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## POSSIBILITIES OF BUILDING OF WIDE-GAUGE RAILWAY IN THE SLOVAK REPUBLIC

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**Abstract:** The contribution deals with an ambitious project, which is the extension of the current wide-gauge railway from Haniska near Košice to Vienna, thus eliminating the transshipment of wagons and overall it should rapidly increase in volume of goods transported by railway from Asian countries without transshipment to Central Europe. The problem itself lies in the disunited view to building a wide-gauge railway led from the territory of Ukraine across the Slovak Republic for needs of the raw materials transportation to Western Europe. The aim is to establish a theoretical base, to evaluate current infrastructure, to analyze the current status and the overall profitability of the project of wide-gauge railway for Slovakia. The aim is to evaluate the advantage or disadvantage of the possibility of extending the already existing wide-gauge railway across the whole territory of the Slovak Republic, which should in practice, meant the construction of approximately 390 to 430 kilometers of new railway track and at least one terminal of combined transport in the Slovak Republic and the European Union. Although the project has been known for a relatively long time, the discussion about this project is conducted in professional circles for nearly 10 years.

### 1 Introduction

Railway transport has belonged for several centuries to the most important forms of passenger transport but especially material transport worldwide. 165 years have passed since the operation of the first steam powered train on the territory of Slovakia. From this historic milestone, the railway infrastructure in our country have been formed and improved to the present form.

Nowadays, there are 3,657 kilometers of railway tracks in Slovakia. They are not used in such a form what is their potential, because their carrying capacity for freight transport is used only on around 31%. In relation to this data, the opponents of the project of the wide-gauge railway (WGR) in the length of about 430 kilometers in our area point to the fact that it would be a waste of finances in enormous volume for the construction of another, although specific track, in case when the capacities of existing ones are not used even to half. On the other hand, it is more than realistic that in the case of the construction of this track, the volume of goods flow on the railways in Slovakia – would considerably increase several times, while the product would flow from the east of the country via the built track Maťovce – Haniska near Košice. The fact is that nowadays through this track, along with other wide-gauge track on Slovak territory (Čop - Čierna nad Tisou) annually flow approximately 15 million tons of cargo, which represents a third of all cargo moving in Slovakian railway network. It can be also considered that the added value of a newly built track would also increase the amount of cargo transported by the tracks of the current split, as the future terminals of combined transport would be connection for wide-gauge railways with road

transport and in appropriate locations with the water transport, as well as connection of the wide-gauge railway with normal-gauge railway. This fact could cause an increase in the use of the existing railway network and also it could be a new stimulus for potential investors to visit Slovakia [1].

The very idea of extension respectively the construction of wide-gauge track through Slovakia comes from Russia. The Russian side is interested in the better usage of existing Trans-Siberian Railway, which leads from the Pacific Ocean coast to Moscow in the length of 9,288 kilometers and many tracks to Central Asia, China as well as the Baikal-Amur Railway is connected to it. According to the idea, the goods could be transported without reloading respectively without changing of wagons from Asia or Russia to Central Europe [1].

### 2 Railways dividing according to the gauge

Most of the railways in the world are so called normal-gauge. „*The track gauge is perpendicular distance between browsing inner edges of the railheads of rail, measured on the axis of the rail at the prescribed depth of 14 mm below top of rail [2]*”.

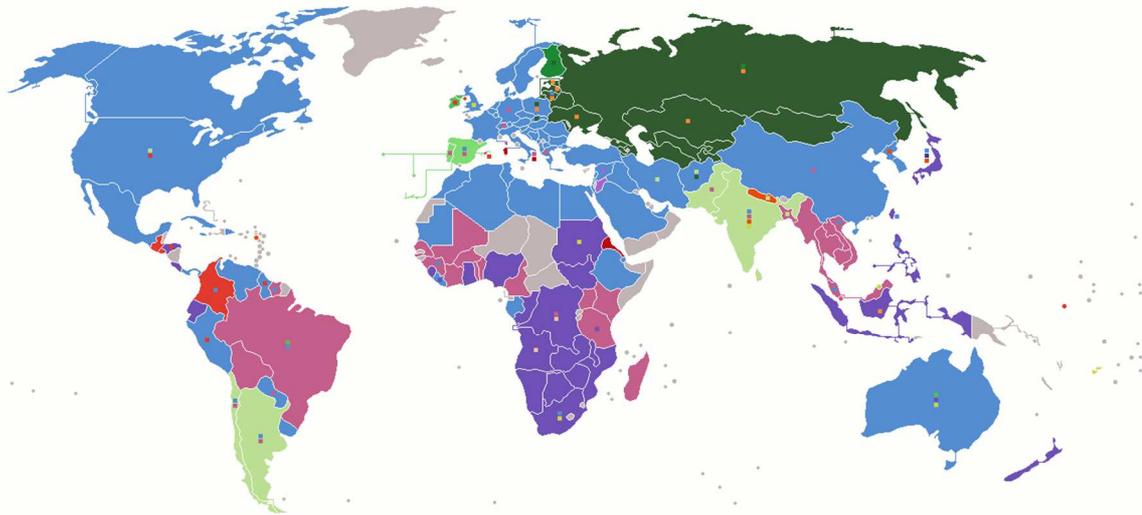
Normal gauge is based on the dimensions of the English road vehicles; it was defined by G. Stephenson. The first modern railway vehicles was created by the remake of road vehicles, after the introduction of the inner edges to the wheels, adjusting of powered vehicles thus, locomotives, and specialization of the vehicles only for running on railway tracks it came to the gauge of 1,435 millimeters. By the usage of English locomotives during the construction and industrial revolution in the European countries, therefore, this gauge took charge in most of

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Europe. However, from the needs of practice, technical or technological solutions but also for safety reasons respectively other political decisions, more than 130 kinds

of gauges are currently being used around the world, 30 of them is of crucial importance (Figure 1).



mm	1676	1668	1600	1524	1520	1435	1372	1067	1050	1000	950	914	762	750	610	600
ft in	5'6"	5'5.67"	5'3"	5'	4'11.8"	4'8.5"	4'6"	3'6"	3'5.3"	3'3.4"	3'1.4"	3'	2'6"	2'5.5"	2'	1'11.6"

Figure 1 Map of railway gauges in the world [3]

Normal gauge, i.e. 1,435 millimeters is used for almost 62% of railway tracks in the world. It is almost everywhere in Europe except for example Switzerland, Finland and others. However, in almost every country there can be also found local tracks or tracks of a different character with a different gauge than the standard, which have for example recreational purposes or other business purposes. In Slovakia, in addition to standard gauge railways there are also tracks with gauge 600, 760, 900 and 1,000 millimeters [1].

Narrow gauge of tracks is mainly used in countries outside of Europe, which consequences of the historical development of the railways and the industrial revolution in England. Atypical, 610 millimeter gauge is in India, Pakistan and some countries of Africa. Argentina and Uruguay are using 750 millimeter gauge on the railway tracks, Switzerland uses over 800 and 1,000 millimeters. So called Cape gauge is used in the south of Africa, on the Pacific islands, in Australia, Japan and also in Brazil [1].

In Slovakia, in addition to the normal-gauge railways, there are also narrow-gauge railways. Among the tracks with atypical gauge belong Tatra’s electric railway network, with a length of 35 kilometers and 1,000 millimeters track gauge. This track from the station Poprad - Tatry leads to Štrbské Pleso with turning in Starý Smokovec and Tatranská Lomnica and it is used for

recreational purposes, respectively for tourist purposes in the Tatra region. Other narrow-gauge tracks are Trenčín – Trenčianska Teplá (gauge of 760 millimeters and length of 6 kilometers) and Košice – Alpinka, which was built in 1965 for recreational purposes (5 kilometers length and 750 millimeters gauge).

By the term of wide-gauge railway is meant track whose gauge is more than the standard 1,435 millimeters. These tracks are throughout Russia and Finland - 1,524 millimeters, in Ireland, Australia and Brazil - 1,600 millimeters and gauge of 1,670 millimeters is used in Spain and Portugal. Some tracks in India, Argentina and Chile are 1,676 millimeters gauge, which is the widest existing gauge of railway tracks in the world [1].

**3 Advantages of railway transport**

One of the most important factors preferring railway transport is its **transport capacity**. For a transport capacity of a normal commodity is determined by standard of 3,000 tons per train set, while on average a road trailer has capacity of about 25 tons, maximum up to 40 tons per trailer. Railway transport thus allows performing, by a single train set, such a transportation power that would be reached by, roughly estimated, 75 road trailers (Figure 2). Thus are saved not only invested financial resources but also labor forces and, last but not least, the environment.

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Figure 2 Capacity utilization of train transport [4]

In **terms of safety**, it is necessary to distinguish at least two directions - and it is security of transport itself and on the other hand the security of transported goods. Railway transport belongs, according to statistics, to the safest form of transport in terms of road accidents; it is also secured one of the highest possible standards of security of transported substrate (e.g. nowadays, in road transportation it is not unusual kidnapping of trailer or the whole combination of vehicles, theft of trailer's content and other damage events).

**The financial side** of runway traffic is the main reason, which greatly exceeds for example road transport. This also includes claims for fuel, respectively for electrified tracks energy claims. As a traction vehicle at train sets is sufficient one, maximum two locomotives so also the costs of operation are, compared with road transport, at a minimum level.

From **the perspective of ecology** when transporting cargo on medium and long distances railway transport has no competition (do not considering river transport respectively marine transport, since it is not possible in certain areas). Whether it has a direct effect of exhalants, in comparison with the road or air transport, it is on a negligible level, but also during its construction there is degraded much smaller part of the country than in the road network.

**Lower transport restrictions** also belong to the further advantages of railway transport. Nowadays, it is ensured during railway transport almost fluent transportation, including border crossing points in the Schengen area and again it is not necessary to keep a variety of restrictions, such as restrictions on the use of highways and first class roads, restrictions relating to weekends respectively public holidays or safety breaks. Last but not least, it is often higher permissible speed of train sets in comparison with goods vehicles.

Except for the advantages offered by railway transport over other forms of transport, there is also **the fact of added value** that is directly related to the tracing of railroad. Wide-gauge but also other railway track directly creates new jobs, it also supports the infrastructure of the region and passenger railway transport may help to develop tourism of the region. As an example, it should be mentioned Levoča district, through which during the building of the main railway artery of Slovakia, thus the north traction Košice – Žilina – Bratislava, the road line was dismissed. It is already only at the level polemics, how much this fact contributed to the development respectively economic stagnation of the whole region, the fact is that nowadays Levoča has no train connection and so the entire suburban but also long-distance transport of persons is ensured only by the bus operators. This fact has significantly contributed to the development of the city. With regard to freight transport, this region, as a whole, is cut off and it all has caused almost zero inflow of investment capital into the region. It is logical that the investor will not enter the area where the infrastructure is significantly weakened, although the potential in the form of workforce is definitely at this place.

In contrast to Levoča district, Spišská Nová Ves can be shown as an example; its economic development was partially supported by the good train infrastructure and thus directs railway connection whether personal as well as freight transport with the main economic centers of Slovak republic.

#### 4 Legislative restrictions

During the construction of railway tracks but also during their operation it is necessary to follow the legislation of the given country, but also in the case of Slovakia, to follow also legislation and the recommendations of the European Union.

Operation on railway tracks in Slovakia modifies the legislation, specifically these laws [1]:

- Law NR SR no. 258 Collection of Laws from 30. September 1993 on Railways of the Slovak Republic as amended by law NR SR no. 152/1997 Collection of Laws and law NR SR no. 259/2001 Collection of Laws;
- Law NR SR no. 513 Collection of Laws from 28. October 2009 on the railroads and about the amending and supplementing of some laws;
- Law NR SR no. 433 Collection of Laws from 21. October 2010, which amends and supplements the law no. 513/2009 Collection of Laws on the railroads and about the amending and supplementing of some laws and which amends and supplements some of the laws;
- Law NR SR no. 393 Collection of Laws from 19. October 2011, which amends and supplements law no. 513/2009 Collection of Laws on the railroads and on the amend and supplement of some laws as amended and which amends and supplements law no. 514/2009

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Collection of Laws about the traffic on the railroad as amended;

- Decree no. 245 MTCRD SR from 24. May 2010 on professional competence, medical fitness and psychical fitness of people at operation at railroads and traffic on railroads;
- Decree no. 205 MTCRD SR from 29. April 2010 on designated technical equipment and determined activities and activities on defined technical equipment;
- Law NR SR no. 514 Collection of Laws from 28. October 2009 on the traffic on the railroads
- Decree no. 350/2010 MTCRD SR from 19. August 2010 on construction and technical regulation of tracks;
- Decree no. 351/2010 MTCRD SR from 19. August 2010 on transportation regulation of tracks“
- 235/1920 The law on the construction of new tracks and determination of construction and investment program;
- 085/1964 Agreement between Slovak republic and Austrian republic on modification of railway border crossing;
- 009/1984 Decree on container transport regulation;
- 008/1985 Decree on Convention on international carriage by railway (COTIF).

EU directives must be followed in all sectors, not excluding the railway transport. Effect on this type of transport have [1]:

- 2005/047 Council Directive 2005/47/ES from 18. July 2005 on Agreement between Community of European Railways (CER) and European Workers' Federation (ETF) on certain aspects of the working conditions of mobile workers engaged in interoperable cross-border transport in the railway sector;
- 2004/881 Regulation (EC) 881/2004 of European parliament and Council from 29. April 2004 on establishing of European Railway Agency;
- 2004/050 Directive of the European parliament and Council on compensation in case of non-compliance with agreed quality requirements for railway freight transport;
- 2004/049 Directive of European parliament and Council on the rights and obligations of passengers in international railway transport;
- 2004/049 Directive of European parliament and Council from 3.3.2004 on certification of train crews operating locomotives and trains on railway network of the Fellowship;
- 2001/014 Directive of European parliament and Council 2001/14/ES on the allocation of capacity of railway infrastructure, the levying of charges for the use of railway infrastructure and safety certification;
- 2001/013 Directive 2001/13EC of European parliament and Council from 26. February 2001 amending Council Directive 95/18/CE on licensing of the railway use [Ú. v. L 75 z 15 .03.2001];

- 1995/019 Council Directive 95/19/EC from 19. Jun 1995 on determination of capacity of railway infrastructure and charges for infrastructure use;
- 1995/018 Council Directive 95/18/EC from 19. Jun 1995 on authorizing the use of railways.

Other laws are available in the relevant literature or in the Collection of Laws of the Slovak Republic.

## 5 Analysis of the facts in connection with the construction of wide-gauge railway

Among the strengths shown by the subjective view of the author belongs:

- strategic position of Slovakia in transnational logistic chain of goods flows,
- incomes for manager of infrastructure, thus for the state budget,
- creation of many job opportunities during the construction but also during the track operation,
- improvement of domestic infrastructure.

Weaknesses of the project could handicap the construction resp. mainly these factors have negative effect:

- huge financial investments into the construction and operation of railways,
- long time horizon of return of investment,
- possible complications with the gaining of private properties for the need of construction,
- possible geological complications in relation to the relief of Slovak republic.

Among the options respectively opportunities that could, from the project for the construction of this track, result for the Slovak Republic are:

- greater use of combined transport and terminals,
- visibility of Slovakia and possible inflow of foreign capital,
- shortening the transit time from Asian countries to Europe,
- possible use of track for passenger transport.

While mentioning the threats, it is necessary to point out that it is only a potential risk. About their realizations often determines the factors that are beyond the given issue, sometimes it can be a random factor, for example:

- lack of interest in freight transport,
- extremely weak usage of track capacity,
- increase of the work price due to unpredictable weather conditions,
- outflow of the capital and investors towards the east, due to lower labor costs,
- significant reduction of the transport volume via a transshipment Čierna nad Tisou.

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**Conclusions**

The intention of contribution is to clarify the eventual benefits as well as drawbacks caused by the construction of wide-gauge railway across the whole territory of the Slovak Republic, i.e. from its current terminus in Haniska near Košice to Bratislava and then to the state border (with the continuation outside SR).

This topic is quite specific and therefore it is very difficult to find a parallel to the said project. However, since this is a significant step into the future not only for the transport aspect of the position of the Slovak Republic in Europe, or even in the world, it is necessary to pronounce the final verdict.

It is therefore only to competent in what direction the project (which was first time presented in some way already more than ten years ago) will involve. Of course, there are many questions unanswered and even more the risks associated with this project - whether an inaccurate forecast of investments in construction, underestimating of other factors in the construction or in pessimistic estimation, low interest and the associated inefficiencies in usage of wide-gauge railway.

An overall analysis of the mentioned problems is the conclusion to continue and still support the idea of building resp. extension of the wide-gauge railway through the territory of the Slovak Republic, however in line with current economic and political situation.

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