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Harmonization of Transport Charging in Slovak Republic

Štefan Čarný[1*],Vladislav Zitrický[1] and Denis Šipuš[2]

[1]*University of Žilina, Univerzitna 1, 010 26 Zilina, Slovak Republic;*
Email: stefan.carny@fpedas.uniza.sk; vladislav.zitricky@fpedas.uniza.sk
[2]*Department of Railway Transport, Faculty of Traffic and Transport Sciences, University of Zagreb; denis.sipus@fpz.hr*

***Corresponding Author:** Štefan Čarný

Abstract: Inland transport in European Union is facing difficult but fundamental goals to achieve. Most of them are more accurately described in the White Paper on the future of Europe. By signing the Treaty of Lisbon, every European country is obligated to fulfil the legislation of the European Parliament. The main document dealing with the transport issue and ecological aspect of transport is the White Paper, which serves as a fundamental document for establishing the legislation and standards. The European Parliament legislation must be implemented in the national legislation including e. g. regulations, decisions or recommendations of the European Parliament. The legislation based on the White Paper is closely focused on transport and the related ecological aspect. Conclusions of this document lead decisions of EU to take serious actions in many different sectors. The transport sector has a significant impact on our environment and the future of the European Union. The current main goal of transport sector is to achieve reduction in emitting pollutants in our environment, and smoothly transfer to renewable sources of energy or at least trying to minimize the resources per transport performance unit.

Key words: Harmonization, charge, infrastructure, transport policy, rail transport

1. Introduction

The main objective of the EU transport policy is to provide a fluent, energy-efficient and safe transport of passengers and products within its territory. By ratifying the Treaty of Lisbon, each Member State has adopted the rules of the European Community and, at the same time, the compliance with the legislation issued by the European Parliament. The challenge of the EU transport policy is based on the White Paper published in 2011. The 40 initiatives identified in this document are designed to provide the preconditions for creating jobs and reducing dependence on fossil fuels. The decrease in the dependence on fossil fuels leads to proportional reduction in CO2 emissions in the transport sector and other undesirable externalities. The aim of reducing these

negative externalities of transport is to reduce them by 60 % by 2050 compared to their present value [1-4].

The shift of transport from road to rail is now a fundamental prerequisite and vision for fulfilling the outlined plans. The use of rail transport and ensuring the equalization of modal split shares in the different competitive modes is a key factor in achieving the above-defined objectives [5,6]. In order to increase the competitiveness of rail transport, it is necessary to ensure the basic instruments of the market mechanism that have the greatest impact on the development of the transport market [7-9]. The unequal rules in the market mechanism currently cause the widening of the gap between road and rail transport. In order to eliminate this undesirable effect, it is necessary to solve, for example, the following basic levels affecting the current system in the transport market: *The harmonization of charges for using transport infrastructure, The restructuring of the national transport policy, The balancing of the amount of funds in the individual types of transport infrastructure.*

2. Liberalization of the Transport Market

The liberalization of the market in the transport sector represents free rules in a market economy. All participants in the transport market should establish optimal inter-company relations and ensure maximum and efficient use of the potential of traffic and technical infrastructure facilities. The essence of the liberalised market is to secure an unregulated economic environment, where the subjects can use all the forms of competition in terms of price and non-price form.

2.1 Traffic

The rapid growth of traffic is related to the opening of the Slovak national economy and the coming of the foreign investors which have ensured the necessary technical development for logistics systems such as “Just in time” that has brought about by this trend [10,11]. The flexibility and adaptability to these technologies has prompted the need to build motorway networks and logistics centres primarily in the faster and more flexible road transport sector. The legislative measures that define the method of excavation, the charge of traffic infrastructure and the methodology how to determine them is defined in the following legislative regulations: The legislation of the *Government of the Slovak Republic No. 497/2013* that determines the manner of the calculation of the toll, the level of the toll rates and the system of discounts on the toll rates for the use of specified road sections, *The Directive 1999/62/ES* of the European Parliament and of the Council of 17 June on the charging of heavy goods vehicles for the use of certain infrastructures, amended by the *Directive 2006/38/ES* of the European Parliament and of the Council, *The Regulation No. 475/2013* Z. z. of the Ministry of Transport and Construction of the Slovak Republic that determines the

sections of motorways, expressways, class I roads, class II roads, class III roads that are subject to the toll.

The charge for the use of the transport route in the road transport is currently addressed by the use of toll fees. The direct charge for the use of transport route has not been implemented in traffic yet. The charge is made on the grounds of the Directive 1999/62/ES of the European Parliament and of the Council where there is a definition of the charge of vehicles (road tax), tolls and users' fees [11,12]. The current implementation of the toll system in the Slovak Republic is based on the EU Directive, based on the environmental impact by the type of vehicle, i.e. its weight and number of axles. It means in practice: vehicles with a maximum permitted gross vehicle weight of 3.5 tonnes to 12 tonnes according to EURO Emission Category and regardless of the number of axles intended for the carriage of more than nine persons inclusive and for vehicles not intended for the carriage of persons; for vehicles with a maximum permitted gross vehicle weight of 12 tonnes or more according to the EURO Emission Category and regardless of the number of axles intended for the carriage of passengers, vehicles with a maximum permitted gross vehicle weight of 12 tonnes or more according to the EURO emission class of the vehicle and the number of axles not intended for the carriage of passengers.

2.2 Rail Transport

The liberalization of the rail transport market was longer. The first step to ensure a liberalised environment in the rail transport market in Slovakia was the transformation process of the state railway enterprise in 2005. Legislative amendment adopted by the Slovak Republic from the Directive 2012/34 / EU of the European Parliament and of the Council establishing a Single European Railway Area, the main task of which is to ensure non-discriminatory access of private carriers to the national railway network.

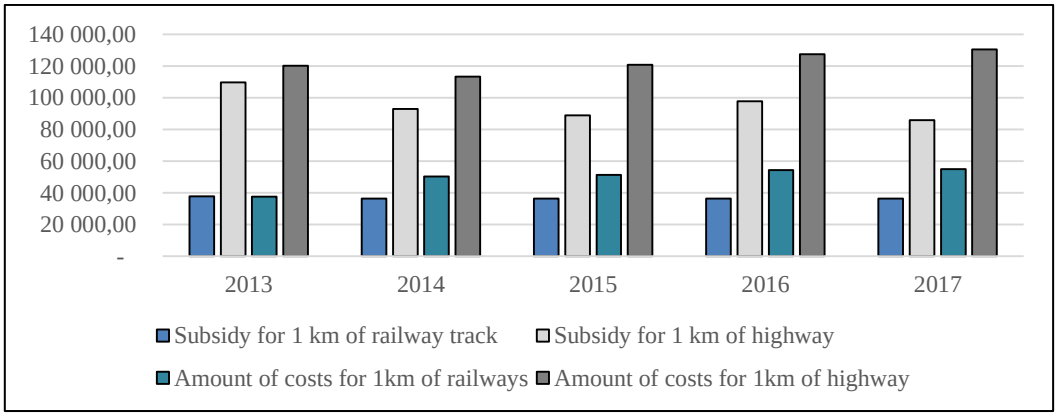
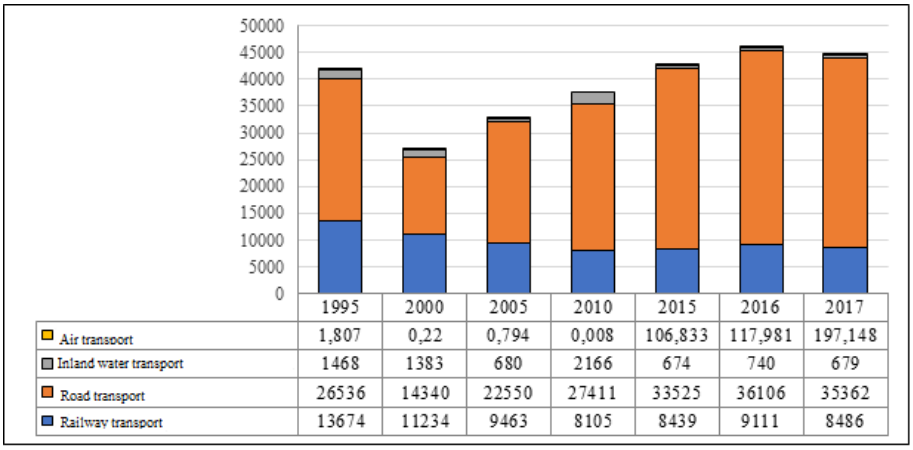


Fig. 1 Graphic comparison of the amount of subsidies and economic costs per 1 km of infrastructure. Source: authors on the base of [11-13]

The current distribution of the performance in rail and road transport is currently largely due to non-harmonized conditions in both modes of transport. Note the comparison of the charge for the use of the road in rail and road transport. The unequal conditions in the transport market are largely due to the unequal distribution of finances in the transport sector. The amount of state investment subsidies that are intended for the purpose of the repair and maintenance of transport infrastructure is distributed in favour of the road traffic as it is depicted in figure 1.



	1995	2000	2005	2010	2015	2016	2017
Air transport	1,807	0,22	0,794	0,008	106,833	117,981	197,148
Inland water transport	1468	1383	680	2166	674	740	679
Road transport	26536	14340	22550	27411	33525	36106	35362
Railway transport	13674	11234	9463	8105	8439	9111	8486

Fig. 2 Modal split of freight transport in Slovakia. Source: [13]

In terms of the competitiveness of transport networks it is only rail transport that can currently compete with road traffic in the largest possible scope. It represents the second largest volume after the road traffic. The depiction of the course of the modal split in the individual modes of transport in figure 2 represents the current situation of the operation of the transport market in the Slovak territory. The year-on-year increase in transport volumes is reflected in an increase in road transport olumes, and the quantity of goods transported by rail represents a stagnation of its performance.

The stagnation of railway transport is to a certain extent caused by insufficient investment plans in the railway sector in the Slovak Republic. Figure 3 shows the development of the construction length of the rail infrastructure in the Slovak Republic. The decrease of the construction length of the rail infrastructure represents especially two factors in the graph:

- Modernising works on the ŽSR network, where the drop is caused by transfers of rails, building tunnels or levelling arches
- The closing of railways

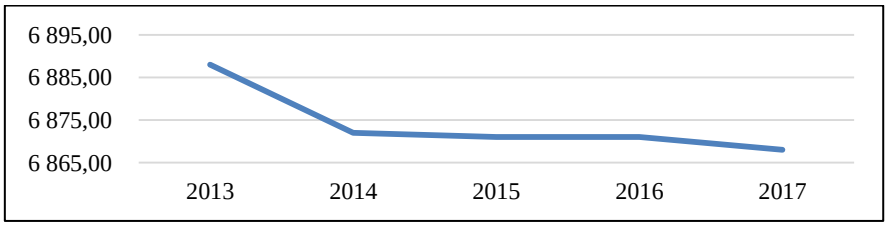


Fig. 3 Construction length of Slovak railway infrastructure. Source: authors on the base [11-13]

The year-on-year increase in figure 4 shows the total length of toll road infrastructure in the SR The greatest increase in the monitored period is shown between 2013 and 2014, which is due to the inclusion of some class 1 roads into the toll infrastructure package. The year-on-year increase represents the construction of the motorway or other road network subject to performance charge in the year on year period.

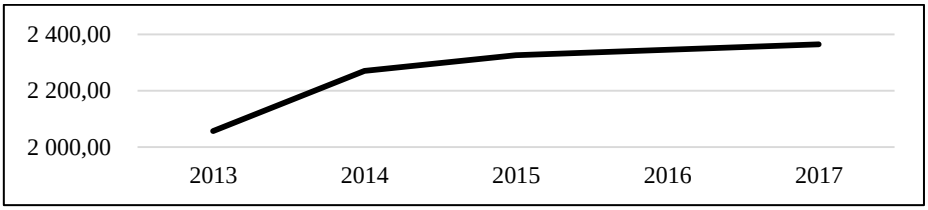


Fig. 4 The length of the road infrastructure in Slovakia. Source: authors on the base [11-13]

From the graphs we can conclude that the growth of road transport is certainly directly connected with the country's investment direction. The widening of the difference in modal split between rail and road transport is therefore also directly related to investment plans and the form of their implementation.

3. Theoretical Base of Infrastructure Charging

To ensure operability and sustainability of any construction project, it is necessary to ensure its funding. A stable funding enables the sustainability of the operation and helps increase demands that may occur during the lifetime of the project, e.g. increase safety, capacity or updating the project.

3.1 Road Transport

Infrastructure costs are divided into investment costs and annual maintenance costs including the construction repair costs. Investment costs shall include all infrastructure construction costs included with project funding. As for investment costs, all costs of land expropriation, planning, preparation of project documentation, supervising of construction, archaeological and geological survey are included. The current condition of the European Union is also monitoring of the return on capital investment and potential profit margins over time. Recovery of costs incurred during the infrastructure construction, modernization and reconstruction is most often based on the planned lifetime of the project and costs related to its running over time. Determining the operating costs of a road infrastructure is related to m^2.

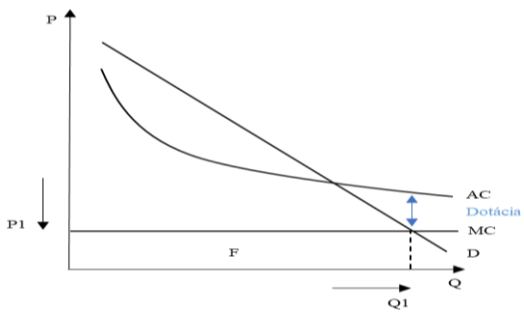
The reason for calculating the operating costs through m2 stems from the diversity of individual road. Roads can differ in terms of their width; the difference may also consist in other areas related to the organization of road infrastructure, e. g. junctions, arms of junctions, turning and merging lanes, additional lanes, lay-bys, etc. [13]. Operating costs of road infrastructure comprise

all cost items the infrastructure operator has to incur to ensure the operation and all required infrastructure properties in accordance with the project documentation.

3.2 Railway Transport

The current objective of charging the railway infrastructure is to ensure the equal accessibility for all its users. A fair, non-discriminatory approach was intended to remove natural monopoly operating in the country as the then national railway company. The basic principle of a non-discriminatory approach is to ensure that any carrier wishing to operate in the railway infrastructure had the same conditions in terms of pricing and non-price policy.

Non-price discrimination refers to preference of selected railway companies or the situation when the infrastructure manager operating the transport services favours the services based on their own interests, thus thwarting fair competition. Railway infrastructure charging is currently most often determined by expressing the price level by means of marginal costs or the price corresponding to the level of average costs.



***AC**-average costs; **MC**-marginal costs; **D**-demand; **P**-price; **Q**-transportation performance*

Fig. 5 Marginal and average costs of natural monopoly. Source: [14]

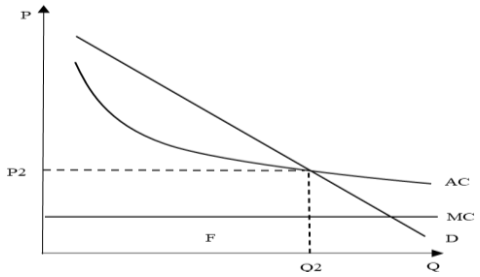


Fig. 6 Determining the prices in the infrastructure by means of average costs. Source: [14]

In case that the price for using railway transport infrastructure was determined based on the average costs, it follows from Figure 3 that in the intersection of the demand and average costs functions, the price of the transportation performance increases, which has the opposite effect than in the first case, and with the same assumed price as the main incentive for utilization of transport, there is a decrease in the volume of the transportation performance.

The examples of railway infrastructure charging in the selected countries indicate the differences in choosing the form of railway infrastructure charging [15]. Despite the recommendations of the EU legislation to charge infrastructure following the principle of long-term marginal costs, Table 1 shows charging on the basis of average costs in the countries at different level of development.

Table 1. Railway infrastructure charging in selected countries. Source: authors

Country	Charging system
Austria	MC+
Czech Republic	MC+
Hungary	FC
France	MC+
Latvia	FC
Finnland	MC+
Germany	FC-
Italy	FC-

4. Liberalization Effects of Railway Transport Market at Present

The process of railway transport liberalization in the Slovak Republic has taken different directions of development in both modes of its use, in passenger and freight transport. The differences between the freight and passenger transport in terms of liberalization and entry of new carriers in the market is most clearly seen in terms of time horizon.

Liberalization effects in the Slovak Republic is most evident in the annual balance sheet of the development of transport infrastructure charges and its analysis in terms of the distribution of the amount by the amounts recorded in the annual reports as private carriers´ sales. Freight transport in the reference period shows a stagnation in the volume of transport in terms of national freight carrier, and a slight regression in the last year. In the private sector, there is a clear year-on-year increase in the volume.

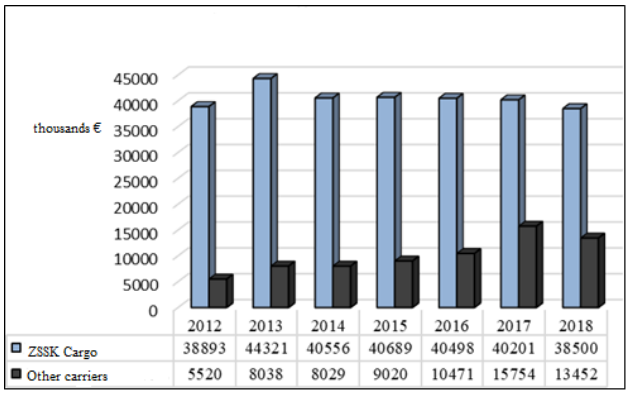


Fig. 7 Sales for using to railway infrastructure in freight transport. Source: [16]

The development in passenger transport sales shows a similar trend as in the case of freight transport. The annual differences in various carriers´ sales are caused by the company Regiojet, which significantly influenced the situation in the passenger railway transport in 2016.

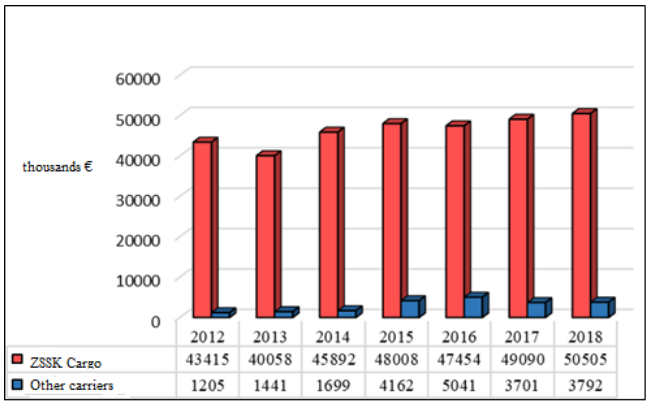


Fig. 8 Sales for using railway infrastructure in passenger transport. Source: [16]

5. Proposal for Harmonizing Transport Infrastructure Charging in SR

Comparing of road and railway system of infrastructure charging shows unequal charging system from the following perspectives: *charged extent of infrastructure in road and railway transport systems, lack of common unit that could be used equally for setting the price for using a transport route, unequal legislation of both transport systems.*

The proposal for harmonising the infrastructure charging at the regional level is based on the analytic part of the contribution, where both infrastructures in the Slovak Republic were characterised. The cause of the proposal is the identified inequality of the infrastructure volume charged. The starting point is the fact that the railway transport infrastructure is charged in its full extent, which means that the infrastructure client, that is, the carrier has to pay for each journey / transportation. On the contrary, in the road transport, only 13 % of the overall infrastructure extent is charged, and the carrier does not need to spend their financial for using transport routes in the case of regional connections. Based on these assumptions, there can be to options to harmonize the charging:

1. Abolishing the fees for using regional routes in the categories 3, 4 and 5.
2. To introduce fees for using the infrastructure for the carriers in regional routes, that is, in the case of road of the 2nd and 3rd class.

5.1 Abolishing Fees for Using Regional Routes in Categories 3, 4 and 5

The first option of harmonizing transport routes charging is to eliminate unequal charging of transport infrastructure in the perspective of region. In terms of long-distance transport, the ratio is rather balanced, as the main routes in Category 1 are charged in the same way as the routes in road infrastructure. There is disproportion in the above-mentioned perspective of region, where the road infrastructure is charged according to the zero tariff rates.

The majority of transport performance on regional routes is CARRIED OUT by passenger transport, through which the state has to ensure the transport serviceability of a given territory. Freight transport shows decrease that has been mentioned in the theoretical part. This is due to ever-lowering interest in using national freight carrier´s work trains and the reduction in sidings on the railway network.

5.2 Introduction of Infrastructure Charging on Regional Routes, on Roads of 2nd and 3rd Class

The introduction of infrastructure charging for the carriers on the regional routes would represent a simple increase in zero charging of the road infrastructure. For efficient use of these funds collected in the form of a toll, it would be necessary to create a financial package that would be subsequently use for financing the repairs and maintenance of the regional routes. Management of this package would be aimed at more efficient distribution directly to the self-governing region which could thus ensure the quality improvement and building new roads necessary for the local needs. The introduction of freight transport charging could pose problems in the local regional economy for small enterprises; therefore the amount could depend on the rate determined by the weight of the vehicle or the number of its axles.

In practice, this would mean higher fees for heavy freight vehicles with more than 3 axles and disadvantageous tariffs for road combination of vehicles, which most affect the conditions of the road. Such tariff could represent a genuine functional instrument that could be used as a basis of cost reduction in the form of avoiding charged sections of road transport infrastructure. The toll rate proposed could be as that given in the following table. Prices per kilometre were set lower than on the roads of the higher class, with a 40% increase in the case of freight transport, for weights of 12 t and more in order to reduce the number of these vehicles using the road infrastructure which does not have the same properties as 1st class roads and highways. When developing the analytical model, it was difficult to establish common rules and to find similar indicators which could be used to objectively determine the financial needs of transport infrastructure and economic indicators of infrastructure efficiency and financial profitability.

5.3 Common Performance Unit as Harmonization Tool

To determine common performance unit, it is theoretically possible to think in terms of common elements and features of both transport systems. In terms of constructing transport routes, the common element of transport structures is, in simple terms, the length and the efficiency of the infrastructure, or its capacity. In terms of means of transport, there can be considered common features of means of transport design. In the case of railway transport, the design of train set

consists of a traction unit and wagons or rolling stock as an independent unit. In terms of its design, road transport vehicle constitutes an independent unit or a set consisting of a tractor and a trailer defined as an articulated vehicle. In passenger transport, bus is the most frequently used vehicle for mass passenger transport.

A common unit for both transport systems could be charging based on the distance in kilometres travelled on transport route as the dependence that we know in a similar form from the road infrastructure toll tariff. However, there would be imbalance even at first glance due to the disproportionate amount of costs necessary for operating road and railway infrastructure, since the railway infrastructure is much more complex and technologically more demanding in terms of maintenance and repairs necessary for ensuring the project standards and railway tracks standards. With regard to the design of the means of transport using the transport infrastructure, it is possible to introduce common charging based on their technical design and the common elements of the compared means of transport.

The common features of means of transport used in railway transport and road transport include e.g. axle, which can be found at both above-mentioned means of transport. In the case of the right setting of the axle load coefficient, such charging can provide realistic and comparable results. However, with the current technological advance, improving the design of various means of transport, and their wide range, such proposal would need a rather complex and practically overly complicated solution. The performance in both transport systems monitored by the infrastructure manager are travelled gross ton-kilometres, which are easy to monitor and can thus represent the simplest method of transport infrastructure charging. Gross ton-kilometres include both loaded and empty runs of transport vehicles, thus meeting ideally all the criteria for determining the common unit for transport infrastructure charging.

5.4 Legislative Harmonization Measures

The draft legislation consists in insufficient assuming of European legislative standards. The Directive 2006/38/ES covers also possible introduction of fees for lorries weighing less than 12 t, which means charging of carriers providing their services using low-capacity means of transport. Currently, the legislation does not regulate commercial vehicles up to 3.5 t, which results in higher frequency and use of this transport system. Increased frequency of vehicles on road network results in negative external costs, whose impact has been mentioned in the previous part.

6. Conclusion

The railway transport market has been undergoing structural changes, where the most visible results are currently presented as the liberalization of transport market. Liberalization and its development

within the road transport was completely different from the liberalization of the railway transport market. Establishment of companies providing transport services in the railway transport sector represents the results of favourable development of legislation aimed at private business entities entrepreneurship. Despite the liberalization of the Slovak railway transport market, the required effects in terms of harmonization of inland transport, namely increased competitiveness of railway transport have not been clearly visible yet.

The current trend of transport growth is largely reflected in the increase in road transport, while railway transport stagnates year-on-year. In addition to all other known railway transport disadvantages, the result can be also its price. Railway infrastructure charging has been undergoing structural changes, while in terms of its use, road transport is charged only to a minimal extent. By implementing harmonization measures between both modes of transport, it is possible to ensure a shift of a significant transport volume from road transport to railway transport, thus reducing all negative externalities generated by road transport and ensuring that the EU plans are met.

Acknowledgments

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