences among the environmental categories. The German charges determine the Euro V as the lowest limit of the favoured trucks, the Euro IV and maybe III can be considered as middle class, but there is a large deviation which shows: in Germany if one drives Euro II or older vehicles, a price have to be paid. The Czech toll collection enumerates the Euro III and VI vehicles into the middle class. The Euro V category commences the preferential vehicles' list being significantly cheaper than the others. Hungary, in this context is lagging behind. Pursuant to the situation of the domestic distribution, only the Euro III vehicles are prioritized while the other Central and Eastern European states uses more modern vehicle categories which implies more modern fleet.

[†] Exchange rates used: see Appendix

The EU guidelines set a maximum price which can be imposed as toll as well as the way to calculate depends on features and costs of the Member State and its road network.

In addition, from the Figure, the most expensive toll level is easily readable which the Austrian. To determine the next, the Table 5 shows a help with the average tariff level.

Table 5: Average toll levels, vehicle with 4 axles, in net Eurocents, 2013

Country	Average - motorway	Country	Average - other toll roads
AT	36,7	HU	16,4
HU	25,3	SK	14,8
CZ	22,0	CZ	11,7
DE	20,4	PL	6,2
SK	20,0		
PL	6,9		

Source: own edition, 2013

In accordance with the calculation, Austria is the “winner” with an average of EUR 0.367. In the most favourable emission category, in Euro VI (EUR 0.313), the toll is just slightly lower than in the costly and obsolete Hungarian Euro I (EUR 0.316). On the second place from the top the Hungarian toll is standing with an average of EUR 0.253. The other toll rates are quite similar, but in average toll level, the differences can occur due to the exchange rates, in this category with EUR 0.220, is the highest in case of Czech Republic which is followed by Germany (EUR 0.204) then Slovakia (EUR 0.200). The cheapest is the Polish toll with an average tariff of EUR 0.069.

The structure of GHG emission is similar in case of the other toll roads to the ones used at the motorways. The Table 5 also presents the average toll levels at the main roads. The figure shows that Hungary leads the list in this case followed by Slovakia. The DSRC technology based Czech Republic and Poland closes the row. An interesting fact can be observed: the toll levels in case of the motorways are almost twice as high as at the other part of the road sections. The only one state which has similar toll level on both sides is Poland with a slight difference of 7 Eurocents.

There are several other facts which can be taken into account:

- The quality of the road network;
- Is the toll subject to VAT?
- Cost of operation of the road network (different level of salaries, etc.)
- The substitution possibilities (by finding new routes), etc.

The Hungarian toll solution has set the standard high in terms of prices and extent, but there are still factors to improve, to catch up with the other states' tolling system.

4.4. REACTION OF THE ECONOMIC PLAYERS

Before the concrete introduction of the road toll the hauliers and the associations accepted the idea. The other non-Hungarian transport companies were not interested in the road damages and air pollution they caused. The price of the road usage was the lowest in our country compared to the nations of Europe, however the now charges in force are excessive.

The organizations hereby aimed at notifying their members of the events and processes and their results constantly through newsletters and conferences since 2009. One significant obstacle hardened the information providing that enough data concerning the cost of such toll was not available, there were only speculations. The improper communication from side of the government, unfortunately, did not support the transporters.

When the decision had been made, a series of lectures and conferences were held across the country mainly in May and June of 2013 in order to help the firms preparing for the change with great impact for the financial liquidity.

On the 1st July different problems occurred in consequence of the short time period allowed to the installation and not having a test period. Different breakdowns hindered the toll collection; many times the system had to be shut down with reference to overload attacks. The first month of the e-toll was not event-free, but for August the system more or less normalised.

Continuous discussions and negotiations took place between the government and the associations with regard to the problems occurred as follows:

- overbilling,
- lack of accuracy in section designations (due to the improper map given to the i-Cell Ltd),
- late installations: prepaid tickets tools and gates,
- delay in the introduction of the loan with preferential interest rates, furthermore accounting problems concerning the loan.

On the other hand, the e-toll may encourage the Hungarian entrepreneurs to improve their performance by the support of the route planning. If a firm wishes to stay on the market, calculations have to be made such as:

- modelling,
- running occupancy,
- quantifying and reducing the empty runs,
- examination of the distance travelled in Hungary,
- there is no official standpoint yet from the side of the NTCA (National Tax and Customs Administration of Hungary as known as NAV: Nemzeti Adó és Vámhivatal) in the issue of further invoicing the e-toll towards the customers etc. (E-útdíj Benchmark Konferencia, 30/09/2013)

Different measures for enhancing competitiveness were elaborated during the 4 months. Some say these are compensations for the freighters, however it is not true. Only for the Hungarian freighters for vehicles with Hungarian license plates competitiveness strengthening possibilities are available.

One of these is the Road toll loan programme, which is a revolving current assets credit which was almost two months late; it was available from the 20th August. The delay of this support caused that many freighters had to stop. The preferential credit, after several changes of the interest rates, is not cheaper than the general credits offered by banks. Based on the calculation of Nagy (2013), the total cost in case of HUF 1 million along with supplementary costs is HUF 104,500, 13.5%. Borrowing this loan is quite complicated as it requires more administration than at a bank.

The second provision is that from the business tax the 7.5% is deductible of the e-toll recognised as an expense in a fiscal year. Unfortunately, this amount is lower than the expected and demanded by the associations. The Hungarian Chamber of Commerce suggests expanding this: not only the inland toll should be deductible but also, in addition, 7.5% of the toll paid internationally as well to improve the competitiveness. (MTI, 2013c) The fierce competition of the road transport does not permit to increase the freight charges which impede the improvements in the sector hence the reduction of proportion of tolls may foster the processes.

The third support from the side of the state entails vehicles with bumper bags equivalent with vehicle suspension system. These trucks deteriorate the roads less than the others therefore to promote this feature the motor vehicle taxes are mitigated in these cases. In every 100 kg the cost is reduced by HUF 350 which annually may reach a savings of HUF 100,000. (mfor.hu - MTI, 2013)

During the discussion both parties, the organizations of the interest groups and the government, were partners to elaborate solutions for the occurring matters.

The first impressions of the European Union to the Hungarian electronic toll system were not positive. The European Commissioner for Transport, Siim Kallas stated that first of all, the Hungarian toll is not in compliance with the EU legislation and its rate exceeds the allowed amount. (Landry, 2013)

Secondly, the system had been launched before the obligatory Union opinion making which should have been carried out 6 months before the introduction. The Ministry of National Development notified the experts of the Union, and the tariffs were calculated in accordance with the Directives. (MTI - VG, 2013)

4.5. EFFECTS

During the four months of operation of the electronic distance based toll in Hungary short term effects are already perceptible. The goal of the subchapter is to give an overview the influence of the toll and how different economic players treated the occurring challenges arising from it. Therefore, the three subgroups are analysed: firms, states and last but not least the consumers.

4.5.1. Firms

One has to make difference between the firms whose profile is haulage and companies who fulfil transportation on their own account. In this part those firms will be mentioned as well which outsource their transport activity.

4.5.1.1. Hauliers

In spite of the fact that only a short time period was available, most of the freighters could prepare for the toll. The preparation involved different approaches, pre-calculations, informing the partners, foundation of an 'action group' whose aim was – in the beginning – to register the vehicles to the system, and then follow the operation and solve the problems; or purchasing more modern vehicles (Világgazdaság, 2013); developments, etc. These were necessary steps.

After the introduction, soon the issue of a significant increase in costs occurred, as the toll has to be paid right away. One can say that the firms give loans to each other; it is not surprising that the companies pay for 30-60 days, and the late payment should be considered, too. This has a significant impact for the finances and liquidity which is now worsened due to the unfavourable payment method of the toll. If the carriers are not able to pay the toll, they either have to stay at home with their trucks or borrow current assets loan. Unfortunately, during my internship I could experience from my colleges that this is a serious and exiting issue. There were a few cases when one of the subcontractors had to

stop simply because they ran out of cash and so could not refuel. The option of the loan could be useful, but if a company would like to borrow a loan for current assets, that firm is in a quite difficult situation, especially nowadays. However, in order to help the firms, a Road Toll Loan is available and supported by the state.

But how much is the amount of this cost increase? This raise is in case of international haulage depends on the Hungarian road sections travelled, but as an average of 4-4.5% raise can be observed, on the other side, during domestic freights it is between 23 to 25 %. (Budai, 2013)

The Hungarian transport firms are unable to finance this degree of cost increase, so they have to pass on the cost to their partners. The strategic partner of the government, the Waberer's International Ltd. announced that they will pass towards its partners this cost. (Index.hu, 2013) After long discussions and negotiations, based on the experiences of the hauliers, 90% of the partners accepted to further invoice this cost, but one should be aware of the fact that some of these would validate this expenditure in their prices (see: chapter 4.5.1.3). Many experienced this as freight rate growth, but this is not the case, since the primary aim is to keep the same level of competitiveness. At the beginning, the freighters had to contain the toll in the invoices towards the partners as both of the parties demanded this information for further analysis. This is not a novelty, as in international haulage in case of different tolls it is a common practice. Although, accounting misunderstandings occurred in this process which hindered the transparency among the expenditures (see previous chapter). By today, the tendency has changed. Not only the freighters, but the consigners ask for 'all in' price during the request for quotations or tenders.

Due to the lack of test period other questions remained unanswered which are related to the finances as well. For a given lorry, an overall statement is received only once in a month which is composed of all the tolls and sections delivered and paid of a given period in general in pdf. The associations demanded to modify this policy and asked for statement for single routes or periods and a change in format to support the analysis processes. It seems to be corrected as the government is willing to reform these rules. The NTCA also looks after this modification for controlling purposes. (Nagy, 2013)

The Hungarian vehicle fleet, as mentioned before is old. The vehicle classifications will compel the hauliers to adapt to the new challenges and to invest in trucks, which are more environment-friendly and safe. Though, the categories are not in compliance with the other European countries' classifications: most of the cases the Euro II and III vehicles are the non-preferable trucks on the roads consequently the fee for the road usage is

higher. Firms, which carry out international transports, lay particular emphasis on this issue as they possess mostly vehicles in Euro V categories which are demanded in Western European relations. Those vehicle owners who have invested in new and more modern trucks are not rewarded for less GHG emissions. An increase in demand is expected for the category Euro III on market of heavy vehicles. One should take into account that from 2014, trucks in Euro VI emission category can be ordered from the manufacturers. If there is a change in the vehicle classifications in the future, it may harmonise the system, though such a change may bring with itself toll increase to be able to achieve the amount of government target.

The toll also obliged the companies to invest in OBUs which is also an additional cost. All over Europe, the different tolls requires different OBUs, even if it is not obligatory in some cases to purchase them. Consequently, it is not surprising that there are more and more devices collecting the tolls from the road users. The Hungarian e-toll is based on an open system, thus there is opportunity for interoperability. However, different interests are usually the main obstacles in installing a common system to achieve this aim. Fortunately, the number of service providers is increasing and the vehicle owners may choose from numerous possibilities now. They may also offer additional services which could support the more effective operation of the firms.

The e-toll entails the prospect of market clearance in the transport sector. The companies realised that without the improvement of their performance this increased cost level can stop them from operation. This is what the market experience at the moment: the number of freight tasks are the same but the amount of trucks to carry out them are less and less. According to the presentation of István Galambos (2013) at the E-toll Benchmark conference, around 400 freight company closed the door in this period. One should note that the as sole reason the introduction of the e-toll, but it is true, having an impact of 25% cost increase is not necessarily tenable for firms less competitive and capital endowed. Small and medium sized enterprises (SMEs) had to face this challenge. The role of the freight organization, for large companies and SMEs equally, has become more important, the carriers strive to reduce the empty runs during the trips. Cost-effectiveness can be the key.

While the e-toll have a substantial impact on the liquidity of freighters, it may have a beneficial effects which is at the moment cannot be measured by quantitative methods only by the experiences of the professionals: this is the issue of the international vehicles employment in import and export. Many observed that there is a slight decrease in

international vehicles working in Hungary; consequently more tasks could be fulfilled by the Hungarians since the number of freight tasks to be done have not decreased. Some carriers do not wish to come to Hungary because of the implemented e-toll, and try to find new markets. Transition in transit is not expected because using the motorways is still shorter and faster than a detour as well as cheaper after all (conditions have to be taken into account inter alia: driving time and salary of the driver, costs of fuel, etc.)

Due to the ever expanding inspections the unauthorized transport decreases constantly. At the introduction every third truck driver did not pay the obligatory toll, which reduced to 2.5%. (MTI, 2013d)

4.5.1.2. *Own account undertakings*

The second group of firms who fulfil the transportation themselves and it is not their main profile. They also do have to rethink their interests. For them, before the e-toll it was more efficient and probably cheaper to deliver the products and materials on their own. In this new situation many of them should consider new possibilities regarding the transport and logistics activities.

They may outsource their transport activity (with long term contract with a service provider); continue the deliveries with rented vehicles and selling the fleet or even keep some trucks and parallel involve hauliers into the processes if needed. (Karmazin, 2013b)

Depending on which sector these operate in, the exact, measurable effects may differ but altogether the increase in transport costs can be observed. Relevant sectors are highlighted in the subchapter 4.5.1.5.

4.5.1.3. *Companies which outsource their transport activity*

Nowadays, outsourcing is a popular and an effective way to reduce costs and to focus on the main activity of a firm. From the cleaning of a building until different activities closely related to the main profile of the company can be outsourced to another firm which is professional in that field. Manufacturers usually use this method in case of the transportation, and maybe logistics as well.

Due to the e-toll, not only the question of deliveries should be analysed but also the complete logistics processes, including warehousing, purchasing, suppliers, etc. Transport companies these firms are contact with surely pass the cost of this toll towards what they may invoice forward or incorporate into their selling prices. Several questions may occur this time as follows:

- Does it worth to purchase in small quantities if the price of the product (spare parts, materials, etc.) already contains the toll?
- Should the selling price include the toll?
- Or a new distribution system would be feasible to establish?
- Tendering is possible way to find the most reliable haulier and work solely with that one.
- Maybe the transportation should not been outsourced completely –question of insourcing.
- Turning to other transport modes could be also taken into consideration (see next chapter), etc.

Regardless of which is the best case scenario for a given company, the Hungarian e-toll is surely a challenge for these enterprises, wholesalers, etc. as well. In a globalized world and as well as in Hungary large number of manufacturers sells their products in abroad which the transportation is essential for.

4.5.1.4. Intermodal transport

The Ro-La (Rollende Landstrasse – Rolling Road) in December 2012 stopped its operation in Hungary and with this more than 30,000 vehicle had to use the roads. (Segesvári, 2012) This is a combined transport mode supported by the EU whose essence is that the truck from the road is transported on railway thanks to which the congestion of the road decreases in line with the GHG emission. There are several other benefits of this transport mode; however, it was not successful in Hungary due to its high costs and slow speed compared to the road transport.

Before the launch of the e-toll, the Association of Hungarian Forwarding and Logistic Service Providers (AHFLSP) (Magyar Szállítványozók és Logisztikai Szolgáltatók Szövetsége - MSzLSzSz) suggested the revitalisation of the Ro-La which did not happen. (Szabó M., 2013)

According to the analysis of the AHFLSP, the intermodal transport can be competitive even without state support in this changed situation. Further developments, though, are required to eliminate the bottlenecks. (Iho, 2013) Around 5% of the road traffic could be transferred to the railways which would result in HUF 78 billion decrease in road maintenance expenditures as well as in 8.3 million tons increase of transported goods of the railway companies along with the revenues of the Hungarian Railways (MÁV). (Hungarokamion.hu, 2013)

After the 1st of July a change was expected by the professionals in this field of transport. By November one could see the effects. According to the analysis of the AHFLSP the road now, in some cases, is more expensive for instance: by using 5 and 10 container carriage train 200 kilometres from Budapest, and 10 container carriage group more on more than 180 kilometres, transport by train could be 25-40% cheaper than the road. (piacesprofit.hu, 2013)

The goods concerned are the mineral oils, steel products, fertilizers transport of which the proportion of road and rail are about the same. In other European countries a 2 to 6% raise were seen in goods transported by rail in medium term. In Hungary it would represent 3 million tons increase. (B. Horváth, 2013)

This transport mode could be more favourable if those heavy vehicles would exempt from the electronic toll in the area of the intermodal logistics centres in Hungary which deliver the goods to and from the centre. (MLBKT, 2013)

According to the research of the Világgazdaság daily (2013), most of the parcel delivery firms build into its prices the e-toll. The DHL Express takes this step because several heavy vehicles are involved in the distribution between the depots, in spite of the fact that the fleet is primarily consist of vans below the limit of 3.5 tons. The firm states arising from the features of the parcels, these expenditures are various, but overall it is a double-digit increase in cost. The DPD Hungária Ltd acts similarly: in case of domestic smaller parcels (0.1 to 50 kg) 4% while at pallet deliveries 28% is the extra charge. The Sprinter Express Delivery Service Ltd. implemented the same changes as the abovementioned two parcel delivery companies. Their calculations include 3.5% and 6% extra charge building into their prices which concerns only the basic freight rates depending on characteristics of the deliveries (Budapest and its surroundings, or countryside transports). Partners of these firms are primarily web shops; therefore, most probably these companies will entail the increased expense in their prices.

On account of the freshness of the topic official, exact numbers are not available, thus this issue would be subject of further analysis. I believe that – if necessary steps are taken – revitalising the combined transport could be achieved depending on the type of goods to be transported. The EU's Common Transport Policy's target is shift the balance between the transport modes significantly by 2020. On the other hand, the road, knowing its flexibility and door-to-door transport feature, will be more popular in the future.

4.5.1.5. Different economic sectors

The waste management firms perceived the effect of the e-toll in 15-20% in some cases even in 35% of freight cost increase.

In order to reduce this negative effect, the transport activities were aimed to further improve and optimise, and in addition vehicles falling into a lower fee category have been used. Discussions were held with the partners in this field as well, but yearly contracts which are valid for a full year could not be modified in many cases.

This sector is very sensitive to this cost increase as it requires a lot of deliveries in large weights or in large size, thus it concerns not only the heavy glass, steel or wood transport but also the relatively light but big-sized plastic as well along with the municipal waste transport. The National Association of Recyclers (Hulladékhasznosítók Országos Egyesülete – HOE) has already demanded the government to establish a discount for this sector as public tasks are carried out, however, no changes have been made in the issue. (ZIP, 2013)

The agricultural producers are exempted from the obligation of paying road toll whose 50% of annual revenue is derived from agricultural main activity. It is valid from the 1st July to 30th November solely between the headquarters/site and the agricultural land during the period of harvest but for maximum 30 days. An official certificate is required from the competent notary based on which the Bound Service Provider issues a free prepaid ticket for the given toll roads. (MTI Eco - VG, 2013) This is a notable alleviation for the agriculture which is still considered as a significant sector in the Hungarian economy. This way cost saved is unlikely will contribute the developments of technologies however it is a burning necessity. This facilitation is important and welcome, but the agricultural products need delivery not only from the fields to the centres of producers but also to the manufacturers, thus to the food industry.

Therefore, the following sector to be mentioned is the food industry. The food processing industry is in difficult situations, for many years now. The competition is fierce on the domestic market as many international suppliers are present and the different retailers, chains are constantly aiming to push down the purchase prices. Several taxes are levied to this sector as well as highly regulated which is coming from its nature. The crisis and the continuously low consumption with the unfavourable economic environment impede the possibility of the improvement. (Császár, 2013)

Before the launch of the toll, speculations were questioning how the toll will influence this industry. Transport of some goods are not necessarily involved which are

mainly the fresh products as these are usually delivered in smaller quantities (thus, there is no need for lorry over 3.5 ton weight) in short distance. It is not surprising for instance that the milk travels hundreds of kilometres but will this toll abolish this trend and will the producers find market nearby? The substantial increase in costs was obvious and “old dilemma” appeared as well: would this cost increase included in the consumer prices? (Fórián, 2013)

Pre-calculations were made in case of the poultry products, too, which showed that there could be an average 5% increase in the prices. (MTI Eco - VG, 2013)

An increase of food procession could be observed as not only the transport costs of the finished goods increases but also the raw materials, packaging materials require deliveries. The most affected products are those which consist of fresh ingredients and their value compared to their volume is low. The “Élelmiszer” journal asked some retailers how they handle the situation: the CBA sees no justification for the price increase as the fuel prices decreased; the Spar conduct negotiations with the suppliers who indicated the willingness of price increase, however, they do not want to validate this cost in consumer prices, neither does the Auchan. (Császár, 2013)

The live animal and meat market is in the same situation. There are no discounts – even though it was asked by many associations from the government – in transport of such goods. A cost increase of 20-30% is present (as these are heavy and low value goods) which cannot be or only in a small degree is validated in the prices. (Braunmüller, 2013) It is feared that the black market will further increase both in milk and meat sectors. (MTI Eco - VG, 2013)

The Hungarian Fruit and Vegetable Organization (Magyar Zöldség-Gyümölcs Szakmaközi Szervezet) asked for special treatment for fruit products. Watermelon, vegetables, grains and oilseeds, root and tuber production are already exempted between 1st July and 30 November for a maximum 30 days from paying the e-toll during the harvest season. However, it would be necessary that the fruits receive the same treatment. (MTI - VG, 2013)

A slight stride forward happen in August, when Attila Csorba, Poultry Product Board, reported a success in an increase of approximately 10% of selling price among several manufacturers. It was noted that this raise will not affect the consumer prices. According to László Lukács, Milk Product Board, there is a possible 8 to 10% increase as well in case of the milk market. (MTI Eco - VG, 2013)

All in all, what can be seen at the moment is that the logistics process improvements, cost-structure developments are in burning necessity in the sectors highly concerned. The retail chains understood the degree of the e-toll and its effects to the manufacturers and so accepted the price changes. The question is if this increase will affect the consumers after all or not.

4.5.2. State

The planned revenue of HUF 75 billion in 2013 most probably will be achieved by the state as according to the presentation of the Zoltán Varga (2013), the Head of the Toll Collecting Department of the – at that time – Hungarian Public Road Non-profit Ltd, until 28th October HUF 53,118 billion toll was collected. The daily average toll flowing into the account is approximately HUF 442.65 billion. Around 105,329 vehicles were registered, 30,120 customers with 48,340 on board units. The toll collected comes from prepaid ticket in 63% and in 37% from OBU.

Next year's revenue from toll collection could exceed the plan by HUF 10 to 15 billion thanks to the continuously improving inspections. The investment costs will be the same, approximately HUF 42 billion which also includes the sources transferred to enforcement units.

4.5.3. Consumers

The first impacts for the consumer of the electronic toll were mainly the increased flow of traffic from the motorways to the roads, in spite the modification of the Road Traffic Regulation (KRESZ) entered into force on the 1st July pertaining the heavy vehicles' transport. The regulation states that these vehicles must travel only on motorways, expressways and main roads and can enter minor roads in the cases of transport of goods requires, for loadings and unloading, or going to the site of its operator. Unfortunately, still many freighters try to use these routes to lower the costs of tolls. With the continuously expanding enforcement these problems will be soon reduced. (MTI Eco - VG, 2013)

At the moment, it is not easy to measure precisely the effect of the road toll in the consumer price index or in the inflation rate due to the overhead reduction programme of the government (10% decrease had been already done, an additional 10% reduction has been applied at the beginning of November 2013). The higher costs of the firms will be paid by the consumers.

Studies analysed the effects to the society in numbers which is in the past presented itself in an average inflation of 1%.

In Hungary at the moment the inflation is around 0.9-1%. However, the core inflation is around 3-3.5% which represents the inflation without any distortions. (Népszava, 2013)

As we walk in the supermarkets, sooner or later, we will see the effects of the e-toll in the prices of everyday products like milk and meat. Pursuant to the data of the Hungarian Statistical Office (KSH, 2013) the prices of food increased by 0.1% in October compared to September 2013. Substantial rise in prices can be seen in case of egg (2.4%), cheese (1.7%), and milk (1.3%). Comparing to October 2012, the increase is even higher, above average, 1.1 %, especially in product such as cheese (8.9%), milk (5.0%) and pork meat (4.4%).

5. CONCLUSIONS

The theme of the Hungarian electronic toll system is very popular. Almost every day there is a new article, a conference or later on several studies will deal with this problem. During my internship I could follow the journals and news daily, and could meet different views and opinions about this question.

This complex issue aroused my attention and I was indeed interested in analysing this topic which had become a challenge as well which character rose from its main feature: its freshness. Hence, the majority of the sources were coming from journals, newspapers and online news portals. I could conclude three interviews which gave support to meet different impressions as well as attend conferences and discussion which further form these impacts.

Analysing the international solutions of the electronic charging was essential not only due to the fact that these operate many years now, but also because this benchmark the HU-GO system. All the professionals refer to these during the discussions and negotiations with their partners and the government, thus to get a comprehensive view it should not have been excluded.

As it could be experienced, the Hungarian electronic toll makes the life of hauliers and also the firms of the manufacturing industries more difficult. The amount of goods to be transported and the number of freight tasks require the same amount of trucks on the market; however, there is a shortage of them.

Every company (especially the small and medium sized enterprises) is fighting against the long payment terms since it has high impact on the finances and liquidity of a company. The road toll does not facilitate this issue as it has to be paid immediately or prepaid. The post payment methods are not frequent yet.

The firms are aiming to devolve this substantial cost to the customers and partners who will validate this in their selling prices. Therefore, from the side of the consumers, price increase can be expected.

On the other hand, the e-toll has an effect of cost structure and operation optimizing. All of the economic players now have to improve their processes to be able to stay in the market. With the usage of the on board units and offered services of the fleet management service providers, those who did not think of investing in such devices may become more effective by using them.

The road toll may encourage investments of new, more modern fleets. There are more and more manufacturing companies with prerequisite of using higher classification trucks (like Euro V) during the transports, these tolls will surely encourage these pursuits. Nevertheless, the Hungarian vehicle categories with the emission classification are not appropriate to step forward to this direction.

The practice nowadays, unfortunately, in Europe is that in one truck there a lot of on board equipment. The diversity among the systems does not seem to decrease. To be able to reach the Single European Transport Area, this problem should be solved as well. There would be decrease in investment and operations costs as well as a more transparent payment method could be achieved.

I believe the Hungarian solution with its specialties is now working properly. After the difficult start, the processes are normalised and the HU-GO is open for developments as well as to enter the line of the interoperable systems.

REFERENCES

Literature:

- Bache, I. & George, S., 2006. In: *Politics in the European Union*. second ed. Oxford; New York: Oxford University Press, p. 370.
- Braunmüller, L., 2013. Beépül a húsárba az e-útdíj. *Világgazdaság*, 15 07, 45(135), p. 2.
- Császár, L., 2013. Ki fizeti az útdíjat?. *Élelmiszer*, 21(7-8), pp. 16-18.
- Demeter, K., 2013. Az útdíjat is sújtja a magyar átok. *Világgazdaság*, 21 06, p. 2.
- Dr. Prezenszki, J., 1998. *Logisztika I.*. s.l.:Műegyetem Kiadó.
- Erdélyi, K., Nikischer, J. & Tátrai, A., 2002. In: *Nemzetközi Szállítmányozás 1.* Budapest: Magyar Közlekedési Kiadó, pp. 13-16.
- European Commission, 2001. *White Paper - European Transport Policy for 2010: time to decide*. Luxembourg: Office for Official Publications of the European Communities.
- European Commission, 2011a. A single European transport area. In: *White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*. Luxembourg: Publications Office of the European Union, pp. 1, 10, 29.
- European Commission, 2013c. EU transport in figures 2013. In: *Pocketbook*. Luxembourg: Publications Office of the European Union, pp. 17, 21, 125.
- Fórián, Z., 2013. Hova vezet ez az e-útdíj?. *Élelmiszer*, 21(6), pp. 7-8.
- Fuvarlevél, 2013. *Fuvarozók lapja - 2013. augusztus*. Nagykanizsa: Új Média Kft..
- Fuvarlevél, 2013. *Fuvarozók lapja - 2013. július*. Nagykanizsa: Új Média Kft..
- Fuvarlevél, 2013. *Fuvarozók lapja - 2013. október*. Nagykanizsa: Új Média Kft..
- Fuvarlevél, 2013. *Fuvarozók lapja - 2013. szeptember*. Nagykanizsa: Új Média Kft.
- Giorgi, L. & Schmidt, M., 2002. European Transport Policy - A historical and forward looking perspective. *German Policy Studies*, 2(4), pp. 1-19.
- Horváth, Z., 2007. The Common Transport Policy and Trans-European Networks. In: *Handbook on the European Union*. 3 ed. Budapest: HVG-ORAC, pp. 382-388.
- Jaubert, S., 2013. WebEye a fedélzetén: eTachograph és e-útdíj bevallás. *Supply Chain Monitor*, 9(6), pp. 10-13.
- Karmazin, G., 2013a. A használatarányos útdíj magyarországi bevezetésének hatása a piac szereplőire. In: Z. Bokor, ed. *Logisztikai Évkönyv 2013*. Budapest: Magyar Logisztikai Egyesület, pp. 237-242.
- Logisztikai Híradó, 2013. Kettes fölét kapott az e-útdíj a szakmától. *Logisztikai Híradó*, 23(4), pp. 7-8.
- Logisztikai Híradó, 2013. Várakozáson felüli az érdeklődés az MLBKT útdíj-konferenciáján. *Logisztikai Híradó*, 23(3), pp. 31-32.
- Muchichka, L., 2013. Megnövekedett költségek. *Supply Chain Monitor*, 9(7), p. 21.
- Nagy, C., 2013. Mennyibe kerül a kedvezményes útdíjhitel?. *Fuvarlevél*, Issue 9, p. 7.

- Nagy, C., 2013. Tárgyalnak a fuvarozók, a kormány változtatni fog az e-útdíj szabályain. *Fuvarlevél*, Issue 9, pp. 22-23.
- Navigátor, 2013. Középpontban az elektronikus útdíj. *Navigátor*, 20(27), p. 27.
- Prezenszki, J., 2006. *Logisztika I.*. 16 ed. Budapest: BME MTI.
- Supply Chain Monitor, 2013. Útdíjrendszer: kevés reklamáció. *Supply Chain Monitor*, 9(6), p. 8.
- Szabó, Y., 2013. Tengelyhatalmak: az e-útdíj zűrés premierje. *HVG*, 06 07, pp. 51-52.
- Szegedi, Z. & Prezenszki, J., 2008. Az áruszállítás menedzsmentje. In: *Logisztika-menedzsment*. Budapest: Kossuth Kiadó, pp. 117-118, 120-121, 127-131, 138.
- The Budapest Times-MTI, 2013. E-toll system lurches into action. *The Budapest Times*, 5-11 07, p. 6.
- Tranzit, 2013a. E-útdíj: aláírátk az első szerződéseket a szolgáltatók. *Tranzit*, 14(4), pp. 22-23.
- Tranzit, 2013b. Mire érdemes a fuvarozóknak figyelniük a csatlakozáskor?. *Tranzit*, 14(4), pp. 24-25.
- Tranzit, 2013c. Fejlesztésekkel az útdíj és a válság ellen. *Tranzit*, 14(4), p. 25.
- Tranzit, 2013d. Költséghatékony vállalatirányítási rendszerrel az e-útdíj többletköltsége ellen. *Tranzit*, 14(4), p. 26.
- Tranzit, 2013e. A WebEye jó úton halad az elektronikus útdíj bevezetésére. *Tranzit*, 14(4), pp. 28-19.
- Varga, Z., 2013. *A megtett úttal arányos elektronikus útdíjszedési rendszer bemutatása - tapasztalatok*. Budapest: Állami Autópálya-Kezelő Zrt..
- Világgazdaság, 2013. A BI-KA Logisztikai Kft. fejlesztésekkel készül az útdíjra. *Világgazdaság*, 19 June.
- Világgazdaság, 2013. Az e-útdíj leállítását kéri a fuvarozók. *Világgazdaság*, 09 07, p. 3.
- Világgazdaság, 2013. Felpörgette az ősz az OBU-k iránti keresletet. *Világgazdaság*, 26 09, p. 5.
- Világgazdaság, 2013. Káosz az e-útdíjrendszerben. *Világgazdaság*, 07 2013, p. 02.
- Világgazdaság-MTI, 2013a. Áthárítják a fuvarozók az e-útdíjat. *Világgazdaság*, 22 07, p. 6.
- Világgazdaság-MTI, 2013b. E-útdíj: érkeznek a hitelkérelmek. *Világgazdaság*, 22 08, p. 3.
- ZIP, 2013. E-útdíj súlytotta hulladékkezelők. *Zöld Ipar Magazin*, 3(9), pp. 8-9.

Online sources:

- Anon., 2012. *Portfolio.hu*. [Online]
Available at: http://www.portfolio.hu/vallalatok/ilyen_lehet_az_e-utdij.166530.html
[Accessed 13 09 2013].
- ASFAG, 2013a. *Interoperability with Germany - Registration*. [Online]
Available at: <http://www.go-maut.at/internationales-engagement/t2g/anmeldung>
[Accessed 15 11 2013].

- ASFINAG, 2013b. *Interoperability with Scandinavia - EASYGO+*. [Online]
Available at: <http://www.go-maut.at/internationales-engagement/easygoplus>
[Accessed 15 11 2013].
- ASFINAG, 2013c. *Austria joins Scandinavian toll service*. [Online]
Available at: http://www.go-maut.at/documents/10176/306652/Press+release_EN.pdf/bcc170a6-824a-4d90-8879-8c9d6c2411e3
[Accessed 15 11 2013].
- ASFINAG, 2013d. *Interoperability with Switzerland*. [Online]
Available at: <http://www.go-maut.at/internationales-engagement/interoperabilitat-mit-der-schweiz>
[Accessed 15 11 2013].
- ASFINAG, 2013e. *Successful solution with Switzerland*. [Online]
Available at: <http://www.go-maut.at/internationales-engagement/interoperabilitat-mit-der-schweiz/erfolgreiche-loesung-mit-der-schweiz>
[Accessed 15 11 2013].
- B. Horváth, L., 2013. *Jól jár a vasút az e-útdíjjal*. [Online]
Available at: <http://www.vg.hu/vallalatok/kozlekedes/jol-jar-a-vasut-az-e-utdijjal-406116>
[Accessed 13 11 2013].
- Bódis, A., 2013. *SkyToll: A record in toll collection was set exactly after a year*. [Online]
Available at: http://www.skytoll.sk/download/TS_EN_20131114.pdf
[Accessed 14 11 2013].
- Černý, I. K., 2009. *Czech electronic toll collection - Next steps*. [Online]
Available at: http://www.telematika.cz/download/doc/czet_09_5_Czech_electronic_toll_collection_Next_steps.pdf
[Accessed 10 11 2013].
- Černý, V., 2009. *The Czech system and its future*. [Online]
Available at: http://www.3k.gov.hu/servlet/download?type=doc_field_file&field=file&id=4630
[Accessed 10 11 2013].
- Commission Européenne, 1998. *Des redevances équitables pour l'utilisation des infrastructures : Une approche par étapes pour l'établissement d'un cadre commun en matière de tarification des infrastructures de transport dans l'UE*. [Online]
Available at: http://europa.eu/documents/comm/white_papers/pdf/com98_466_fr.pdf
[Accessed 10 09 2013].
- Council of the European Union, 2012. *Hungary: EUR 495.2 million in cohesion fund commitments suspended*. [Online]
Available at: http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ecofin/128917.pdf
[Accessed 18 11 2013].
- Czech National Bank, 2013. *Central bank exchange rate fixing*. [Online]
Available at:

- http://www.cnb.cz/en/financial_markets/foreign_exchange_market/exchange_rate_fi_xing/daily.jsp?date=15.11.2013
[Accessed 17 11 2013].
- CSCMP, 2013. *Council of Supply Chain Management Professionals*. [Online]
Available at: <http://cscmp.org/aboutcscmp/definitions.asp>
[Accessed 08 08 2013].
- Dr. Schierhackl, K., 2012. *Electronic toll collection in Europe*. [Online]
Available at:
http://www.norvegfinans.com/sitefiles/1/dokumenter/SisteKl11.55SchierhacklKlaus_ElectronicTollCollectioninEurope_18.09.2012_v4.pdf
[Accessed 15 11 2013].
- Emyto.sk, 2013. *Tariffs*. [Online]
Available at: <https://www.emyto.sk/web/guest/toll/rates>
[Accessed 13 11 2013].
- European Commission, 2011. *All facts and figures - Transport*. [Online]
Available at: http://ec.europa.eu/transport/strategies/facts-and-figures/all-themes/index_en.htm
[Accessed 18 11 2013].
- European Commission, 2012. *Technical rules on electronic tolling*. [Online]
Available at:
http://ec.europa.eu/transport/modes/road/road_charging/technical_rules_en.htm
[Accessed 15 11 2013].
- European Commission, 2013a. *What do we want to achieve? - Transport*. [Online]
Available at: http://ec.europa.eu/transport/modes/road/index_en.htm
[Accessed 30 09 2013].
- European Commission, 2013b. *Road Infrastructure Charging – Heavy Goods Vehicles*. [Online]
Available at:
http://ec.europa.eu/transport/modes/road/road_charging/charging_hgv_en.htm
[Hozzáfézés dátuma: 30 09 2013].
- European Commission, 2013c. *Charging of Heavy Goods Vehicles in the EU*. [Online]
Available at:
http://ec.europa.eu/transport/modes/road/road_charging/doc/hgv_charging.jpg
[Accessed 30 09 2013].
- Eurostat, 2012. *Excessive Deficit Procedure*. [Online]
Available at:
http://epp.eurostat.ec.europa.eu/portal/page/portal/government_finance_statistics/excessive_deficit
[Accessed 18 11 2013].
- Eurostat, 2013. *Glossary: Excessive deficit procedure (EDP)*. [Online]
Available at:
http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Glossary:Excessive_deficit_procedure
[Accessed 18 11 2013].

- Feix, I. K., 2009. *Czech electronic toll collection – two and half years of experiences*. [Online]
Available at: http://www.telematika.cz/download/doc/itsn_09_karel_feix.pdf
[Accessed 12 11 2013].
- FIATA, 2013. *International Federation of Freight Forwarders Associations*. [Online]
Available at: <http://www.fiata.com/>
[Accessed 17 11 2013].
- GO-Maut.at, 2013. *Toll Rates*. [Online]
Available at: <http://www.go-maut.at/en/bezahlung/tarife>
[Accessed 30 09 2013].
- Go-Maut, 2013. *Tariffs*. [Online]
Available at: <http://www.go-maut.at/bezahlung/tarife>
[Accessed 26 11 2013].
- HU-GO.hu, 2013a. *About the amount of the toll*. [Online]
Available at: <https://www.hu-go.hu/articles/view/206574#menu>
[Accessed 18 11 2013].
- HU-GO.hu, 2013b. *Toll Sections*. [Online]
Available at: <https://www.hu-go.hu/articles/view/206584#menu>
[Accessed 18 11 2013].
- HU-GO.hu, 2013. *What is an on-board unit?*. [Online]
Available at: <https://hu-go.hu/articles/view/206581#menu>
[Accessed 10 11 2013].
- Hungarokamion.hu, 2013. *Logisztikai szolgáltatók: versenyképesebbé tehető a kombinált áruszállítás*. [Online]
Available at: <http://hungarokamion.hu/2013/02/17/logisztikai-szolgaltatok-versenykepesebbe-teheto-a-kombinalt-aruszallitas/>
[Accessed 10 11 2013].
- Iho, 2013. *Esély a kombinált közlekedés feltámasztására*. [Online]
Available at: <http://iho.hu/hir/esely-a-kombinalt-kozlekedes-feltamasztasara-130215>
[Accessed 14 11 2013].
- Index.hu, 2013. *Áthárítja az útdíjat a Waberer's*. [Online]
Available at: <http://index.hu/gazdasag/2013/06/28/waberers/>
[Accessed 10 10 2013].
- Kapitány Szabó, A., 2013. *Váratlanul megint lett nyertese az útdíjrendszernek*. [Online]
Available at: http://nol.hu/archivum/20130419-felkeszen_is_elindul?ref=sso
[Accessed 18 11 2013].
- Közlekedésfejlesztési Koordinációs Központ, 2011. *Matrica bruttó árak 1999-től*. [Online]
Available at:
http://kkk.gov.hu/servlet/download?type=doc_field_file&field=file&id=6232
[Accessed 18 11 2013].
- KSH, 2013. *Októberben 0,9% volt az infláció*. [Online]
Available at: <http://www.ksh.hu/docs/hun/xftp/gyor/far/far21310.pdf>
[Accessed 15 11 2013].

- Landry, D., 2013. *EU concerns about Hungarian highway tolls*. [Online]
Available at: http://www.bbj.hu/politics/eu-concerns-about-hungarian-highway-tolls_68760
[Accessed 26 September 2013].
- Magyar Nemzeti Bank, 2013. *Árfolyam táblázat*. [Online]
Available at: <http://www.mnb.hu/arfolyam-tablazat?query=daily,2013-11-15>
[Accessed 17 11 2013].
- Mandiner, 2013. *A kormány saját hatáskörbe utalja az e-útdíj szedését*. [Online]
Available at:
http://mandiner.hu/cikk/20130123_a_kormany_sajat_hataskorbe_atalja_az_e_utdij_szedeset
[Accessed 18 11 2013].
- mfor.hu - MTI, 2013. *Megállapodással védi a kormány a fuvarozókat az e-útdíjtól*. [Online]
Available at:
http://www.mfor.hu/cikkek/Strategiai_megallapodassal_vedi_a_kormany_a_fuvarozokat_az_e_utdijtol.html
[Accessed 9 11 2013].
- MLBKT, 2013. *Zöld utat kérnek a zöld fuvarozásnak*. [Online]
Available at: <http://e-utdij.logisztika.hu/zold-utat-kernek-a-zold-fuvarozasnak/>
[Accessed 11 11 2013].
- MTI - KG, 2013. *Az Európai Bizottság is ajánlja a magyar újítást*. [Online]
Available at: <http://mno.hu/gazdasag/az-europai-bizottsag-is-ajanlja-a-magyar-ujitast-1196978#>
[Accessed 23 11 2013].
- MTI - VG, 2013. *Az Európai Bizottság szerint a magyar e-útdíj nincs összhangban az uniós joggal*. [Online]
Available at: <http://www.vg.hu/vallalatok/kozlekedes/az-europai-bizottsag-szerint-a-magyar-e-utdij-nincs-osszhangban-az-unios-joggal-411159>
[Accessed 9 11 2013].
- MTI - VG, 2013. *E-útdíj: a gyümölcstermékekre is könnyítéseket kérnek*. [Online]
Available at: <http://www.vg.hu/gazdasag/e-utdij-a-gyumolcstermekre-is-konnyiteseket-kernek-407204>
[Accessed 14 11 2013].
- MTI Eco - VG, 2013. *A dohánytermékek árérése és az e-útdíj okozhat inflációs meglepetést*. [Online]
Available at: <http://www.vg.hu/gazdasag/makrogazdasag/a-dohanytermekek-arrese-es-az-e-utdij-okozhat-inflacios-meglepetest-411438>
[Accessed 23 11 2013].
- MTI Eco - VG, 2013. *Drágítja a baromfitermékeket az elektronikus útdíj*. [Online]
Available at: <http://www.vg.hu/gazdasag/gazdasagpolitika/dragitja-a-baromfitermekeket-az-elektronikus-utdij-406199>
[Accessed 14 11 2013].
- MTI Eco - VG, 2013. *Egyre több kis utat lepnek el a teherautók az e-útdíj miatt*. [Online]
Available at: <http://www.vg.hu/vallalatok/kozlekedes/egyre-tobb-kis-utat-lepnek-el->

- a-teherautok-az-e-utdij-miatt-410618
[Accessed 15 11 2013].
- MTI Eco - VG, 2013. *E-útdíj: Mentességet kaphatnak a mezőgazdasági termékek.* [Online]
Available at: <http://www.vg.hu/vallalatok/mezogazdasag/e-utdij-mentesseget-kaphatnak-a-mezogazdasagi-termekek-406857>
[Accessed 15 11 2013].
- MTI Eco - VG, 2013. *E-útdíj: Tovább nő a sertéságazat vesztesége.* [Online]
Available at: <http://www.vg.hu/vallalatok/kozlekedes/e-utdij-tovabb-no-a-sertesagazat-vesztesege-407512>
[Accessed 14 11 2013].
- MTI Eco - VG, 2013. *Máris jön az áremelés az e-útdíj miatt.* [Online]
Available at: <http://www.vg.hu/vallalatok/maris-jon-az-aremeles-az-e-utdij-miatt-409318>
[Accessed 14 11 2013].
- MTI, 2013a. *E-útdíj - NFM: 13 kilométerrel csökkent az érintett útszakaszok hossza.* [Online]
Available at:
<http://www.mti.hu/Pages/news.aspx?newsid=357201&lang=hun#357201>
[Accessed 5 11 2013].
- MTI, 2013b. *Nemzeti Útdíjfizetési Szolgáltató néven folytatja tovább az Állami Autópálya Kezelő.* [Online]
Available at:
<http://www.mti.hu/Pages/news.aspx?newsid=358977&lang=hun#358977>
[Accessed 11 11 2013].
- MTI, 2013c. *MKIK: a külföldi útdíj egy része is legyen levonható az iparűzési adóból.* [Online]
Available at:
<http://www.mti.hu/Pages/news.aspx?newsid=356270&lang=hun#356270>
[Accessed 9 11 2013].
- MTI, 2013d. *E-útdíj - A teherautósok három százaléka blicceli el az útdíjat.* [Online]
Available at:
<http://www.mti.hu/Pages/news.aspx?newsid=360473&lang=hun#360473>
[Accessed 15 11 2013].
- MTI-Mazars, 2013. *MAZARS: a rezsicsökkentés leértékelte az érintett cégeket.* [Online]
Available at:
<http://www.mti.hu/Pages/News.aspx?newsid=361836&lang=hun&contnews=1&append=1&print=1>
[Accessed 18 11 2013].
- Mytocz.eu, 2013. *Tariffs.* [Online]
Available at: <http://www.mytocz.eu/en/toll-system/toll-rates/index.html>
[Accessed 12 11 2013].
- Mytocz, 2013a. *Tolling System.* [Online]
Available at: <http://www.mytocz.eu/en/new-customer/tolling-system/index.html>
[Accessed 12 11 2013].

- Mytocz, 2013b. *General Architecture*. [Online]
Available at: <http://www.mytocz.eu/en/toll-system/general-architecture/index.html>
[Accessed 12 11 2013].
- Mytocz, 2013c. *Toll Paying Comparision*. [Online]
Available at: <http://www.mytocz.eu/en/new-customer/prepay-x-postpay/index.html>
[Accessed 12 11 2013].
- Narodowy Bank Polski, 2013. *Exchange rates - archive: Table No. 221/A/NBP/2013 of 2013-11-15*. [Online]
Available at:
<http://www.nbp.pl/homen.aspx?navid=archen&c=/ascx/TabArchEn2.ascx&n=13a221en>
[Accessed 17 11 2013].
- Népszabadság Online, 2013. *A Levegő Munkacsoport szerint még lehet E-útdíj határidőre*. [Online]
Available at: http://nol.hu/gazdasag/a_levego_munkacsoport_szerint_meg_lehet_e-utdij_hataridore
[Accessed 18 11 2013].
- Népszava, 2013. *Nagy a maginfláció*. [Online]
Available at: <http://nepszava.hu/cikk/1000370-nagy-a-maginflacio>
[Accessed 15 11 2013].
- piacesprofit.hu, 2013. *Újra versenyképes lehet a kombinált szállítás*. [Online]
Available at: http://www.piacesprofit.hu/kkv_cegblog/kkv_velemenyn/versenykepes-lehetne-a-kombinalt-szallitas/
[Accessed 7 11 2013].
- Portfolio.hu, 2012. *Ilyen lehet az E-útdíj*. [Online]
Available at: http://www.portfolio.hu/vallalatok/ilyen_lehet_az_e-utdij.166530.html
[Accessed 7 11 2013].
- Portfolio.hu, 2013. *Elbukott az elektronikus útdíj-tender - Megszólalt a Getronics*. [Online]
Available at: http://www.portfolio.hu/vallalatok/elbukott_az_elektronikus_utdij-tender_megszolalt_a_getronics.178504.html
[Accessed 18 11 2013].
- RSD, 2011. *Road and Motorway Directorate of the Czech Republic: Roads and motorways in the Czech Republic*. [Online]
Available at:
[http://www.rsd.cz/rsd/rsd.nsf/0/633e2faf9f4a1078c12578f80033a11e/\\$file/rsd2011en.pdf](http://www.rsd.cz/rsd/rsd.nsf/0/633e2faf9f4a1078c12578f80033a11e/$file/rsd2011en.pdf)
[Accessed 12 11 2013].
- Schwarz-Herda, F., 2005. *Toll Collection in Austria: Implementation of a fully electronic system on the existing motorway network*. [Online]
Available at: <http://www.piar.org/ressources/documents/309,5.2-Schwarz-Herda-0405C11.pdf>
[Accessed 15 11 2013].
- Segesvári, C., 2012. *Megszűnik a Ro-La: 30 ezer kamion zúdul a sztrádákra*. [Online]
Available at: http://www.delmagyar.hu/szeged_hirek/megszunik_a_ro-

- la 30 ezer kamion zudul a sztradakra/2302170/
[Accessed 14 11 2013].
- SkyToll-Myto, 2013a. *Legislation*. [Online]
Available at: <https://www.emyto.sk/web/guest/legislative>
[Accessed 14 11 2013].
- SkyToll-Myto, 2013b. *Technology for toll collection*. [Online]
Available at: <https://www.emyto.sk/web/guest/technology>
[Accessed 14 11 2013].
- Szabó M., I., 2013. *A kormány kinyírta a "gördülő országutat"*. [Online]
Available at:
http://hvg.hu/gazdasag/20130306_Avaganyzar_feloldasat_varja_a_gordulo
[Accessed 14 11 2013].
- Toll Collect, 2013a. *The truck toll in Germany*. [Online]
Available at: http://www.toll-collect.de/fileadmin/content/Dokumente/PDFs/Informationen/Nutzerinformationen/nutzerinfo_gb.pdf
[Accessed 12 11 2013].
- Toll Collect, 2013b. *Cancellation & rebooking*. [Online]
Available at: <http://www.toll-collect.de/en/all-about-the-toll/cancellation-rebooking.html>
[Accessed 12 11 2013].
- Toll Collect, 2013c. *Automatic log-on with the On-Board Unit*. [Online]
Available at: <http://www.toll-collect.de/en/all-about-the-toll/log-on/automatically-with-on-board-unit.html>
[Accessed 12 11 2013].
- Toll Collect, 2013d. *Toll Enforcement*. [Online]
Available at: <http://www.toll-collect.de/en/all-about-the-toll/toll-enforcement.html>
[Accessed 12 11 2013].
- TollCollect.de, 2013. *Tariffs*. [Online]
Available at: <http://www.toll-collect.de/en/all-about-the-toll/toll-rates.html>
[Accessed 12 11 2013].
- Útvonaltervező.eu, 2012. *Autópálya matrica árak 2012*. [Online]
Available at: <http://utvonaltervezo.eu/utazas/autopalya-matrica-magyarorszag/autopalya-matrica-arak-2012-sms-autopalya-matrica-vasarlas-2012.html>
[Accessed 09 11 2013].
- viaToll.pl, 2013. *Tariffs*. [Online]
Available at: <http://www.viatoll.pl/en/heavy-vehicles/toll-rates>
[Accessed 12 11 2013].
- viaTOLL, 2012. *Summary of the viaTOLL system functioning after one year - Warsaw*. [Online]
Available at: <http://www.viatoll.pl/en/heavy-vehicles/press-information>
[Accessed 12 11 2013].

- viaTOLL, 2013a. *viaTOLL System*. [Online]
Available at: <http://www.viatoll.pl/en/heavy-vehicles/viatoll-system?showall=1>
[Accessed 24 11 2013].
- viaTOLL, 2013b. *Payments*. [Online]
Available at: <http://www.viatoll.pl/en/heavy-vehicles/payments-8?showall=1>
[Accessed 12 11 2013].
- Vladimir, B., 2008. *Czech toll system after first year of operation*. [Online]
Available at:
http://www.transportenvironment.org/sites/default/files//docs/events/2008_04_road_charging_conference_9_bartl.pdf
[Accessed 12 11 2013].
- World Bank, 2013. *Surface area (sq. km)*. [Online]
Available at: <http://data.worldbank.org/indicator/AG.SRF.TOTL.K2>
[Accessed 10 11 2013].
- World Bank, 2013. *Roads, goods transported (million ton-km)*. [Online]
Available at: <http://data.worldbank.org/indicator/IS.ROD.GOOD.MT.K6>
[Accessed 18 11 2013].

Other Sources:

- Budai, L., 2013. *Az e-útdíj, mint a vállalati üzletpolitika része*. Budapest: Bábolna Sped Kft.; presentation
- Dr. Meisel, S., 2012. *Common and Community Policies of the European Union - notes*. Szolnok
- Dr. Mészáros, F., Toldi, M. & Siposs, Á., 2012. *A hazai közúti díjtörténelem bemutatása*. s.l., s.n.
- E-útdíj Benchmark Konferencia, 30/09/2013. *E-útdíj rendszer - konferencia résztvevők tapasztalatai*. Budapest: s.n.
- Hódosi, A., 2013. *International Logistics - notes*. Szolnok
- Karmazin, G., 2013b. *Az e-útdíj hatása a saját számlás vállalatok versenyképességére*. Budapest: s.n., conference presentation
- Közlekedésfejlesztési Koordinációs Központ, Díjstratégiai Iroda, 2009. *Fehér Könyv: A magyar közúti díjpolitika irányelvei 2020-ig /tervezet/, s.l.: s.n.*
- Interview – Budapest, 12 August 2013. 09:00 -*Manager of State Owned Company*,
- Interview – Budapest, 28 October 2013. 13:00, - *Associate professor*
- Interview – Budapest, 29 October 2013. 08:00, - *Hungarian Road Transport Association (MKFE)*

ANNEXES

APPENDIX 1 –TOLL CHARGES IN EUROCENTS, 2013

Motorways

Country	Axles	0	I	II	III	IV	V	EEV	VI	
CZ	2	12,30	12,30	12,30	9,61	9,61	6,15	6,15	6,15	
CZ	3	20,88	20,88	20,88	16,39	16,39	10,50	10,50	10,50	
CZ	4 +	30,35	30,35	30,35	23,72	23,72	15,17	15,17	15,17	
AT	2	19,30	19,30	19,30	19,30	17,00	17,00	15,50	14,90	
AT	3	27,02	27,02	27,02	27,02	23,80	23,80	21,70	20,86	
AT	4	40,53	40,53	40,53	40,53	35,70	35,70	32,55	31,29	
AT	5 +	40,53	40,53	40,53	40,53	35,70	35,70	32,55	31,29	
DE	till 3	27,40	27,40	27,40	19,00	16,90	14,10	14,10	14,10	
DE	4+	28,80	28,80	28,80	20,40	18,30	15,50	15,50	15,50	
HU	2	15,14	15,14	13,17	11,19	11,19	11,19	11,19	11,19	
HU	3	21,25	21,25	18,48	15,71	15,71	15,71	15,71	15,71	
HU	4 +	34,32	34,32	28,60	22,88	22,88	22,88	22,88	22,88	
PL	3,5-12	9,55	9,55	9,55	8,36	6,68	4,77	4,77	4,77	A and S
PL	min 12	12,65	12,65	12,65	10,98	8,83	6,45	6,45	6,45	A and S
PL	+	9,55	9,55	9,55	8,36	6,68	4,77	4,77	4,77	A and S
SK	2	19,30	19,30	19,30	18,30	17,90	17,90	17,90	17,90	12 t +
SK	3	20,20	20,20	20,20	19,30	18,90	18,90	18,90	18,90	12 t +
SK	4	20,90	20,90	20,90	19,90	19,60	19,60	19,60	19,60	12 t +
SK	3,5-12 t	9,30	9,30	9,30	8,60	8,30	8,30	8,30	8,30	
SK	5 +	20,60	20,60	20,60	19,30	18,90	18,90	18,90	18,90	12 t +

Other toll roads

Country	Axles	0	I	II	III	IV	V	EEV	VI	
CZ	2	5,82	5,82	5,82	4,53	4,53	2,91	2,91	2,91	
CZ	3	10,09	10,09	10,09	7,88	7,88	5,05	5,05	5,05	
CZ	4 +	14,44	14,44	14,44	11,27	11,27	7,22	7,22	7,22	
HU	2	6,44	6,44	5,60	4,76	4,76	4,76	4,76	4,76	
HU	3	11,15	11,15	9,70	8,24	8,24	8,24	8,24	8,24	
HU	4 +	21,41	21,41	17,84	14,27	14,27	14,27	14,27	14,27	
PL	3,5-12	7,64	7,64	7,64	6,68	5,25	3,82	3,82	3,82	GP and G
PL	min 12	10,03	10,03	10,03	8,83	6,92	5,01	5,01	5,01	GP and G
PL	+	7,64	7,64	7,64	6,68	5,25	3,82	3,82	3,82	GP and G
SK	2	7,00	7,00	7,00	6,30	6,30	6,30	6,30	6,30	12 t +
SK	3	14,60	14,60	14,60	13,60	13,60	13,60	13,60	13,60	12 t +
SK	4	15,30	15,30	15,30	14,60	14,30	14,30	14,30	14,30	12 t +
SK	3,5 t – 12 t	15,30	15,30	15,30	14,60	14,30	14,30	14,30	14,30	
SK	5 +	15,60	15,60	15,60	14,90	14,60	14,60	14,60	14,60	12 t +

Source: own edition, data based on HU-GO.hu, Go-Maut, Myto.cz.eu, TollCollect.de, viaToll.pl, Emyto.sk, 2013

Without VAT

Exchange rates, 15.November 2013:

EUR	1,000	=	PLN	4,189
EUR	1,000	=	HUF	298,380
EUR	1,000	=	CZK	27,15

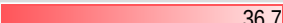
Sources:

CZK - Czech National Bank,

HUF - Magyar Nemzeti Bank, and

PLN - Narodowy Bank Polski, 2013

APPENDIX 2 – AVERAGE TOLL IN CASE OF VEHICLE WITH 4 AXLES

Country	0-I	II	III	IV	V	EEV	VI	Average	
AT	40,53	40,53	40,53	35,70	35,70	32,55	31,29	 36,7	Motorway
HU	34,32	28,60	22,88	22,88	22,88	22,88	22,88	 25,3	
CZ	30,35	30,35	23,72	23,72	15,17	15,17	15,17	 22,0	
DE	28,80	28,80	20,40	18,30	15,50	15,50	15,50	 20,4	
SK	20,90	20,90	19,90	19,60	19,60	19,60	19,60	 20,0	
PL	9,55	9,55	8,36	6,68	4,77	4,77	4,77	 6,9	
Country	0-I	II	III	IV	V+			Average	
HU	21,41	17,84	14,27	14,27	14,27			 16,4	Other toll roads
SK	15,30	15,30	14,60	14,30	14,30			 14,8	
CZ	14,44	14,44	11,27	11,27	7,22			 11,7	
PL	7,64	7,64	6,68	5,25	3,82			 6,2	

Source : own edition, 2013