

## Railway Development in Light of Market Needs: A SWOT Analysis of the Rail Transport Markets in the Visegrád Four Countries

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ARTICLE INFO	ABSTRACT
<p>Article History</p> <p>Received 30 July 2020; Accepted 14 December 2020</p> <hr/> <p><i>JEL Classifications</i> O18, L92, R58</p>	<p><b>Purpose:</b> This paper intends to provide a comparative analysis of the Czech, the Hungarian, the Polish and the Slovak railway development strategies in light of the evolution of transport needs, travel habits, freight volumes, and regional business relations. By offering a general SWOT analysis through real-life examples, the paper shall contribute to the better understanding of railway development trends in the Visegrád states.</p> <p><b>Design/methodology/approach:</b> The research's scope is to identify the real motives and triggers of railway modernization and construction policies in the Visegrád Four countries (the Czech Republic – “Czechia”, Hungary, Poland and the Slovak Republic – “Slovakia”). Through the quantitative research of international, national and corporate transport databases and surveys, as well as the analysis of EU strategies and V4 presidency programs, the paper concludes that the regional rail transport market has clear advantages with constantly growing traffic and every time more actively trading companies.</p> <p><b>Findings:</b> The study found that the V4 railway integration is in major part powered by the EU's development funds and communitarian regulations support the competitiveness of rail services in the region. However, the efficiency of train services ranks below the communitarian medium level in most of the V4 states. Therefore, if Visegrád countries wish to close up with their western neighbors, the frequency, the speed and the quality of train services must improve.</p> <p><b>Research limitations/implications:</b> As this study provides a general insight to Visegrád railway development strategies from a market perspective, future researches might focus on the political motivations of such infrastructure projects. Further papers might also investigate the possible impacts of railway developments on the employment, cultural and business relations, travel habits, tourism, and environmental protection in the Visegrád area.</p> <p><b>Originality/value:</b> By offering a general SWOT analysis through real-life examples (dated from these countries' EU accession), the paper shall contribute to the better understanding of railway development trends in the Visegrád states. The research primarily focuses on the relationship, causal mechanisms, interactions, and dynamics between infrastructure investments and the concrete needs of the transport sectors of these states. The analysis has multiple levels including that of state actors, sub-state regional entities, railway undertakings, and transport corridors. In order to provide a global European view on the evolution of rail transportation, V4 statistical data is compared to European average numbers all through this study.</p>
<p><b>Keywords:</b> <i>Transport, railways, integration, development, statistics, SWOT</i></p>	

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## 1. Introduction

The research's scope is to identify the real motives and triggers of railway modernization and construction policies in the Visegrád Four countries (the Czech Republic, Hungary, Poland and the Slovak Republic).<sup>1</sup> Through the quantitative research of international, national and corporate transport databases and surveys, as well as the analysis of EU strategies and V4 presidency programs, the paper concludes that the regional rail transport market has clear advantages with growing traffic and actively trading companies. Talking about strategic transformations related to the Eurasian transport integration, Pepe J.M. (2018) argues that the emergence of deeper economic interdependencies among developing countries led to the reconstruction of existing corridors and the exploitation of new trade links on the East-West axis. The European Union's South East Transport Axis project's analysis (SETA, 2012) on transport development plans and the Valdai Discussion Club's report on the North-South transport corridor (Karavayev & Tishehar, 2019) confirmed the potential of railway corridors from Scandinavia to South-East Europe and Central Asia addressing V4 territories. The 2010-2011 annual report of the Community of European Railway and Infrastructure Companies (CER, 2011) also stressed that the V4s' development concepts to boost the position of the railway sector contributes to the creation of an energy efficient, environmentally friendly, and safe transport grid while promoting economic growth and regional cohesion. The same conclusions can be traced in a recent development potential report of the International union of railways (UIC, 2020) on Eurasian corridors.

This paper discusses that ensuring interoperability between railway lines is also essential for the competitiveness of the sector. The technical strategy (EIM, 2008) of European Rail Infrastructure Managers defines the specifications for interoperability to be applied for both the passenger and freight sectors to provide faster and heavier trains, reduced costs, and smarter technologies for operation. This study shows the possibilities and the gaps of the Visegrad countries' railway systems in this field with special regards to future strategies.

However, the lack of sufficient connections, the relatively substandard technical parameters and the concentrated markets are still impeding rail's competitiveness relative to other modes in these countries. Therefore, by offering a SWOT analysis through real-life examples (dated from these countries' EU accession), the paper shall contribute to the better understanding of railway development trends in the Visegrád states. Bouraima *et al.* (2020) employs a SWOT matrix in their study on the railway system's development strategy of the West African Economic and Monetary Union to demonstrate the crucial role of the sector for the economies. The same method was followed by Sun *et al.* (2018) in their analysis on the competitive development strategy of the China railway express.<sup>2</sup>

The research primarily focuses on the relationship, causal mechanisms, interactions, and dynamics between infrastructure investments and the concrete needs of the sector. The analysis has multiple levels including that of state actors, sub-state regional entities, railway undertakings, and transport corridors. In order to provide a European view on the evolution of rail transportation, V4 statistical data is compared to EU average numbers. In order to verify the structural advantages of the V4 countries as far as their ability to get targeted EU funding for railway development is concerned, the paper provides a comparative statistical analysis based on data retrieved from the European Commission's CEF database, showing the ratio between all transport grants and railway-related financial resources from 2014 to 2019. Through targeted research of EUROSTAT databases and statistical yearbooks, this study aims at highlighting the strengths and the weaknesses of the V4 countries' railway systems compared to the rest of the EU. With the aim of having a V4-focused study on the evolution of the railway market, statistical trends are proposed in this paper by data retrieved from the above-noted sources for the evolution of the number of operators, the transport figures of goods and passengers, modal shift, as well as the market shares of domestic incumbent operators and new entrants. Through keyword-searches of ministerial communiqués, annual reports of national railway undertakings, V4 presidency programs, studies of international railway organizations and thematic newspaper articles, this paper identifies common V4 railway development goals.<sup>3</sup>

The enlargement of the European Union in 2004 gave impetus to trading links between Eastern and Western European economies. Consequently, the Czech, the Hungarian, the Polish and the Slovak railway systems began to report promising figures for the intensity of use mostly driven by freight services. This paper also seeks answers on how the funds and regulations of the European Union shape the Visegrád cooperation's transport strategies as railway routes in this region are important parts of the European network. Such endeavor is attended to be reached by proposing a quantitative synthesis of railway investments supported by EU financial mechanisms in the 2014-2019 programming period.

The research completes the Author's previous studies about transport interest articulation in Central Eastern Europe, about the background of high-speed railway constructions in V4 countries, as well as about the role of EU tools enhancing the railways' interconnectivity in the Visegrád countries.

## 2. Strengths: Structural Advantages and EU Funds

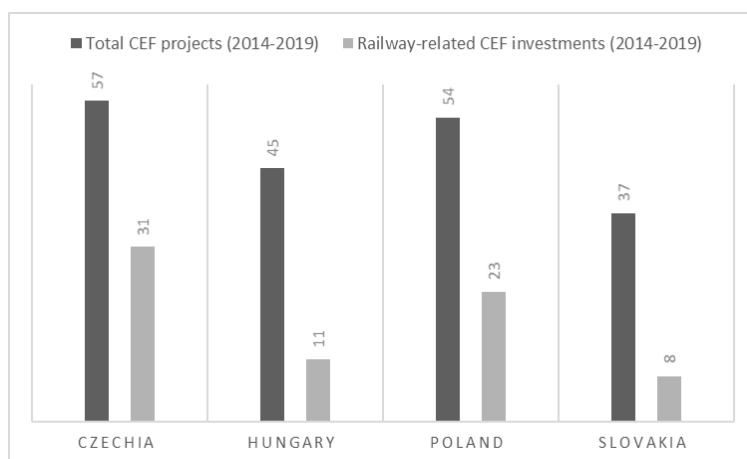
Over the years, the V4 cooperation introduced ministerial conferences and experts group meetings of rail professionals in order to harmonize their positions towards the sectoral policies of the European Union. Being net recipients of EU structural funds, the four states are active players in the informal "Friends of Cohesion Policy" club and managed to get the highest amount of EU funds per capita for the 2014-2020 multiannual financial period. Visegrád states put emphasis on the exchange of experiences in the implementation of railway constructions co-financed by such funds. The EU Cohesion Policy contributes to the improvement of the region's public transport services by the procurement of modern rolling stock, the upgrading of railway infrastructure or the construction of

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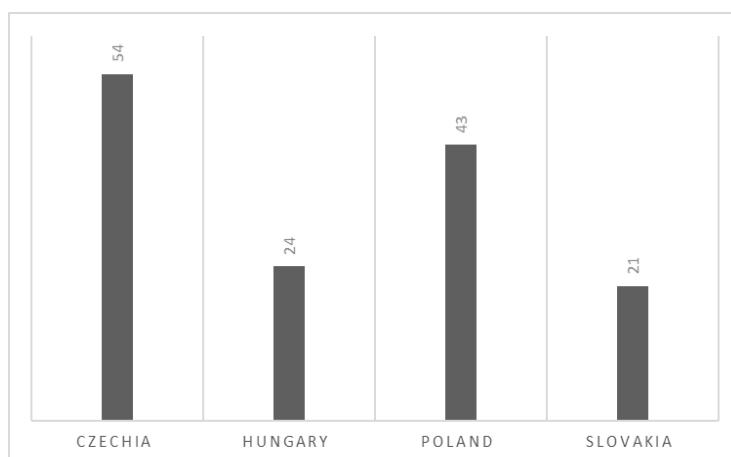
new sections. V4 regional railway integration is in major part powered by EU funds and policies. The deployment with modern train control systems and various line rehabilitation as well as construction projects shape the Visegrád countries' main infrastructure strategies (Tóth, 2018b).

The EU's Multiannual Financial Framework ("MFF") provides the main tools for V4 railway investments amid its distinct pockets for mobility: Connecting Europe Facility ("CEF"), Shift2Rail, Cohesion Fund, etc. The 2021-2027 MFF gives priority to cross-border railway projects. Even the previous (2014-2020) communitarian budget offered 41.6 billion euros as blended (public & private) financing for the realization of transport development projects. Additionally, the Commission allocated 11.3 billion euros from the Cohesion Fund to improve transport infrastructure in 15 less developed EU countries (European Commission, 2018).

Rail has a paramount share in the Czech and Polish transport development activities. During the 2014-2019 programming period, Czech beneficiaries received 1.1 billion euros co-funding from the Cohesion Fund as part of CEF projects. Such grants contributed to investments (works and studies) of a total value of 1.6 billion euros in that timeframe. As much as 54% of such initiatives were directly related to railway development, thus the major part of EU funds (1.062 billion euros) supported the sector. In the same period, Hungarian bidders were granted 1.1 billion euros co-funding (primarily from the Cohesion Fund). Such grants contributed to transport investments of a total value of 1.3 billion euros. About 24% of these projects were linked to railway investments with a budget of 860 million euros altogether. In the given timeframe, Polish beneficiaries were transferred 4.2 billion euros as CEF Transport co-funding (out of which €4.1 billion came from the Cohesion Fund). These grants contributed to investments totaling 6 billion euros. 43% of these initiatives were railway infrastructure development activities, counting for a total budget of more than 3.5 billion euros. In Slovakia, transport projects were granted 712.4 million euros CEF co-funding, out of which more than 704.7 million euros were transferred from the Cohesion envelope. Such grants contributed to investments valued at 927.5 million euros. All things considered, 8% of the Slovakian CEF projects focused on railways and these initiatives received almost one third of the total contribution (Connecting Europe Facility, 2019).



**Figure 1. Selected CEF projects in the 2014-2019 programming period**  
Source: Own representation (Connecting Europe Facility, 2019)



**Figure 2. Proportion of railway investments within CEF-funded projects (2014-2019)**  
Source: Own representation (Connecting Europe Facility, 2019)

The majority of the incumbent V4 railway undertakings have their own financial resources to invest in development projects. With the exceptions of the Czech railway infrastructure manager and the Polish public railway group, all main companies closed the 2018 accounting period with balances in hand.

**Table 1. Annual reports of V4 railway incumbents**

2018	Net profit / loss
Czech Railways	<b>45.96 million euros</b>
SŽDC	<b>-20.52 million euros</b>
MÁV Hungarian State Railways	<b>32.42 million euros</b>
MÁV-Start	<b>28.57 million euros</b>
PKP Polish Railways	<b>-29.53 million euros</b>
ŽSR Slovak Railways	<b>171,846 euros</b>
ŽSSK	<b>37,376 euros</b>

Source: Own representation (Annual reports ČD, 2019: 7; Összevont, 2019; Annual report MÁV-Start, 2019; Annual report PKP, 2019; Annual report SŽDC, 2019; Annual report ŽSR, 2019; and Annual report ŽSSK, 2019)

The Visegrád area is characterized by a relatively dense intertwining of transport networks. At the time of their EU-accession, the Czech Republic, Hungary and Poland had the longest railway network among the new Member States, which altogether constituted the 79% of the new EU Countries' railway system (Kartal, 2007). The Czech Republic has one of the densest railway networks in Europe (122km / 1,000km<sup>2</sup>) and the densest among V4 countries (ECORYS, 2006a).

**Table 2. Electrification level of V4 railway lines, as of 2018**

	Functioning railway lines (length)	Electrified railway lines (%)
Czech Republic	9,567km	<b>34%</b>
Hungary	7,441km	<b>41%</b>
Poland	19,307km	<b>61%</b>
Slovak Republic	3,627km	<b>44%</b>

Source: own representation (Eighth Annual Market Monitoring, 2020)

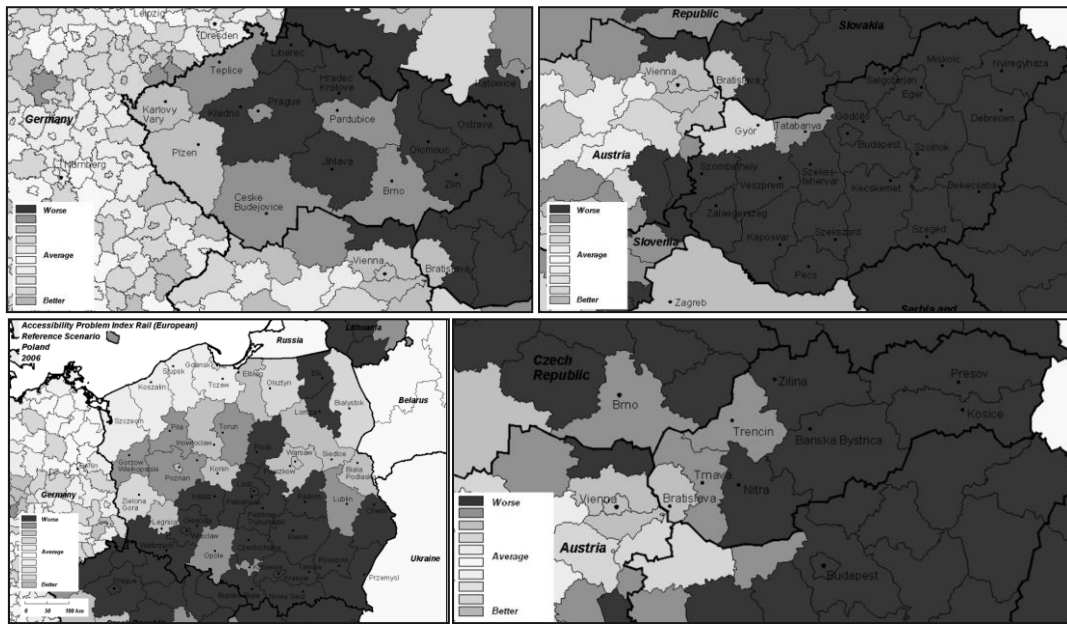
As of 2018, the average electrification level in Europe (EU 28, plus Serbia, Kosovo, and the Republic of North Macedonia)<sup>4</sup> stands at 55%, while such figure is around 44% in the Visegrád States. Poland is the only V4 country in which the length of functioning railway lines had a notable growth over the past years. From 2017 to 2018, altogether 56km of newly built tracks were inaugurated in the biggest V4 country, which meant an 0.3% increase, in contrast to the European average decline of 0.14% (Eighth Annual Market Monitoring, 2020).

### 3. Weaknesses: Room for improvement

In the first years of their EU membership, road accessibility rates in Czechia and Hungary were close to European standards, but the rail accessibility was relatively underdeveloped in all the V4 states with the poorest regions being deprived from fast and reliable train services to the capital cities or the local economic centers. At the time of its EU accession, Poland had to deal with accessibility problems with serious regional disparities. The Baltic region had accessibility above the national average and close to the European levels, whereas the areas bordering Czechia, Slovakia, Ukraine and Belarus were below domestic and European standards. The situation has improved primarily due to cohesion policies. (ECORYS, 2006b).

Transportation modes in V4 countries predominantly developed by the routes of major freight movements between the European Communities and the former Eastern Bloc countries. Consequently, the Visegrád countries' railway network lacks major north-south connections (Tóth, 2018a). The problem of the relatively scarce and underdeveloped north-south rail routes is reflected by the 9-10 hours average journey time between Budapest and Krakow (625km). By comparison, trains run the approximately 611km long east-west Budapest-Prague route in only 6 hours. The presidency programs of the V4 cooperation give special focus to the development of north-south routes, emphasizing Central Europe's need for infrastructure guarantees managed as collective European programs. Additionally, Visegrád countries together with Croatia decided to tackle regional challenges of mutual concern, particularly to develop the north-south axis of the region's road and rail transport network.

Another element that obstacles the creation of smooth crossborder rail connection between V4 countries is that the region is not a homogeneous in terms of a number of certain decisive technical parameters. Hungary predominantly uses alternating current 50 Hz / 25 kV, while the power supply system in Poland is dominated by direct current 3 kV. The Czech Republic and Slovakia operate mixed electrification systems. The proportion of standard and broad-gauge rail lines in use also varies the four CEE countries (Eurostat, 2020c; Statistical yearbook, 2019).



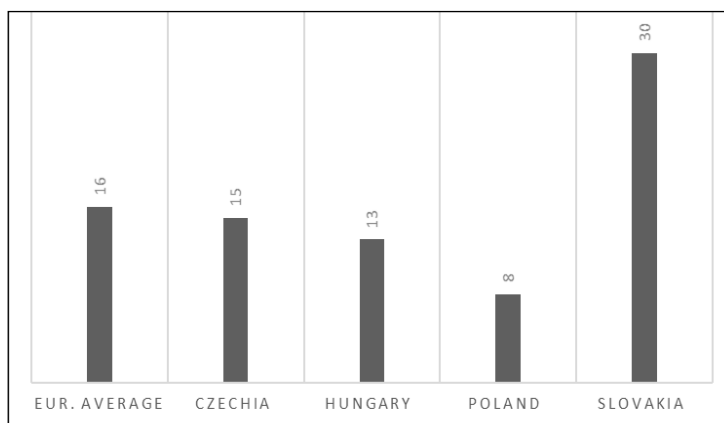
**Map 1. Accessibility of rail services in the Visegrád Four**  
 Source: ECORYS, 2006a; ECORYS, 2006b; ECORYS, 2006c; ECORYS, 2006d

Until their accession to the European Union, V4 governments had not been efficient enough in combining track infrastructure and rolling stock assets to deliver considerable economic outputs. The total capital productivity levels in terms of technical efficiency of the national railway companies were under Western European levels. Rail infrastructure thus needed to be improved to attract passengers, boost cross-border cooperation, and draw trade partners to the region. The relatively poor conditions of the Visegrád states' railways services led to passengers switching from rail to cars. According to a 2018 rating, based on a survey evaluating frequency, punctuality, speed and price of train services, the efficiency of train services ranked below the communitarian medium with only the Czech results being above EU average (EU Transport Scoreboard Country Factsheets, 2020).

The objective of these four governments was to improve the performance of the sector by investing in infrastructure and signalling, safety and traffic control devices, and the modernization of the rolling stock (Tóth, 2019). Their main initial problem was that the railway industries have been very concentrated in the 1990s, and the robust structures of the national railway companies impeded their ability to respond quickly to new challenges and go through extensive structural reforms (Griffin, 2007). By 2017, ratings of the quality of railroad infrastructure in the Czech Republic and Slovakia have grown above European standards, although, in Hungary and Poland such indexes still rank below the EU average (European Commission, 2018a). Ensuring interoperability between railway lines is essential for the competitiveness of this type of transport mode. The main directions of V4 states' railway strategies are in line with the conclusions of the review (C4R, 2015) of existing practices to improve capacity on the railway network elaborated by the EU-funded Capacity for Rail project. In order to increase the modal share of railways, it is indispensable ensuring adequate capacity and punctuality in line with market needs by the promotion of intermodality and interoperability (C4R, 2015). The deployment with the second level of the European Train Control System (ETCS) and various rehabilitation, as well as construction projects on key railway corridors have been at the core of the Visegrád countries' infrastructure development strategies. All V4 countries take part in the cooperation of the European Commission, manufacturers, infrastructure managers as well as undertakings from the rail industries of EU Member States to deploy the European Rail Traffic Management System ("ERTMS"). According to recent deployment plan deadlines, the system on the core network corridors passing through the V4 region will be implemented within a five-six year term (Commission Implementing Regulation, 2017).

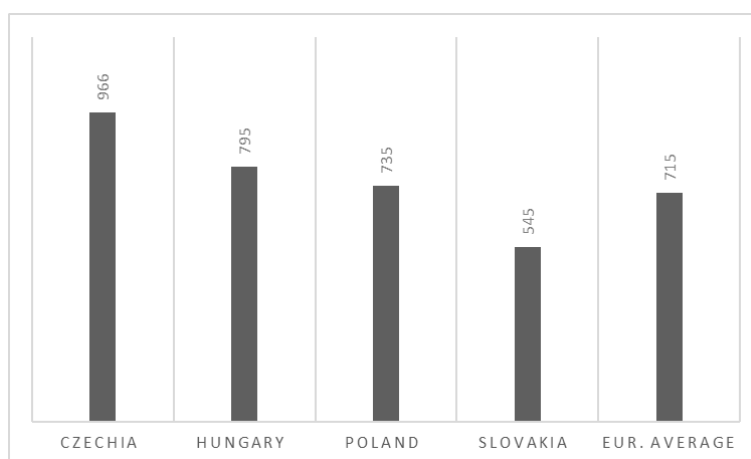
Multilevel V4 meetings normally pay attention to traffic problems caused by bottlenecks. In order to facilitate cross-border rail traffic, a high-level working group on transport connections was launched to coordinate the implementation of the relevant V4 agreements (Programme of the Slovak Presidency, 2014). The V4 Rail Roundtable was formed in 2017-2018 as a platform for railway expert discussions about how to increase competitiveness of rail transport along the north-south freight corridors and exploit railway infrastructure developments by sharing best practices among Central East European terminals and freight companies.

With regard to travel habits, in most of the V4 countries there is room for improvement to reach the European medium level as far as weekly rail usage is concerned among the inhabitants. According to a 2018 representative survey, 16% of the EU's population uses domestic passenger train services (long-distance, regional and suburban – except for metros and trams), at least once a week. The proportion of weekly train users in Slovakia is almost 2 times higher than the EU average, while in the rest of the V4 states, such ratio is below the communitarian medium (European Commission, 2018b).



**Figure 3. The weekly usage of domestic passenger train services (%)**  
Source: Own representation (European Commission, 2018b)

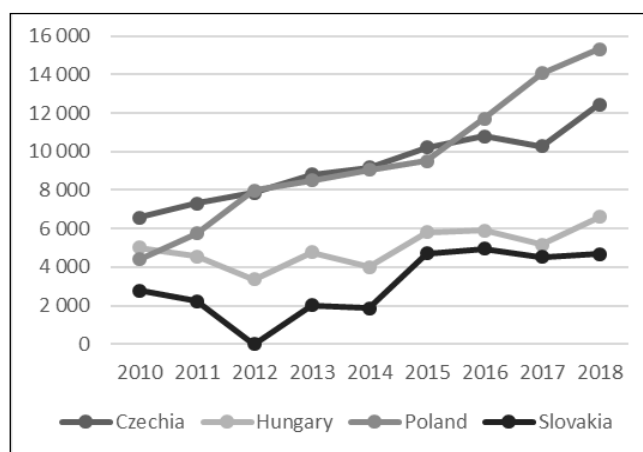
However, calculating the number of kilometers ran by passenger trains per one inhabitant one can have a different picture about V4 travel habits. This indicator shows the average distance travelled by one citizen in a given country. The Czech Republic ranks as the first among Visegrád states with 966 passenger-km per inhabitant in the year 2018, followed by Hungary (795 passenger-km), Slovakia (735 passenger-km), and Poland (545 passenger-km), compared to the European average of 715 passenger-km a year. (Eighth Annual Market Monitoring, 2020). This means that in the V4 region, Czech people are most likely to travel longer distances by train and that at a European level, V4 citizens, in general, are more likely to use this transportation mode to travel between cities.



**Figure 4. Distance travelled by one inhabitant in 2018 (kms)**  
Source: Own representation (Eighth Annual Market Monitoring, 2020)

#### 4. Opportunities: Promising Results

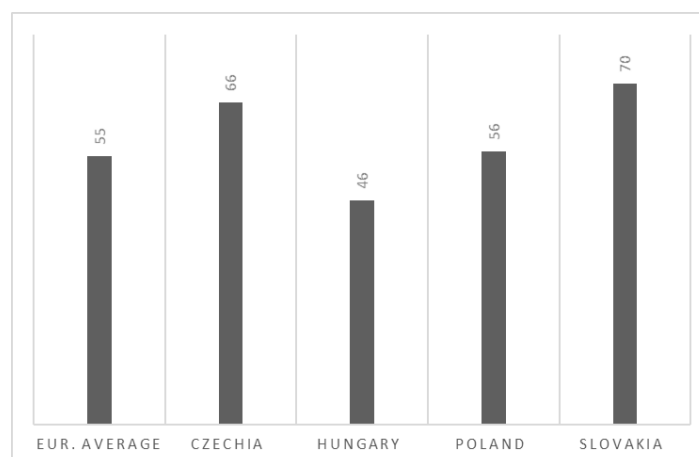
From 2009 to 2018, the number of railway operators has doubled in the Czech Republic, and increased by 40% in Poland. The growth has been less notable in Slovakia (25%), Hungary, in exchange, witnessed a quite notable evolution in this field as the number of railway undertakings has multiplied by 26. In 2018, there were 49 active railway companies registered in Czechia, 52 in Hungary, 78 in Poland and 20 in Slovakia (Eurostat, 2020b). In the Czech Republic, 78% of all train movements is effectuated by passenger trainsets, while in Poland it's "only" 65%. Altogether, 73% of the trains circulating on the Visegrád railway lines are operated by passenger undertakings as opposed to the European average of 81%. In the past years, both freight and passenger rail traffic has increased at the same rate across Europe. (Eighth Annual Market Monitoring, 2020). While through the past 10 years, 17-18% of the total cargo shipments has been handled on rails in the European Union, V4 Countries have reported more favorable ratios for the sector with data around or above 30%. At the time of the country's EU accession, the Czech Republic ranked in the fourth position in Europe with respect to freight railway traffic in terms of millions of tons (ECORYS – CZ, 2006).



**Figure 4. Annual railway transport of goods (containers & swap bodies, thousand tons)**  
Source: Own representation (Eurostat, 2020a)

The Polish rail freight market, which witnessed the sixth highest growth from 2017 to 2018, ranks as the second largest in Europe (between Germany and France). As far as the freight capacities of railway infrastructures are concerned, Poland has the second highest load factor after North Macedonia among the European countries with standard gauge rail tracks (1,435mm) measured by the “ton km per train km” indicator (Eighth Annual Market Monitoring, 2020). Market shares of the domestic incumbent rail freight operators stand around the average European level in the V4 countries, with the Hungarian market being the less concentrated. Only one of the 27 active rail freight undertakings in Hungary can be seen as incumbent, whereas about 80% of the total freight movement on the Hungarian network is international. In the Czech Republic and Poland, the rail freight business is categorized as highly concentrated. Apart from the publicly owned ČD Cargo, there are 78 rail freight companies actively doing business on the Czech network.

There are 72 trading rail freight operators on the Polish market. Besides the state-owned PKP Cargo that controls a market proportion of around 40-45%, 20 other undertakings have market shares over 0.5%. However, all market players are considered to be in competition with each other. In Slovakia, there are 38 rail freight undertakings besides the publically owned ŽSSK Cargo.

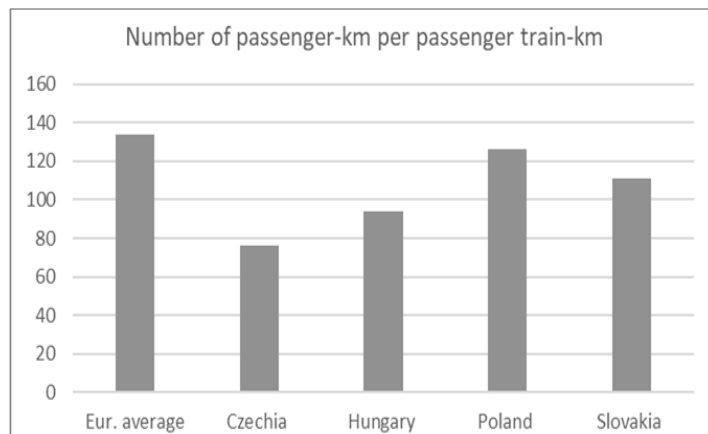


**Figure 5. Market share of the domestic incumbent rail freight operator, as of 2018 (%)**  
Source: own representation (Eighth Annual Market Monitoring, 2020)

Market share discrepancies between leader and less significant business entities indicate the incumbent company’s competitive advantages *vis-à-vis* the rest of the undertakings, thus showing possible barriers to new-joiners on the market. In the four Visegrád states, 59.5% of the rail freight market is covered by the national incumbent operators. Market entrants face the most difficult situation in Slovakia, where the company with a historically dominant national position operates the 70% of all freight trains, whereas in Hungary, only the 46% of such services are managed by the domestic incumbent. By contrast, such portion in the European countries stands at around 55%. In the Slovak Republic, there are no foreign incumbents, in Czechia and Hungary they have a quite modest market representation (1% and 2%, respectively), while in Poland, foreign dominant operators manage as much as the 10% of all freight train services, which number stands quite close to the European average of 13% (Eighth Annual Market Monitoring, 2020).

In the Visegrád region, passenger trains altogether ran 43 billion km in 2018, which is 8.7% of all European passenger train movements. The number of inhabitants living in the Visegrád countries give 12,4% of the total EU population (EU population, 2019). Rail passenger traffic has increased in all V4 countries from 2017 to 2018, with the Czech Republic reporting the most significant (8%) and Hungary registering the less notable (0.5%) increment

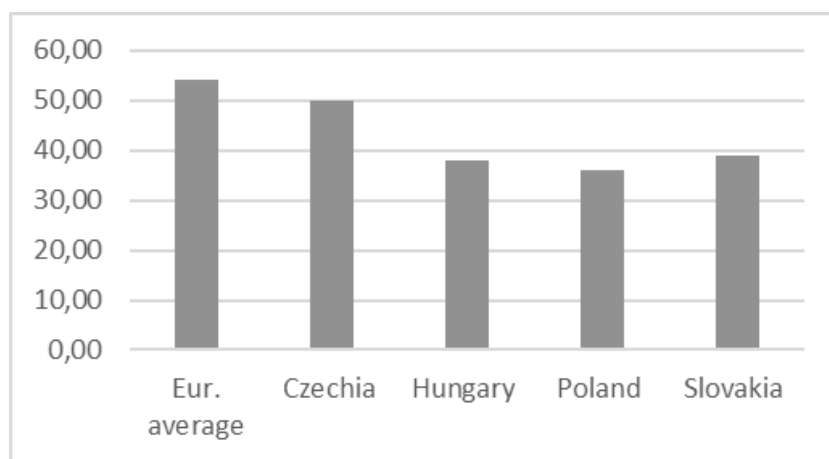
compared to the 4% European average. By dividing total passenger-kms by total train-kms, one can get an indicator that gives a realistic picture about rolling stock capacities. As of 2018, Poland leads the way among the V4 countries in such ranking, followed by Slovakia, Hungary and Czechia. Visegrád states, however, rank below the European standard: the trainsets are shorter and / or have less seats (Eighth Annual Market Monitoring, 2020). However, prior to the 1989 regime changes, both Hungary and Czechoslovakia had quite sophisticated rail manufacturing know-how and industries supplying rolling stock to other Eastern Bloc countries (Griffin, 2007). Such characteristic gives a strong basement for the current rolling stock manufacturing capacities of these states. Rail vehicle production is still an active business in all V4 countries.



**Figure 6. Rolling stock capacities in the V4 countries, as of 2018**  
Source: own representation (Eighth Annual Market Monitoring, 2020)

Across the Visegrád countries, public service obligation services accounted for 94% of passenger train movements, which exceeds the European average by 12 percentage points. In the Czech Republic and Poland, the share of PSO traffic on the supply side is higher than on the demand side. In the V4 region, companies with historically leading market positions have a share of 82% in the passenger rail business, with Hungary reporting the highest proportion (97%) and Poland registering the smallest share (58%) for domestic incumbent undertakings. By contrast, the European average market share of domestic incumbents is 77%. Among V4 states, in terms of train kilometers per year, as of 2018, Poland has the largest market proportion (59%) of non-incumbents, while in the rest of the Visegrád allies such share stands below 8%. The European standard market share for non-leaders is 18%. The presence of foreign-registered incumbent passenger undertakings is traceable only in Poland with a market proportion of around 1% as opposed to the European average of 11%. (Eighth Annual Market Monitoring, 2020).

In V4 countries, similarly to most of other European states, the railway tracks are primarily used by passenger rather than by freight services. In 2018, 78% of the network users in Czechia were passenger trains. In Hungary, passenger trains had an 81.6% share, in Poland and Slovakia such proportions were 63.9% and 69.2%, respectively.

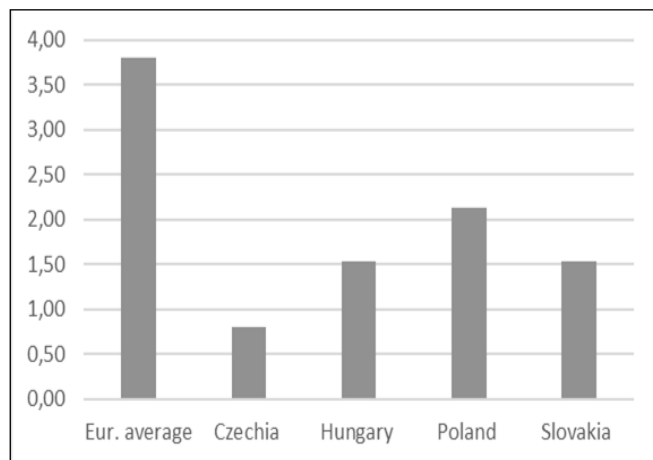


**Figure 7. Network usage intensity in V4 states (train km/route-km/day)**  
Source: Own representation (Eighth Annual Market Monitoring, 2020)

As of 2018, Visegrád average price of a minimum track access package is around 1.5 euros, in contrast to the European standard 3.8 euros. In this region, passenger rail undertakings pay the 60.75% of the total track access charges, compared to the European average 88% (Eighth Annual Market Monitoring, 2020). It is essential to mention that passenger train compositions are shorter and lighter than freight trainsets, consequently such services generate less profit per one train, as track access charges are principally calculated based on axle-load and length indicators. The average minimum price of running a passenger trainset in the V4 countries is 1.26 euros per train (as opposed to

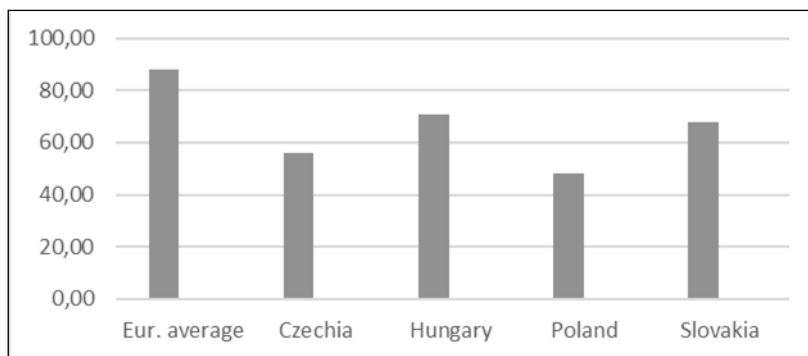


the European average of 4.33 euros per train units). At the same time, the cost of running a freight train is 2.15 euros per unit (that stands quite close to the European average of 2.56 euros). In both cases, the Polish prices are the most expensive and the Czech charges are the most favorable on the regional market (Eighth Annual Market Monitoring, 2020).



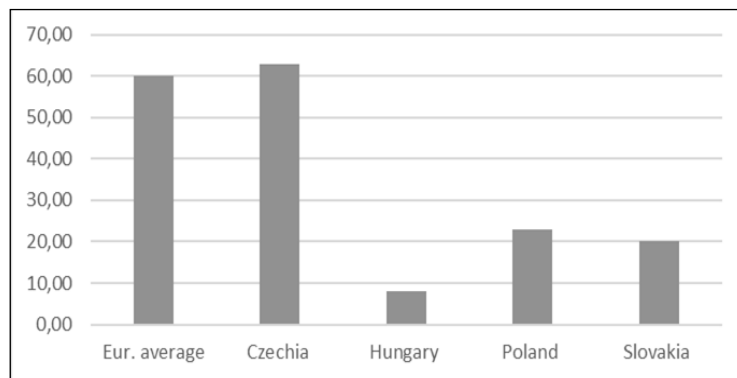
**Figure 8. Minimum track access charges paid by railway undertakings (EUR/train-km), as of 2018**  
Source: Own representation (Eighth Annual Market Monitoring, 2020)

As of 2018, the highest number of active railway undertakings was reported on the Czech market (as much as 102), while the smallest portion of trading railway companies was registered in Hungary (with 28 active undertakings on the market). The 88% of active railway undertakings in the V4 countries provided freight services as opposed to the average European portion of 71.5%. As far as their proportion is concerned, the biggest difference could be traced on the Slovak market, where the number of freight operators is almost 10 times higher than that of passenger undertakings. By contrast, in Czechia, the latter operators are around 4 times more the formers (Eighth Annual Market Monitoring, 2020).<sup>5</sup>



**Figure 9. Breakdown of the total track access charges by passenger services in 2018**  
Source: Own representation (Eighth Annual Market Monitoring, 2020)

The EU member states' practical cooperation in the field of railway policies culminates in the creation of the integrated trans-European railway network ("TEN-T"). V4 states support the strengthening of such cooperation as their major routes have become integral parts of priority transport axes. In the past 20 years, rail freight volumes between the EU and Belarus, Moldova, and Ukraine increased constantly. In contrast to TEN-Ts, Rail Freight Corridors ("RFC") are purely freight-focused cross-border governance mechanisms involving ministries, infrastructure managers, railway undertakings and terminals. The RFC network reflects concrete operational and market-driven demands, thus it covers routes outside of the TEN-T system, too.



**Figure 10. Length of the TEN-T Network completed at the end of 2016, compared to the total**  
Source: Own representation (EU Transport Scoreboard Country Factsheets, 2020).

Given their land-locked positions (with the exception of Poland) and the increasing level of Asia-Europe rail traffic, the strengthening of these countries' railway relations towards Eastern Asian countries is definitely advantageous for the region's performance in terms of international trade balances. The presence of Chinese companies, and the "Belt and Road" initiative of Beijing's diplomacy have resulted in the establishment of rail land-bridges via Visegrád Countries towards Western European destinations, significantly shortening the normally 30-40 day long sea routes and avoiding bottlenecks in Northwestern European logistical hubs. Such "Silk Roads" provide economic and geopolitical benefits for the states they cross.<sup>6</sup> Trade links between Europe and the Far East are slowly shifting from road or maritime routes to rail. The roughly 10,000km distance between Chinese and EU ports may be covered in 15 days by train through the Trans-Siberian route, as opposed to an average maritime trip of 30 days (Farkas *et al.*, 2016). Thus, the common V4 goal is to forward more goods on the railways.

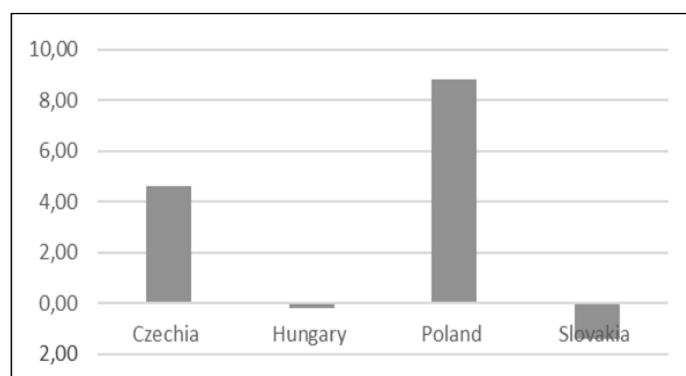
##### 5. Threats: The High-speed challenge and the shift in transportation routes

The modernity of rail services may be measured by the number of operating high-speed lines. Such cutting-edge systems have become symbols of modern transport services while contributing to regional integration amid social and economic development. High-speed trains could encourage people to shift from air to rail for both leisure and business. Industry associations forecast a minimum 10% compound annual growth rate for the passenger rail sector in the medium term as this sector could be the best response from the mobility system to population growth, rising standards of living and increased demand for transport (Burroughs, 2020).

However, if the V4 countries wish to take part in such boom, the frequency, the speed and the quality of passenger train services must improve. In addition, both the frequency and affordability of high-speed services depend on the market liberalization, in which Visegrád countries are lagging behind. V4 presidency programs include general discussions on the construction of future high-speed passenger rail lines in the region. Given the need for a fast north-south train service, during their February 2016 bilateral negotiations, the prime ministers of Hungary and Poland agreed to improve rail connections between their countries (The alliance, 2016). As of 2019, technical and profitability studies are being run related to such new high-speed passenger train service going up to 250-300 km/h.

From the Visegrád region, currently only Poland operates high-speed trains. As of March 2019, the Polish railway network had a 224km long HSR line that partially connects Katowice and Krakow with the capital city. The Polish Government plans to extend the country's HSR network to 598km in future. At the time of writing, the Czech Republic is the only other V4 state with intentions to build high-speed railway infrastructures with a planned extension of 810km (High Speed Lines, 2020). The Czech Republic plans to construct a 810km long HSR network (Velim team, 2018). Czechia considerable made progress in the implementation of a high-speed line that in time would connect Prague with the neighboring capital cities (Libor Lochman speaks, 2019). Hungary plans to build up a Budapest-centered modern and elevated speed railway network in Central Europe. As part of such endeavors, the upgrade of the Belgrade-Budapest rail line is expected to be completed by 2023. There are plans to build a HSR line between Budapest and Cluj (Romania) as well (The Visegrád Group to build, 2018). From 2017 to 2020, the Government intends to spend 4.8 billion euros on rail development projects increasing the country's electrified rail network to 3,300km (Cabinet Office of the Prime Minister/MT, 2017).

Another concern is the shift between Eurasian routes. Trans-Siberian shipments connecting Western European and Chinese destinations tend to prefer the (Kazakhstan)-Russia-Belarus-Poland route as opposed to the (Kazakhstan)-Russia-Ukraine-Hungary/Slovakia corridor resulting in growing freight volumes for the northern V4 countries and a drop for their southern allies. From 2017 to 2018, following European tendencies, rail freight traffic has increased in Czechia and Poland, too. Hungary and Slovakia, in contrast, witnessed a slight decrease primarily due to the East Ukrainian conflict that is still a burden on rail traffic routes passing through the country towards gauge-changing facilities in Slovakia or Hungary. Shipments from Ukraine occupy the leading position in the total commercial freight traffic of the Slovak national rail freight company ŽSSK as Slovakia has become one of the most important countries in transit transportation of commercial cargo from Russia towards Western Europe (Tóth, 2018b).



**Figure 11. Evolution of rail freight traffic in V4 countries from 2017 to 2018**

Source: Own representation (Eighth Annual Market Monitoring, 2020)

## 6. Conclusion

Summing up the strengths and opportunities, one must not forget that the V4 region is characterized by a dense railway network with connections to main international transport corridors. Research of market reports and annual balances of railway companies shows that the regional rail transport market has clear advantages with constantly growing number of enterprises reporting promising financial results. Rail traffic has increased in all V4 countries with operational costs being more affordable than the European medium. Freight services represent a considerable market share in the V4, which is a forward-looking attribute as far as shifting road freight traffic toward environmentally sustainable modes are considered. This study presents promising trends in the V4 countries for both rail freight and passenger services. While over the past 10 years, 17-18% of the total cargo shipments has been handled on rails in the European Union, V4 states reported proportions being twice as much as the EU average. As for passenger services, V4 citizens are more likely to use this transportation mode to travel longer distances than in the rest of the Community.

As part of the V4 cooperation, governments introduced ministerial conferences and working group meetings of professionals to harmonize their positions towards sectoral policies. The intergovernmental policy coordination has strategic relevance as Visegrád countries are net recipients of EU structural and cohesion funds. On one hand, by comparing the relative share of financial recourses provided by the European Union for railway development, this paper concludes that V4 railway integration is in major part powered by the EU's development funds being the main tool for investments amid specialized pockets. On the other hand, the Community's sectoral regulations support the competitiveness of the railways in the V4 region with special regards to the completion of the trans-European railway network of which Visegrád railway lines are becoming integral parts.

Talking about weaknesses and threats, it is essential to note that based on the market trends identified in this study, it can be stated that entering the rail markets of these four states is still more difficult than in Western Europe due to the strong positions of incumbents and the lack of absolute liberalization. V4 railway industries are still relatively concentrated with robust business structures. Compared to Western European levels, Visegrád rail infrastructures still show relatively low accessibility rates and substandard technical parameters leading to longer journey times. The lack of sufficient cross-border transport links and north-south connections is still a burden on competitiveness *vis-à-vis* other transport modes. The introduction of smooth V4 intraregional train services is also impeded by the technical heterogeneity of the four countries' railway infrastructures.

The efficiency of train services still ranks below the Communitarian medium in most of the V4 states. By giving a focused research of market reports and satisfaction surveys this study may help understanding why passengers tend to prefer road services over trains. If V4 countries wish to close up with their western neighbors, the frequency, the speed and the quality of train services must improve. In addition, the affordability of train services depends on the level of market liberalization, a policy field where Visegrád countries are lagging behind.

As this study provides a general insight to Visegrád railway development strategies from a market perspective, future researches might focus on the political motivations of such infrastructure projects. Further papers might also investigate the possible impacts of railway developments on the employment, cultural and business relations, travel habits, tourism, and environmental protection in the Visegrád area.

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## Endnotes

<sup>1</sup> The present study has been presented at the 12th International Conference "Economies of the Balkan and Eastern European Countries", EBEEC 2020, that has been online in Opatija, Croatia from May 29th to 31th 2020 (<http://ebeeec.ihu.gr>).

<sup>2</sup> A convincing SWOT analysis appears in a master degree thesis (Petracchini, 2017) at the Faculty of Civil and Industrial Engineering of the Sapienza University of Rome as a scientific technique used to prove (or disaffirm) the competitiveness of the rail transport sector the Sultanate of Oman.

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<sup>3</sup> In order to narrow down the high number of hits and identify the relevant information, contextual ‘intext’ searches have been run on the following terms (and their variations): “high-speed”, “railway development”, “railway investment”, “railway policy”, “railway construction”, “modal share”, “modal shift”, “shift to rail”, “rail transport market”, “boost rail”, “enhance rail”, “develop rail”, “promote rail”, “railway connections”, “railway lines”, “railway transportation”, “rail transport”, “railway network”, “railway infrastructure”, and “rolling stock”.

<sup>4</sup> The Independent Regulators Group’s 2020 market report gathered data from the then 28 Member States of the European Union, plus Switzerland, Serbia, Kosovo, and the Republic of North Macedonia, therefore, in the paper the terms “Europe” and “European” consequently are used for the above-noted geographic region.

<sup>5</sup> The First Railway Package (2001) gave operators the right to enter the trans-European network on a non-discriminatory basis. The Second Railway Package (2004) proposed safety regulations and certification procedures. The Package contained a directive on the allocation of infrastructure capacity and the levying of charges for its use. The Third Railway Package (2007) introduced open access rights for the provision of international rail passenger services. It also gave birth to a special European licensing for locomotive drivers, enabling them to circulate on the entire European rail network. The 2012 Single European Railway Directive laid down rules regulating the use of railway infrastructure for domestic and international rail services. The Fourth Railway Package (2016) completed the single market for rail services: the Single European Railway Area. By significantly reducing costs and administrative burdens for railway undertakings, the legal package’s technical pillar was intended to support the competitiveness of the railway sector vis-à-vis other transport modes. The Fourth Railway Package’s market pillar meant the final legal step towards market opening.

<sup>6</sup> The roughly 10,000km distance between Beijing and the German port city of Hamburg may be covered in 15 days by train through Mongolia (or Kazakhstan), Russia, Belarus and Poland, as opposed to an average maritime trip of 30 days (Farkas *et al.*, 2016).

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## Appendix

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- A1. Figure 1. Selected CEF projects in the 2014–2019 programming period
- A2. Figure 2. Proportion of railway investments within CEF-funded projects (2014–2019)
- A3. Figure 3. The weekly usage of domestic passenger train services (%)
- A4. Figure 4. Distance travelled by one inhabitant in 2018 (kms)
- A5. Figure 5. Market share of the domestic incumbent rail freight operator, as of 2018 (%)
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