Comparison of Railway Routes Enabling Freight Transportation from the Eastern Border of Poland to the West

Wojciech Kamiński(✉) and Aleksander Sładkowski

Faculty of Transport, Silesian University of Technology,
Krasińskiego 8, 40-019 Katowice, Poland
{Wojciech.Kaminski,Aleksander.Sladkowski}@polsl.pl

Abstract. This article presents railway routes currently used in freight transportation from the eastern border of Poland to western countries. Due to increasing number of transported containers, new alternative routes have been proposed. Then was made a comparison of these routes to determine if the parameters of the proposed routes do not differ significantly from the parameters currently used routes. In order to comprehensively compare the parameters, coefficients have been introduced allowing them to be combined with each other. Parameters that have been included among others the length of route, the number of tracks and the cost of access to the infrastructure. Subsequently calculation the average value of all parameters allow to evaluate the particular route and compare it with the others.

Keywords: Railway transport · Railway lines · Freight transport

1 Introduction

Due to the large volume of imported goods from Southeast Asian countries in recent years, there is an increase of freight transport in containers mainly from China to Western European countries. Most of the goods are delivered by sea, but some of them are transported by rail through the territory of Poland. A certain threat to the use of rail transport in freight transport from China to Western European countries is the imposition on Russia, through which runs all railways corridors, economic sanctions. In the first quarter of 2014, the turnover between Russia and the countries belonging to the European Union decreased by 3.4% [1]. The use of rail transport reduces transport time from 42–45 days in the case of sea transport, up to 15–17 days by using a train with containers [2]. In 2008, a little over 25 thousand tons of goods were transported in intermodal transport, and in 2013 it was already over 27 thousand tons. Still this transport in Poland is mainly related to the transport of containers to ports in Gdynia and Gdańsk, using mostly by car transport, however, the number of containers transported by rail transport also increases [3]. In 2011 according to the Office of Rail Transport, container transport services were offered by 7 railway carriers, who transported 30% more containers than in the previous year [4]. In 2018 container transports accounted for 97% of the total intermodal transport in Poland and their size was

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characterized by an upward trend, because 32.5% more of containers were transported than in the previous year. The vast majority of intermodal transport, as much as 73% was made in international transport [5]. Until the early 1990s, due to political and economic reasons, it was not possible to create a pan-European integrated intermodal rail network. The ongoing process of economic transformation has enabled the transformation of domestic large railway enterprises and the rise of new railway operators on the market, which allowed for the development of international transport [6]. Countries in Asia, such as China, Mongolia, Kazakhstan, have railway infrastructure in different condition, as well as various types of handling terminals, which is a certain difficulty when performing international transport [7]. Another factor to be taken into account in the performance of international transport is the cost of domestic rail transport in China, because production is concentrated mainly in the eastern regions and on the coast. Due to the considerable territorial size of the country, transport to the west, towards the border with Kazakhstan, is time-consuming and expensive [8]. Recently, the trans-Asian railway network has been developing, including railway connection Singapore-Kunming [9]. The international east-west transport corridor is not a single rail route. There is a connection of northern Europe with the Persian Gulf and various variants of routes leading from the east coast of Asia to the countries of Western Europe. The most important of them is the corridor of the Trans-Siberian railway route, then through Belarus, via Poland from Małaszewicze to Kunowice, then to Western Europe or via Ukraine, Slovakia and the Czech Republic to the west [10]. The connection of China via Kazakhstan, Russia, Belarus and Poland to western Europe was presented in 2004 as one of the versions of the Eurasian land bridge. The most involved in these activities were China, because the efficient connection enables problem-free export of goods, which is important for the Chinese economy [11].

Two main railway corridors are used to transport goods between the eastern and western Polish borders, from Małaszewicze to Kunowice and from Medyka to Bielawa Dolna. In connection with the increasing number of containers transported by these routes and the possible gradual overload of currently used container terminals, the possibility of using other terminals and planning new routes to them should be analyzed. The purpose of this article is to present new communication routes that can be used in freight transport from across the eastern Polish border to the west and their comparison with currently used communication routes. The parameters of currently used transport corridors and alternative transport routes will be compared.

2 Container Terminals in Poland

Due to the differences between the gauge used in Eastern Europe (1,520 mm) and in Central and Western Europe (1,435 mm) during transport goods from the east (e.g. from China) to Western countries it is necessary to make transshipment or change the wheelbase of wagons. The time required for reloading goods or changing the wheel spacing of wagons together with the document flow process at the border can reach up to 46% of the total time needed to complete the transport order. Changing the wheel spacing of wagons can be implemented by: replacing whole bogies, replacing wheelsets, or using a system of extended wheelsets [12]. The use of the SUW2000 system of

extended wheelsets, which has been tested in cross-border passenger transport at relatively short distances during freight transport over long distances is difficult [13]. It would be necessary to solve technical problems associated with the carriage of freight wagons over long distances, on different types of rails. Another limitation for this solution is the high cost of the system extended wheelsets, which makes it much cheaper to reload containers at a terminal located on the border or to change the bogies [14]. Wide gauge lines reach the eastern border of Poland, while normal-gauge lines are used for further transport. Container terminals are used for transshipment. Currently are over 20 container terminals in Poland located inside the country. Their number in the last 10 years has increased by 2/3, but they are distributed very unevenly. There are over 10 container terminals located on the Polish borders. They are located at the eastern border of the country with Ukraine and Belarus, at the western border with Germany and in the area of the Gulf of Gdansk serving sea transport [20]. All container terminals present in Poland are shown in the Fig. 1.

Most container terminals are located in the vicinity of Warsaw, Poznań, Łódź or Wrocław, while at the same time remaining areas without container terminals, what occurs in Podlasie, Warmia and Mazury and in Kujawy. One of the problems encountered during the construction of new container terminals is the fact that such an investment requires considerable financial outlay. The incurred costs are reimbursed after a long period of time, as a result of which investors choosing to build terminals limit their size to the minimum in relation to the planned use. Later, when there is an increase in transshipments, a terminal that does not have a significant reserve of its use requires expansion, which lasts a certain period of time, making it impossible to significantly increase container transshipment. The consequence of such a situation may be the loss of customers in the case of domestic transport for other types of transport, e.g. car transport, and in the case of international transport (as transporting East to the West) for other transport routes [15]. Due to the limited capacity of container terminals in Poland, railway transport corridors should be run in such a way as to enable the use of existing container terminals to the maximum extent.

3 Main Railway Lines in Poland

The map of major railway lines located on the territory of Poland is shown in the Fig. 2. This map shows the permissible speeds on these lines. Different colors correspond to the maximum speeds allowed on railway lines. The maximum speed allowed on the railway network in Poland is 200 km/h, which is reached only by passenger trains. In the case of railway lines with permissible speeds above 120 km/h, such a speed applies only to passenger trains, and freight trains do not exceed 120 km/h [21].

Currently, as the main directions of rail transport development in Poland (2020–2030), the following were adopted: modernization and revitalization of existing railway lines, modernization of existing ones and building new container terminals, modernization of stations and stops, and undertaking measures to improve the integration of rail transport with road transport [16].

3.1 Standard-Gauge Lines

The largest infrastructure manager on standard-gauge lines in Poland is Polish National Railways (PNR) Polish Railway Lines S.A. The company manages 18,513 km of railway lines, of which approx. 12,000 km (about 60%) is electrified. These lines are in a different technical condition and have different permissible speeds [22]. The percentage structure of maximum timetable speeds in the 2017/2018 train schedule is shown in the Fig. 3.

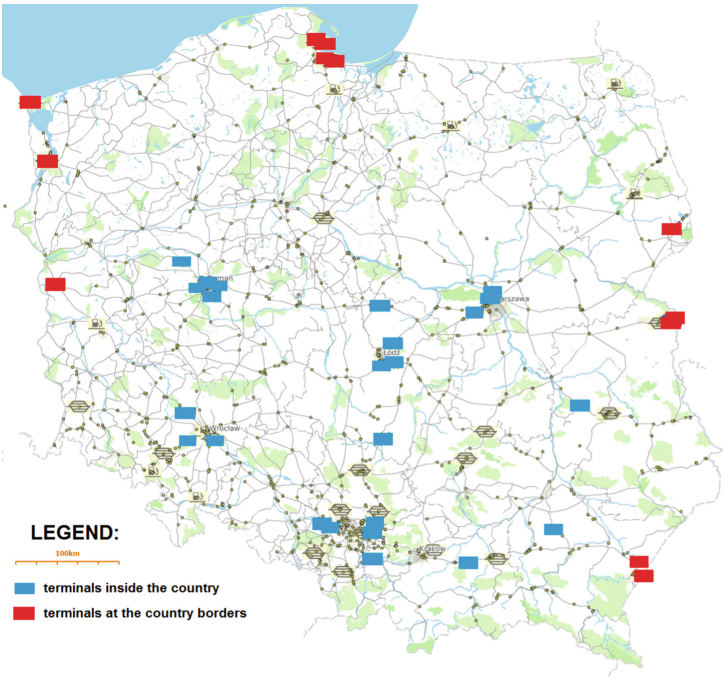

Fig. 1. Container terminals in Poland [20].

3.2 Broad-Gauge Lines

The longest broad-gauge line in Poland is the Broad-gauge Ironworks Line (BIL) running to Euroterminal in Sławków from the Ukrainian border in Hrubieszów through Zamość, Biłgoraj and Sędziszów. This line has the number 65. The total length of this line is 394 km, it is entirely monorail and non-electrified. The maximum speed is 80 km/h. The train traffic is run by the company PNR, which almost exclusively uses ST44 series locomotives and modernized ST40 version. The company is also the infrastructure manager of this broad-gauge line. The BIL line was built for the purpose of transporting goods, so its route bypasses larger cities and only freight train movements are run there. There are 9 stations on this line: Hrubieszów, Zamość Bortatycze (there is a rolling stock plant here), Szczebrzeszyn, Zwierzyniec Towarowy, Biłgoraj,

Wola Baranowska, Staszów, Sędziszów, and Sławków. In addition, there are 13 turnouts on the line [21]. The BIL wide-gauge line is a well-functioning, almost independent of the standard-gauge system lines.

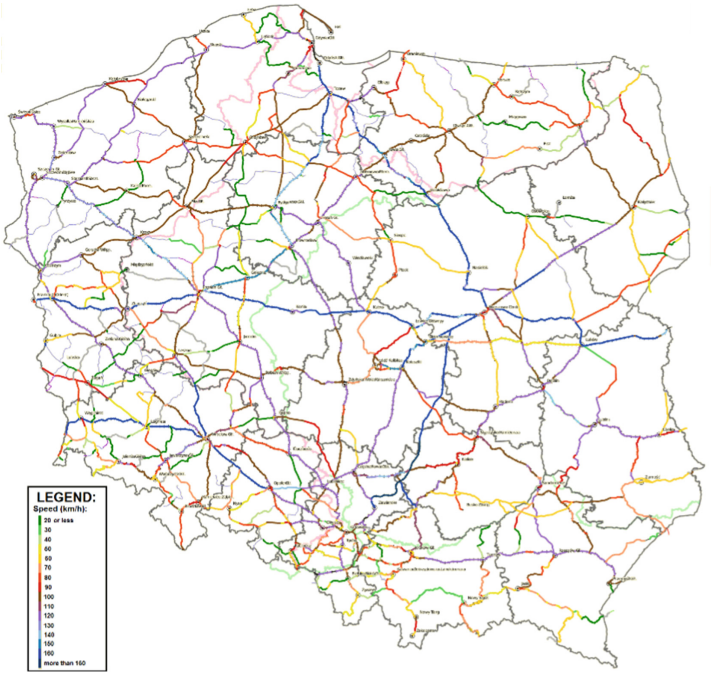

Fig. 2. Permissible speed on railway lines in Poland [21].

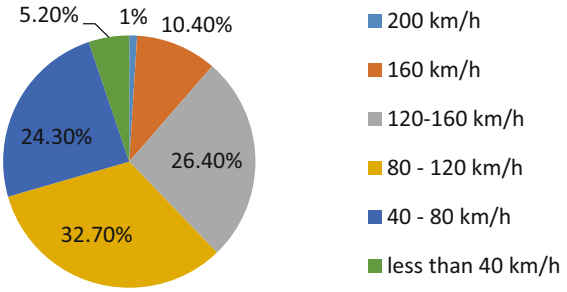

Fig. 3. Structure of maximum speeds on railway lines in Poland [22].

Other broad-gauge lines are: line number 217 from the country border in Braniewo to Bogaczewo, open in freight transport from Braniewo to Wielkie Wieżno, line number 205 from the country border in Wielewo to the fuel base in Kotki, line number 57 from the country border in Kuźnica Białostocka to Geniusze use from Kuźnica

Białostocka to Sokółka, line number 59 from the country border in Siemianówka to Chryzanów, line number 60 from the country border in Terespol to Kobylany, line number 63 from the country border in Dorohusk to the fuel base in Zawadówka, line number 116 from the country border in Werchrata to Kalpisze, use in freight transport from the border to the station Werchrata and line number 92 from the country border in Medyka to Przemyśl Główny, which is the only one of the broad gauge lines in Poland used in passenger traffic [21].

4 Currently Used Communication Routes

Different transport corridors are used for freight transport between China and Western Europe. One of them runs along the Trans-Siberian Railway route, the use of which is possible in two different ways: the shortest route from China to Western Europe is the variant running through Kazakhstan, while the most advantageous parameters have a route through Mongolia [17]. This route runs through the territory of Poland. The map of railway lines showing used communication routes on the territory of Poland enabling transportation of goods from east to west is presented in the Fig. 4. Broad-gauge railway lines are marked with blue color, standard-gauge lines allowing for freight transportation on the East-West routes with green color, while black color shows normal-gauge railway lines use in passenger and freight transport, and lines open only in freight traffic are marked with red color.

4.1 Use of Standard-Gauge Lines from Małaszewicze to Kunowice

One of the connections used in transport between east and west is the communication route from the terminal in Małaszewicze to Kunowice on the country border using the international railway transport corridor E20. Railway lines located on it are double-track and electrified. Freight trains from Małaszewicze goes to Łuków via modernized railway line number 2. The speed limit in freight transport in this section is 120 km/h, both freight and passenger trains run on this line. The section from Łuków to Skierniewice passenger trains passes through Siedlce and Warsaw, however, for freight trains is most often used, the Warsaw Ring Road line number 12 via Pilawa, which is an element of the CE20 transport corridor. This line, except for the short section Piława-Czachówek Wschodni, is deprived of passenger traffic, while the quantity of freight trains on this section is systematically increasing. The speed limit for freight trains in this section is currently 40–80 km/h; there are also numerous speed limits. Currently only are conducted works to maintain the current operating parameters, however, the manager of infrastructure is seeking to modernize this line, which will allow for traveling freight trains a speed 120 km/h in the future. From Skierniewice the continuation of the transport corridor for transit freight trains runs along line number 11 to Łowicz Główny. On this line the permissible speed in freight transport is between 60 and 100 km/h. Both freight and passenger trains run this line. The section from Łowicz Główny to the country border in Kunowice through Kutno, Konin, Swarzędz, the freight beltway by Poznań, Zbąszynek and Rzepin, freight trains runs by railway line number 3. Both passenger and freight trains operate on this line. For freight trains the

maximum permissible speed is 80–100 km/h. Currently the section of line number 3 between Poznań and Warsaw is undergoing modernization. The section between Września and Konin has been opened for traffic, however, the works are been continued on the section between Konin and Kutno, which means that this section is closed to train traffic. The trains are routed through Toruń Główny and Gniezno. The completion of modernization works is planned for August 2019, and the entire investment will cost 2.6 billion PLN [18].

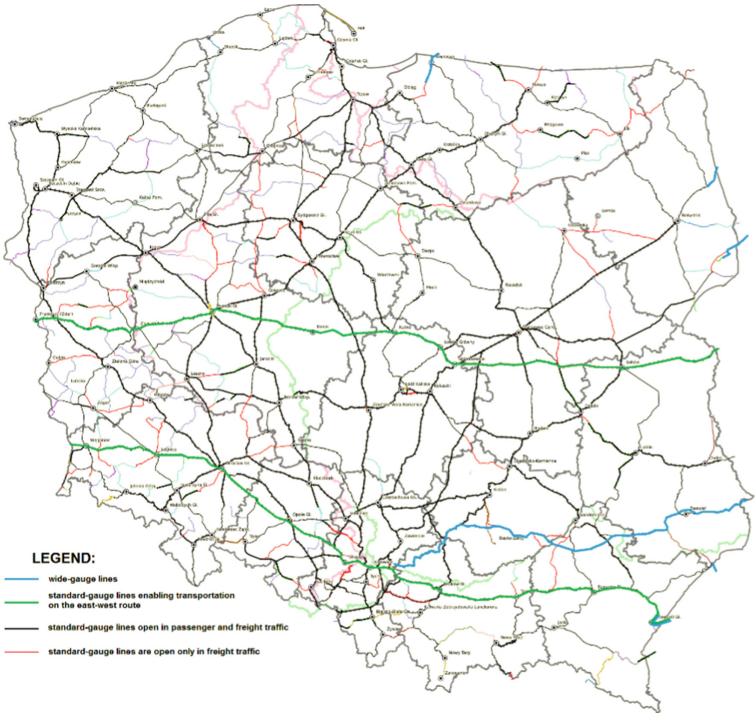

Fig. 4. Currently used communication corridors on the East-West route [21].

4.2 Use of Standard-Gauge Lines from Medyka to Bielawa Dolna

Another standard-gauge transport route from east to west border of Poland is the use E30 transport corridor. This corridor consists of two-track and electrified railway lines. On these sections, except for the final Węgliniec - Bielawa Dolna, both passenger and freight traffic is carried out. Freight trains from Medyka to Kraków pass by the railway line number 91 through Przeworsk, Rzeszów Główny and Tarnów. The maximum speed in freight transport along the entire length of the line is 120 km/h with the exception of the section Przemyśl Zasanie - Przemyśl Główny, where the speed is 50 km/h. In Krakow freight trains use the freight beltway, then go by line number 133 to Jaworzno Szczakowa. This line, just like the entire railway junction in Krakow, is being modernized. The completion of works is planned for the second half of 2020, and

the cost of this investment will amount to over 2 billion PLN [18]. Currently the speed limit on this section is from 50 to 100 km/h. After completion of modernization works, the speed for freight trains will be 120 km/h. The line is modernized in stages, and the closures are implemented in a single-track manner, which makes it possible to carry out continuous train traffic on it, however, due to the significant reduction in capacity, freight trains are now routed there mainly at night. From Jaworzno Szczakowa the trains go to Mysłowice, by modernized line number 134, where the speed allowed for freight trains is 120 km/h. Then, getting to Katowice is possible thanks to the fragment of line number 138 from Oświęcim. The maximum speed on this section is 100 km/h. Further part of the route runs along line number 137 to Gliwice. This line is modernized, the maximum speed for freight trains is 120 km/h here. From Gliwice to Opole Główne it is possible to get through Kędzierzyn-Koźle, which requires continuation running the line number 137, and then from there via the line number 136 to Opole Groszowice, where it connects with the line number 132 running towards Wrocław Glowny. These lines have an acceptable speed depending on the section between 50 and 100 km/h. The international transport corridor E30 runs through Kędzierzyn-Koźle. Another option is to run from Gliwice Łabędy to Pyskowice by a line number 135. This line is modernized and the speed allowed there for freight trains is 120 km/h. In Pyskowice is an entry to the line number 132 running through Strzelce Opolskie, Opole Główne, Brzeg, Oława to Wrocław. With the exception of the section Opole Groszowice-Opole Zachodnie, where is a speed limit 70 km/h, the maximum speed for freight trains in this section is 120 km/h. From the Wrocław Brochów station, freight trains use the freight beltway by Wrocław, so that after passing it, go to line number 275 to Miłkowice via Legnica. The speed allowed on this section for freight trains is 120 km/h. In Miłkowice, the freight trains commence driving on line number 282 through Bolesławiec to Węgliniec. Also on this section the speed allowed in freight transport is 120 km/h. From Węgliniec freight trains towards the country border go through modernized railway line number 295 to Bielawa Dolna. In this section, passenger traffic is not carried out, while freight trains run at a maximum speed 120 km/h. The route of the international transport corridor E30 from Węgliniec runs towards the country border in Zgorzelec. However, due to the fact that this line is unelectrified, freight trains are directed mainly towards Bielawa Dolna. Currently works related to the electrification of railway line number 278 from Węgliniec to Zgorzelec have begun. However, until the electrification of the line also on the German side of the border, which is currently not planned, this electrification will not increase the possibility of using this line in freight transport.

5 Alternative Communication Routes Possible to Use

There are also other lines, currently unused, in transit transport from east to west of Poland using standard-gauge routes or a broad-gauge BIL route. The map of railway lines with marked (green color) possible to use communication routes on the territory of Poland enabling freight transport from east to west is shown in the Fig. 5.

5.1 Use of Broad-Gauge Line BIL and Euroterminal Sławków

An alternative to terminals located directly at the eastern Polish border in Małaszewicze or in Medyka is the possibility of using during reload goods Euroterminal located in Sławków. The terminal has a storage area of 3,500 TEU. On its area are over 24 km standard-gauge tracks and approx. 17.5 km broad-gauge tracks. To this terminal reaches the Broad-gauge Ironworks Line (BIL) runs from the Ukrainian border in Hrubieszów [19]. From the terminal in Sławków, after transshipment or change the wheelbase of wagons, it is possible to continue driving using standard-gauge lines. It is possible to go from Sławków to the Sosnowiec Maczki station and from there by line number 134 to Mysłowice. The further route from Mysłowice towards the border in Bielawa Dolna can be done in the same way as in the case of transport from Medyka described in Sect. 4.2. An additional advantage of use the broad-gauge BIL line may be the fact that there are no passenger trains running on it, which have priority over freight transport and in case of high intensity they may significantly limit the capacity of routes.

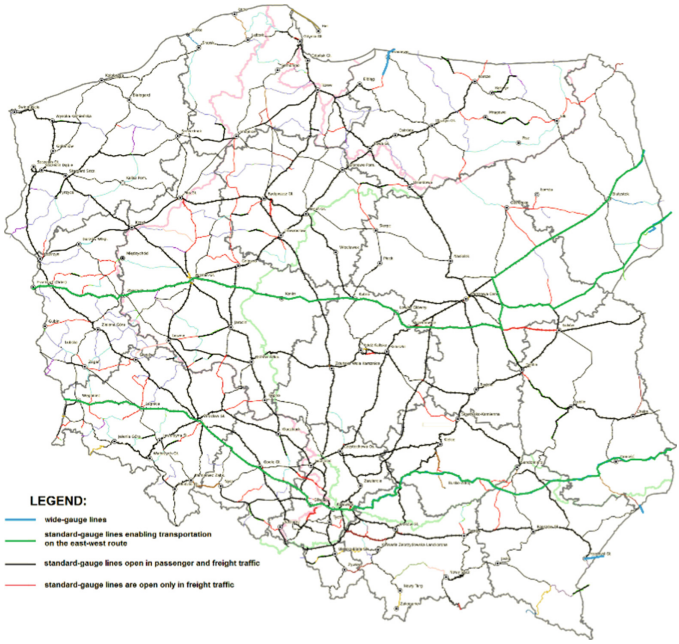

Fig. 5. Communication routes possible to use on the east-west route [21].

5.2 Use of Standard-Gauge Lines from Chryzanów to Kunowice

Another terminal that can be used as an alternative to Medyka or Małaszewicze for transit transport through Poland is the one located at the eastern border in Chryzanów near Narewka. Freight train from Narewka go by railway line number 131 to Siedlce. This line is unelectrified, which forces the locomotive change at the Siedlce station or service the entire section with diesel traction. The line from Narewka through

Hajnówka to Czeremcha is single-track, on the further stretch through Siematycze and Mordy, it is double-track. With the exception of the Narewka-Hajnówka section, where only freight traffic is carried out, passenger trains run on this line. The speed limit on this line is from 80 to 120 km/h. Freight train from Siedlce go to Mińsk Mazowiecki by the electrified, double-track line number 2. The maximum speed in freight transport on this line is 120 km/h. From Mińsk Mazowiecki train should go through the single-track line number 13 to Pilawa. The permitted speed here is 60–100 km/h. In Pilawa, the freight train can enter line number 12 to Skierniewice and continue ride to the border in Kunowice, similarly as in the case drive from Małaszewicze.

5.3 Use of Standard-Gauge Lines from Kuźnica Białostocka to Kunowice

There is also the option of using a logistics center for transshipment in Łososśna near Kuźnica Białostocka. Both broad and standard-gauge tracks reach this center. Transshipment goods such as coal and wood are carried out in this center it mainly for the needs of the nearest region. The center can also be used to reload containers transported from the east to Western Europe. After transshipment to standard-gauge wagons from Kuźnica Białostocka, the freight train may go by line number 6 to Tłuszcz. This line is electrified, on the section from Kuźnica Białostocka to Białystok it is single-track, on the further section it has two tracks. The permissible speed on the section Kuźnica Białostocka-Sokółka is 80 km/h, on the Sokółka - Białystok section it is 100 km/h. The further part of the route after modernization within the framework of the Rail Baltica project will have the speed limit for freight trains 120 km/h. From Tłuszcz freight train should go by line number 13 to Pilawa. It is an electrified line, single-track, the permissible speed almost its entire length is 60 km/h. Further the freight train can go to Kunowice similarly as in the case drive from Małaszewicze.

6 Comparison of Various Communication Routes

The list of selected parameters of individual railway routes is presented in the Table 1. Comparison the length of communication routes is presented in Table 2. For its implementation, the length of the currently used communication route from Małaszewicze to Kunowice was assumed, due to the fact that it is part of the transport corridor from China via Mongolia to Western European countries and due to the fact that it is shorter than the route from Medyka to Bielawa Dolna.

This comparison shows that there are significant differences in the length of railway communication routes. Another factor that has been analyzed is the cost of access to infrastructure on a studied route. This cost is affected by the length of the route and the category of railway lines through which communication routes run. The gross train weight 2,600 tonnes was assumed for the cost analysis. For the route from Hrubieszów to Bielawa Dolna using the Broad-gauge Ironworks Line (BIL), the cost of access to the infrastructure was not presented due to the fact that this line is managed by PNR BIL, which is both the infrastructure manager and the carrier.

Table 1. Parameters of the analyzed railway communication routes.

Route	Length, km	Traction power network	Number of tracks	Maximum speed, km	Minimum speed, km
Małaszewicze - Kunowice	650	on the whole route	2	120	40
Medyka - Bielawa Dolna	667	on the whole route	2	120	50
Hrubieszów - Bielawa Dolna	753	except Hrubieszów - Sławków	1 – section to Sławków; 2 – the rest of the route	120	40
Chryzanów - Kunowice	723	except Chryzanów - Siedlce	1 – section to Czeremcha and between Minsk and Pilawa; 2 – the rest of the route;	120	40
Kuźnica Białostocka - Kunowice	760	on the whole route	1 – section to Białystok and between Tłuszcz and Pilawa; 2 – the rest of the route;	120	40

Table 2. Comparison of the length of analyzed railway communication routes.

Route	Lenght, km	Difference with the current variant (in %):
Małaszewicze - Kunowice	650	–
Medyka - Bielawa Dolna	667	2.62%
Hrubieszów - Bielawa Dolna	753	15.85%
Chryzanów - Kunowice	723	11.23%
Kuźnica Białostocka - Kunowice	760	16.92%

This company presents summary rates for freight transport, but it does not determinate the cost of access to the infrastructure itself. The cost comparison is presented in Table 3. Similarly like in case of routes length to compare the costs of access to the infrastructure, the access price is compared to the currently used communication route from Małaszewicze to Kunowice, because it is the most used and is part of the transport corridor from China through Mongolia to European countries west.

This comparison shows that the price differences for access to the infrastructure for communication routes amount to several thousand PLN, and the cheapest way is ride from Medyka to Bielawa Dolna.

Table 3. Comparison costs to infrastructure access on the analyzed railway communication routes.

Route:	Cost	Difference with the current variant (in %):
Małaszewicze - Kunowice	13,315.50 PLN	–
Medyka - Bielawa Dolna	11,723.47 PLN	−11.96%
Hrubieszów - Bielawa Dolna	–	–
Chryzanów - Kunowice	14,403.51 PLN	8.17%
Kuźnica Białostocka - Kunowice	15,029.40 PLN	12.87%

The aim of a comprehensive comparison of the most important parameters of railway communication routes has been introduced coefficients allowing them to be combined with each other. The parameters taken into account are:

- length of the route: were assumed values from 0 to 1. For the route from Małaszewicze to Kunowice, the shortest communication route, the value 1 was assumed, while for the longest route from Kuźnica Białostocka to Kunowice the value 0 was assumed. The proportional intermediate values were assigned to the remaining routes;
- traction power network: were assumed value 1 for the route electrified along its entire length, the value 0 for non-electrified routes and the value 0.5 for routes electrified partly, regardless of the length of non-electrified section. This is due to the fact that the non-electrified section forces the exchange locomotives generating additional travel time or handling the whole route with two-traction locomotives;
- number of tracks: this parameter takes values from 0 to 1. Its value depends on the length of the double-track section occurring on the whole route, was calculated according to the following formula:

$$W_i = \frac{D_D}{D_C}, \tag{1}$$

where W_i – coefficient including the number of tracks on a route; D_D – length of the double-track section (in kilometers); D_C – the total length of route (in kilometers).

Using this formula double-tracks routes received the value of 1, whereas for single-track routes the obtained value would be 0. For partially double-tracks routes, values between 0 and 1 were obtained, taking into account the length of single-track and double-tracks sections.

- cost of access to the infrastructure: were assumed values from 0 to 1. For the route from Małaszewicze to Bielawa Dolna, the cheapest variant in terms of access to infrastructure, the value 1 was assumed, and for the route from Kuźnica Białostocka to Kunowice for the access to which cost is the highest value was 0 assumed. The other routes received proportional intermediate values. Due to the inability to determine the cost for access to the infrastructure for the route from Hrubieszów to Bielawa Dolna, this parameter was omitted in this case.

The comparison of parameters railway communication routes is presented in Table 4 which shows the average value of all analyzed parameters. Due to the lack of data regarding the cost of access to the infrastructure on the broad-gauge route from Hrubieszów to Bielawa Dolna, in the case of this route, the average value concerns only the other three parameters.

Table 4. Comparison of parameters railway communication routes.

Route	Length	Traction power network	Number of tracks	Cost of access to the infrastructure	Average value
Małaszewicze - Kunowice	1	1	1	0.52	**0.88**
Medyka - Bielawa Dolna	0.85	1	1	1	**0.96**
Hrubieszów LHS - Bielawa Dolna	0.06	0.5	0.46	–	0.34
Chryzanów - Kunowice	0.34	0.5	0.90	0.19	0.48
Kuźnica Białostocka - Kunowice	0	1	0.89	0	0.47

The calculated average can take values from 0 to 1.

7 Conclusions

Comparison of currently used communication routes enabling freight transport from the eastern border of Poland to western countries with proposed new, alternative routes allows to state that the most advantageous parameters have currently used routes from Medyka to Bielawa Dolna (0.96) and from Małaszewicze to Kunowice (0.88). The second route obtained a slightly worse average value of all parameters due to the fact that it consists of a large number of kilometers of main lines for which the cost of access to the infrastructure are high. The proposed three new communication routes are characterized by similar parameters (0.34–0.48), however noticeable worse than the routes currently used. The definitely lower average value of all parameters proposed new routes is related to the fact that they are longer, so the cost of access to the infrastructure belonging to PNR Polish Railway Lines is higher, because more kilometers must be paid. Moreover, not all new routes are double-track and electrified along their entire length. However, due to the continuous growth number of containers transported by rail through the territory of Poland on the East-West route and the capacity limitations currently used both routes and transshipment terminals in the future it may be necessary to propose new routes. Therefore, the proposed new alternative routes despite the worse parameters may be used allowing the increase of the freight transported by Poland.

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