DEVELOPMENT OF THE INTERMODAL MARKET IN POLAND FROM THE PERSPECTIVE OF CARGO HANDLING OPERATIONS IN INTERNATIONAL SUPPLY CHAINS – SELECTED ISSUES

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Abstract

A significant role within the framework of the European Union's policy of sustainable transport development is assigned to the intermodal transport. The development of the intermodal market, particularly with regard to the international carriage of goods has been observed also in Poland over the last several years. Nevertheless, the share of intermodal transport in the total cargo transport differs from the best Western European models. In 2016 12.8 million tonnes of cargo (over 23% more than in 2015) were carried using the intermodal transport in Poland. The intermodal market in Poland has its specificities - it is a rail intermodal market on which 96.4% of the transported intermodal units in 2016 were containers. Due to its geographical location, Poland has a large potential for handling containerized cargo flows in the framework of international supply chains. Intermodal transport is used on several major routes: North-South - as transport to and from Polish seaports, transport from Poland to Western European seaports, and the East-West transport (including but not limited to transit through Poland). The main purpose of this article is to discuss the current status of the development of the intermodal market in Poland in terms of its role in handling cargo flows in international supply chains. In addition, the aim is to identify factors supporting further development and the barriers that disturb this development. Research of literature, analysis of statistical data published by the Central Statistical Office, analysis of reports published by the Office of Rail Transport (the Polish rail market regulator) and information from entities operating in the intermodal market in Poland (including intermodal operators) were conducted to accomplish the main objective of the article. The performed analysis related to both the infrastructure issues concerning the intermodal market in Poland and its organization-based, formal and legal, and economic aspects. Moreover, selected external circumstances forming the intermodal market position in Poland in handling international supply chains, including but not limited to the development the new Silk Road initiative have been discussed. The findings and conclusions arising from the conducted analysis can serve as examples and guidance for other countries in which the role of intermodal transport should also be strengthened.

Key words: intermodal transport, intermodal market in Poland, international supply chains, containerized cargo flows, development of intermodal market

1. INTRODUCTION

The development of intermodal transport constitutes one of the crucial areas of interest for the EU transport policy. It provides grounds for the implementation of the EU policy of transport sustainable development. References to intermodal transport[1] and its role in balancing the transport system can be found in numerous transport-related documents issued by the EU institutions. One of the crucial documents is White Paper on transport from 2011, which determines the goals of competitive and resource-efficient transport system: "Thirty per cent of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than fifty per cent by 2050, facilitated by efficient and green freight corridors. Meeting this goal will also require appropriate infrastructure to be developed" (European Commission, 2011, p. 9). Over the years, the EU institutions have implemented various programs aiming at facilitating the development of intermodal transport, e.g. PACT, Marco Polo I and II (Grzelakowski, 2014, p. 13). The advantages of intermodal transport are undisputable. Their pro-ecological character has been underlined in numerous reports and discussed in reference publications.

The intermodal transport is used in freight services in the hinterland of seaports, in particular in handling the flows of cargo in the global supply chains where the main section involves transport by sea[2]. The development of intermodal transport has been observed in Europe and North America. Each of these markets has its own specificity (Colliers International, 2015, p. 7-9). The intermodal terminals operate as the so-called *dry ports* or *inland ports* of various types (Talley, Ng, 2017, p. 175, 176). When considering their role for the entire supply chain, it is assumed that such facilities considerably affect the effectiveness of logistics corridors (Ambrosino et al., 2015, p. 106). The reference publications discuss also the role of intermodal transport for the optimal supply chain logistics (Bhattacharya et al., 2014, p 73). Moreover, it is clear that the possibility to provide various services is conditioned by proper logistics infrastructure, and that the exchange of information and involvement of various groups is also important (e.g. terminal operators, carriers), which is leading to the Supply Chain Integration (Clott, Hartman, 2016, p. 131).

Poland, a large Central European country, thanks to the location has got potential for the development of intermodal transport and for handling containerized cargo flows in the framework of international supply chains. Intermodal transport is used on

[1]In the article there is no additional distinction for combined transport. We need to add that intermodal transport is understood here as: „The movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing modes" , and combined transport as: „Intermodal transport where the major part of the European journey is by rail, inland waterways or sea and any initial and/or final legs carried out by road are as short as possible". (UN/ECE, 2001, p. 17,18)

[2] Following UNCTAD we need to indicate: "in 2015, world seaborne trade volumes are estimated to have accounted for over 80 per cent of total world merchandise trade" – i.e. 10 047 millions of tons loaded, with 1 687 millions of tons loaded among them as containerized cargo (UNCTAD, 2016, p. 6-7).

several major routes: North-South - as transport to and from Polish seaports, transport from Poland to Western European seaports, and the East-West transport. However, there are also some obstacles. Among them, for a number of years we have indicated, e.g.: status of linear and nodal transport infrastructure, shortage in rolling stock, disproportions in financing the infrastructure of particular transport sectors or lack of sufficient promotion of such services (UTK, 2012, p. 32). Over time, in some of the above mentioned sectors we have observed some improvement. It results from subsequent documents issued and from particular activities (e.g. regarding infrastructure modernization). They are necessary since in recent years, in Poland, the volume of foreign trade has been rapidly increasing. Poland has also been the transit country. The cargo must be transported effectively and sustainably, and intermodal transport is a solution.

The above mentioned geographical location and economic and political situation place Poland in important position in handling the flows of cargo in international (also global) supply chains. The Polish seaports and container terminals located there constitute gateway to imported cargo to Europe and cargo exported from Europe by sea (they undoubtedly compete for the role with the ports of Western Europe). The role of intermodal transport should be strengthened by services in the hinterland of the ports. When considering the flow of freight in international supply chains we also need to pay attention to land transport between Europe and the Far East, in particular within the new Silk Road. This direction will undoubtedly gain in importance. Poland may potentially become an important European participant of this initiative, too.

Therefore the main purpose of this article is twofold: 1) to discuss the current status of the development of the intermodal market in Poland in terms of its role in handling cargo flows in international supply chains, 2) to identify factors supporting further development and the barriers that disturb this development. Research of literature, analysis of statistical data published by the Central Statistical Office, analysis of reports published by the Office of Rail Transport (the Polish rail market regulator) and information from entities operating in the intermodal market in Poland (including intermodal operators) were conducted to accomplish the main goal of the article.

The paper is divided into four chapters. After the *Introduction* chapter 2 (*Characteristics of Intermodal Transport in Poland*) and chapter 3 (*Intermodal Services in Poland and International Supply Chains*) of this article involve analysis of intermodal market in Poland and selected conditions for its development. Its objective is to present details of the current situation and indicate opportunities for strengthening the role of the market in international supply chain services. The analysis relates to the infrastructure issues concerning the intermodal market in Poland and its organization-based, formal and legal, and economic aspects. Moreover, selected external circumstances (e.g. new Silk Road initiative) forming the intermodal market position in Poland in handling international supply chains have been discussed. Chapter 4 presents *Conclusions*.

2. CHARACTERISTICS OF INTERMODAL TRANSPORT IN POLAND

2.1. Basic Information on the Market of Intermodal Transport in Poland

From the beginning of economic transformation in Poland we can observe interest in the development of intermodal service market. In a formal manner, it was noticeable already in 1994, when document entitled Transport policy was published, including suggestions for the necessity to establish favourable conditions for the development of combined services (Engelhardt, 2015, p. 11). Over time, other documents were issued, regarding, e.g. the strategy for transport development and the national transport policy including the concept of intermodal transport. Moreover, specific effective legal solutions were provided, significantly supporting such services. In 2006, intermodal trains were granted very favourable track access charge (amounting only to ca. 15% of real own costs of access to infrastructure). However, its time of validity was not long; the preferential charge was abolished in 2009 (Engelhardt, 2015, p. 15,16). For many years, the issue of track access charge has been one of the main obstacles in the development of intermodal services in Poland (UTK, 2012, p. 31). For several years the 25% intermodal discount is applicable in Poland. The discount contributes to shifting the cargo from road to rail (Nietz, 2017, p. 30). At present in Poland binding is the programme document entitled: The Strategy for Transport Development until 2020 (with perspective until 2030). The objectives related to the development of intermodal transport include mainly the modernization and revitalization of rail infrastructure (linear and nodal) used in such services and located within the AGTC network (MTBiGM, 2013, p. 63).

To answer the question to what degree the above mentioned regulatory initiatives and granted reductions have contributed to the improvement of intermodal market, we need to analyse the changes in fundamental parameters defining the market. The analysis refereed to the last ten years, when the development became significant, disturbed only by falls during the economic crisis between 2009 and 2010 (Table 1). In terms of total volume of transported cargo, in the analysed time period, we can indicate the increase in the volume of services from ca. 4,1 million tons in 2007 to 12,8 million tons in 2016 (which totals more than 300 %). We need to indicate that in particular years (analysing the time period from 2010) their growth varied from 6% to 37%. Similar regularities can also be observed in relation to changes in the volume of transport output. In particular years (from 2010) we have also observed the annual stable increase in the number of intermodal units (all types) and the volume of freight expressed in thousands TEU (up to nearly 1.44 million TEU). It is indicated that the increase in the number of intermodal units in recent years resulted e.g. from the increased transit traffic (e.g. from China) or from the increase in the container traffic of new cargo groups e.g. biomass (UTK, 2016, p. 4). As a result, in the analysed time period, we observed the increase in the share of intermodal freight on the market of rail services in total. Still in 2003 it amounted to 0.94 % (measured by mass of goods) and 1.71% (measured by transport output), in 2011 2.37% and 4.53% respectively (UTK, 2012, p. 14), and in 2016 the values totalled 5.8% and 8.8% respectively (UTK, 2017, p. 2). We need to add that the related European average (by transport output) amounted to 17.6% already in 2010 (UTK, 2012, p. 6).

Table 1. Basic information on rail intermodal services in Poland between 2007 and 2016

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
(in million tons)	4,1	4,8	3,3	4,4	5,9	8,1	8,6	9,6	10,4	12,8
(in bn ton-km)	1,6	2,2	1,4	1,9	2,4	3,0	3,1	3,4	3,7	4,4
in thou. units	342,4	423,8	267,0	344,6	488,9	644,6	689,3	699,6	745,3	951,0
w thou TEU	540,0	692,9	429,8	569,6	798,9	1054,2	1123,4	1114,2	1151,8	1436,3
number of rail carriers*	6	6	7	5	7	9	10	12	12	13
average distance in intermodal transport (in km)	398	464	437	429	414	378	355	354	358	346

Source: own elaboration of the author based on: (UTK, 2017, p. 2-4; UTK, 2012; Matczak, 2013, p. 151)

The specificity of the market of intermodal transport in a particular country can be additionally defined by the existence of particular type of intermodal units. In the analysed time period, in Poland, we can clearly observe the dominance of containers ISO (20' and 40'). In 2016 alone their share totalled 89.7%, but the share of other container capacities were much smaller (only several percent each), which in total amounted to 96.4% share of containers of all types in the total number of all types of intermodal units. The unusually small share, in the total volume of intermodal transport, refers to heavy vehicles (0.01%) and swap bodies (0.7%) (UTK, 2017, p. 4). Such small transport share of heavy vehicles results e.g. from the lack of specialized terminals in Poland and lack of rolling stock to handle such units. The presented structure of intermodal units transported has been characteristic for the Polish market for many years, hence we may indicate that intermodal transport in Poland involves mainly rail container transport.

When considering the information on intermodal market in Poland we need to indicate that over time the number of rail carriers has consistently been increasing (Table 1), providing intermodal unit services. Also in this respect we can observe the development of the said market (more on the subject in point 2.2.). By analysing the information provided in table 1, we can observe that from 2011 the average distance covered by the carriers has been shortening. It is unfavourable since the profitability of such undertakings decreases. At the same time, it proves better availability of intermodal services and, despite the existing obstacles, better intentions to provide services at shorter distances. To complement the image of the Polish market of rail container services we need to focus on the use of rolling stock. At the end of the third quarter of 2015, 3 078 locomotives and 10 709 platform wagons were in operation. Their average age totalled over 36 and over 30 years respectively. Therefore, the rolling stock is extremely deteriorated (UTK, 2016, p. 8). The carriers have regularly been replacing the rolling stock. It is crucial since the stock represents the carrier, in particular on the international market. The dominance of international services is characteristic for the market of intermodal transport in Poland. Together with services provided in the hinterland of the Polish seaports they include also the flows of cargo within the international supply chains. The factors affecting such direction for the development of intermodal services in Poland shall be discussed further in point 3 of the article.

2.2. Subject-Based and Organizational Aspects of Intermodal Market in Poland

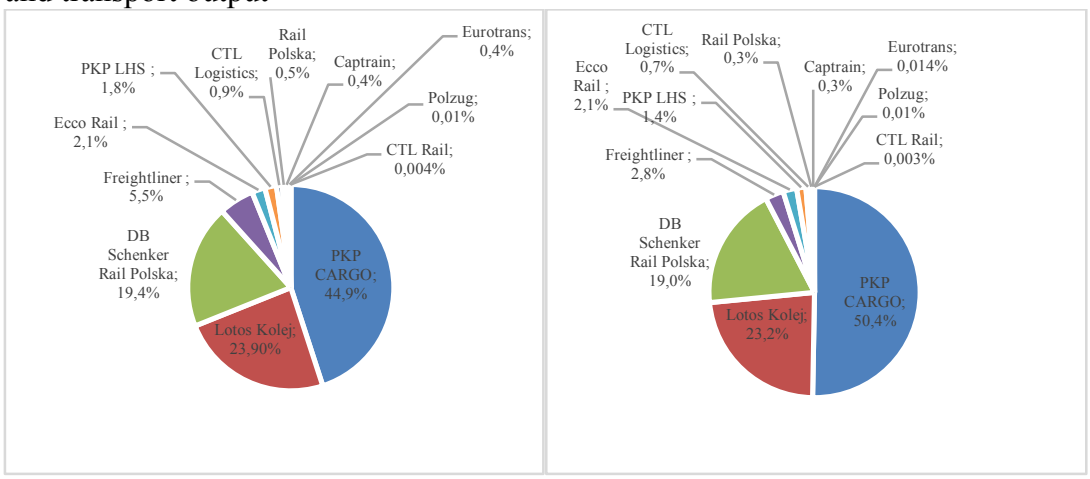
In Poland, as in other European countries, on the market of intermodal services there are numerous different entities, providing diversified services. They include: rail infrastructure and intermodal terminal managers, rail carriers, intermodal transport operators and their customers (who may include shippers, freight forwarders or logistics service providers) (Matczak, 2013, p. 153). Due to limited length of the text and specificity of the Polish intermodal market, this part discusses entities directly involved in the rail container transport[3]. The conditions of their operation on the market are influenced by the rail market independent regulator, namely the Office of Rail Transport. The Office supervises the correct application of laws regarding the said market, and the activities of the rail infrastructure managers and rail carriers.

The main manager of rail infrastructure in Poland is PKP PLK S.A. company. The entity manages over 96% of the Polish rail network and at the same time provides economic conditions for rendering services in intermodal transport (e.g. through the amount of charges imposed on rail carriers). One of the most important tasks implemented by PKP PLK S.A. involves the modernization and other activities aiming at improving the technical condition of railway lines. The funds for such implementation come from own resources as well as the Railway Fund (UTK, 2016b, p. 122). Moreover, the use of EU funds is also possible. At the same time, we need to realize that track access charge (TAC) in Poland is of relatively high level compared to those applicable in other European countries. In 2015, in Europe, the average track access charge for freight trains amounted to 2.6 € per train kilometre. At that time in Poland, the rate totalled 3.2 € per train kilometre, in Germany 2.9 €, in Spain only 0.2 €, and in Latvia 9.5 € (IRG-Rail, 2017, p. 21). The above mentioned 25% intermodal discount constitutes the incentive to provide intermodal transport services.

The other important group of entities comprises rail carriers. As already mentioned, the evolution of the Polish intermodal market (one of its dimension) is undoubtedly reflected by the increase in the number of carriers. In 2007, there were 6 carriers on the market, in 2015 – 12 (Figure 1), and in 2016 the intermodal transport services were rendered by as much as 13 rail carriers (UTK, 2017, p. 4).

[3] Issues related e.g. to road carriers or road transport infrastructure managers are omitted.

Figure 1. Carriers' share in intermodal transport in Poland (in 2015) by cargo mass and transport output



Source: (UTK, 2016, p. 3)

The intermodal operators are responsible for providing the service offer in intermodal transport. The entities are characterised by various business models. The reference publications differentiates their three main types (Matczak, 2013, p. 161-163). Firstly, typical, universal intermodal operators – organizers (purchasing particular partial services from other service providers, e.g. PCC Intermodal, Polzug). Secondly, operators from the rail carriers group (or entities related by equity - e.g. Cargosped – company of PKP Cargo Group) and thirdly, intermodal operators coming from the group of logistics operators, shipowners or road carriers (e.g. Maersk Line, Erontrans) (Matczak, 2013, p. 161-163). Moreover, there are also other hybrid models and we may undoubtedly observe more of them in the future. Already at present many intermodal operators act as intermodal terminal operators (Matczak, 2013, p. 156). Among those who can provide significant number of intermodal terminals there are: Cargosped, PCC Intermodal, Polzug, Loconi, Erontrans and Spedcont) (UTK, 2016, p. 5-6). The available terminals or capital ties between the entities on the market undoubtedly affect the operators' service offer (e.g. services provided in particular geographical directions). The intermodal operators exercise important function by combining the flows of cargo, and integrate the flows within the supply chains. They contribute to their implementation in a pro-ecological manner. Such activities are defined in the reference publications as Greening the Supply Chain.

2.3. Transport Linear Infrastructure in Poland for Intermodal Transport Services

Poland as a country covering the area of over 312 thousand km^2, has got well-developed linear infrastructure network of particular transport modes. However, as mentioned above, the condition of the said infrastructure is indicated as one of the elements hampering the development of intermodal market. Therefore, we need to conduct thorough analysis of the said issue. It will focus on the components of infrastructure directly linked with rail and road container traffic in Poland. The basic information is presented in table 2.

Table 2. Transport (road and rail) infrastructure in Poland

Specification	1995	2000	2005	2010	2015
Railway lines operated in km	23 986	22 560	20 253	20 228	19 231
of which standard gauge	22 598	21 575	19 843	20 089	19 231
of which electrified	11 627	11905	11 884	11 916	11 865
of which single track	13 693	12814	11 096	11 353	10 505
Hard surface public roads (urban and non-urban) in thou km	237	250	254	406	420
motorways in km	246	358	552	857	1559
expressways in km	-*	-*	258	675	1492

*-no data available
Source: own elaboration of the author based on: (CSO, 2006, p. 523), (CSO, 2016, p. 537).

Over the twenty analysed years we have observed significant development of road transport linear infrastructure in Poland. The evolution can be observed both in the total length (in thou. km) of hard surface public roads (urban and non-urban) from 237 thou. km in 1995 to 420 thou. km in 2015. At the same time, we have also observed considerably more: motorways (from 246 km in 1995 to 1559 km in 2015) and expressways from several hundred kilometres to 1492 km at the end of 2015. Actually there are in Poland, in total 1627,3 km of motorways and 1552,7 km expressways (GDDKiA, 2017) and the average network density[4] in Poland (in 2014) amounted to 92 km (CSO, 2016b, p. 315).

The significant improvement in the road transport infrastructure affects the development of intermodal services in Poland in two ways. On the one hand, adversely, since we can observe the development of services rendered only by road transport. On the other hand, there is also positive impact. The services provided by road transport constitute significant element (feeder system) of intermodal transport services. It is important that they are rendered on good quality roads, smoothly and quickly.

The rail transport infrastructure is of fundamental importance for the implementation of intermodal services in Poland. At present, we have in operation 19 231 km of railway lines (which ranks Poland fourth in Europe behind Germany, France and Italy in terms of the length of railway lines) (IRG-Rail, 2017, p. 14). About 54,6% of which are single track ways and over 61% of which are electrified (which constitutes the value above the European average amounting for 22 countries to – 54.6%) (IRG-Rail, 2017, p. 16). We also need to add that in the majority they are standard gauge lines (1435 mm), although we have sections of wide track (1520 mm) (with small share in the network). Network density[5] amounted in Poland (in 2015) to 6.2 km (CSO, 2016b, p. 315), which provides a good result compared to other European countries.

Looking back, we need to indicate that over the last twenty years (Table 2), the length of railway lines used in Poland was significantly reduced (ca. 4 755 km railway lines were withdrawn from operation). However, recently a lot of modernization works on railway lines and other elements of infrastructure have been performed. As a result, the share of railway lines which can be recognized as good quality lines, has

[4] „Hard surface public roads per 100 km^2 of total area" (CSO, 2016b, p. 315).
[5] „Standard gauge railway lines operated per 100 km^2 of total area" (CSO, 2016b, p. 315).

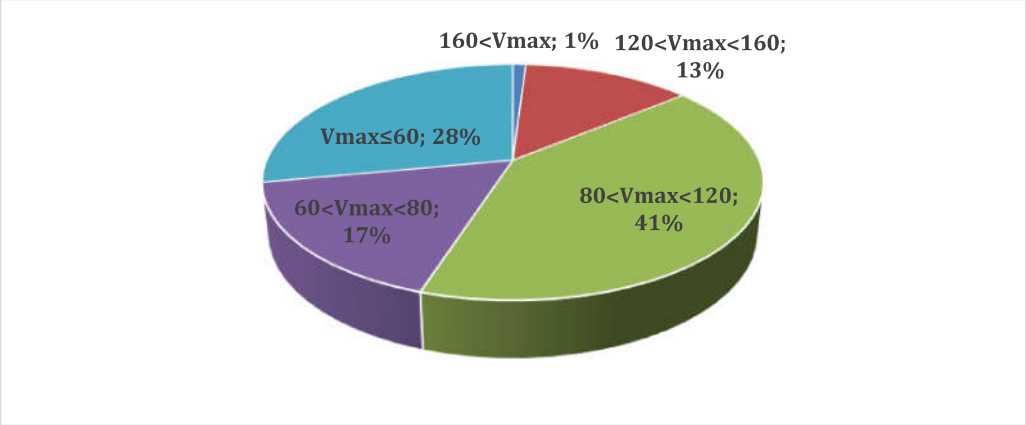
been increasing (Table 3). Although the condition[6] of rail infrastructure has been improving, it still significantly differs from Western European standards. The said fact requires necessary speed limitations (Figure 2) and limited permissible axle load (UTK, 2016b, p. 123). These factors constitute barriers for the development of intermodal connections (they include e.g. hinterland services to and from Polish seaports). Too slow timetable speeds make intermodal transport, in terms of transit time, much less competitive than the services provided by road transport.

Table 3. Technical condition of railway transport infrastructure* in Poland (between 2010 and 2015)

Condition of infrastructure	2010	2011	2012	2013	2014	2015
good	36%	40%	43%	47%	51%	55%
satisfactory	35%	32%	30%	27%	27%	27%
unsatisfactory	29%	28%	27%	26%	22%	18%

*Under the management of PKP PLK SA
Source: own elaboration of the author based on: (UTK, 2016b, p. 122).

Figure 2. Share of railway line length by max. speeds in 2015

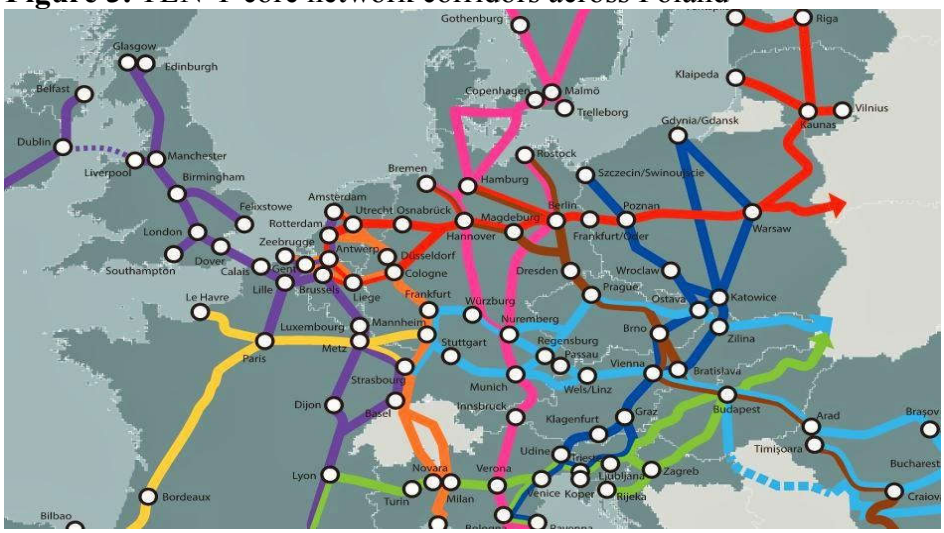


Source: own elaboration of the author based on: (UTK, 2016b, p. 124).

When analysing the importance of existing transport infrastructure for cargo handling in international supply chain, we need to realize that the main sections of newly-built road transport infrastructure (motorways and expressways) and modernized railway lines are part of the two core network corridors across Poland, TEN-T – the Baltic-Adriatic Corridor (with rail freight corridor no.5) and the North Sea – Baltic Corridor (with rail freight corridor no. 8) (Figure 3).

[6] Good – no operational limits; satisfactory – lowered speed or other limitations; unsatisfactory - significant lowering of speed and significant number of other limitations (UTK, 2016b, p. 122).

Figure 3. TEN-T core network corridors across Poland



Source: http://ec.europa.eu/transport/themes/infrastructure/doc/ten-t-country-fiches/ten-t-corridor-map-2013.pdf (accessed 10.03.2017)

We need to add that the European Union established special programme Connecting Europe Facility to finance the TEN-T network. For the programme beneficiaries, 11.3 billion EUR in total were allocated for transport-related investments, including 4.3 billion EUR for Poland (Rydzkowski, 2015, p. 179).

2.4. Intermodal Terminals in Poland

One of the basic conditions for the development of intermodal transport is the existence of proper number of intermodal terminals in the country and their spatially optimal distribution. In Western European countries the average number of terminals amounts to 4.2 terminal per 10 000 km^2 of the country's area (in Germany over 4 per 10 000 km^2, in Belgium over 7 per 10 000 km^2 and in the Netherlands over 11 per 10 000 km^2. In Poland the said rate totals 1 terminal per 10 000 km^2. The total number of container terminals used in intermodal services amounts to 31 today (UTK, 2012, p. 10; UTK, 2016, p. 5). They are located rather unevenly on the national scale; however, we can determine three main areas where they are located (Figure 4): the first – on the coast of the Baltic Sea (e.g.: in Gdańsk, Gdynia, Szczecin and Świnoujście); the second – along the area in the central part of Poland (e.g.: near Poznań, Łódź and Warsaw); the third – at Lower and Upper Silesia (e.g.: Brzeg Dolny, Kąty Wrocławskie, Dąbrowa Górnicza and Sławków). In some parts of the country there are no such facilities to provide the national and international services, in particular in the northern and eastern part of Poland.

Figure 4. Intermodal terminals in Poland (in 2015)

Source: (UTK, 2016, p. 7)

Among intermodal terminals used to provide services in Poland there are a number of facilities which in terms of their supra-structural equipment (RTG cranes), technical parameters, e.g. (length of tracks with minimal standard ca. 600m – 750m) or yard surface standard, meet Western European standards. These are modern facilities in the Polish seaports, or e.g. the terminal in Kutno. However, a significant number of the Polish intermodal terminals fail to meet Western European requirements making it possible to handle larger flows of containerized cargo. The main problem involves their unsatisfactory technical condition. It refers to: limited handling and storage capabilities; low quality of handling equipment (in many of them reachstackers dominate), low quality of terminal surface and storage yards, poor condition of access roads (UTK, 2012, p. 11-12; Grzelakowski, 2014, p. 16).

Moreover, we need to indicate that in Western Europe e.g. in Germany intermodal terminals, in many cases, constitute the integral part of the logistics centres established, called freight villages. They are multi-entity structures – they include many companies (mainly from TSL sector). In Poland, no plans regarding the construction of such logistics centres were implemented. Therefore the location of the majority of storage facilities without direct access to intermodal terminals limits the possibilities to consolidate the flows of cargo and start regular full train services (Grzelakowski, 2014, p. 16). It is especially important for international supply chain cargo services.

3. INTERMODAL SERVICES IN POLAND AND INTERNATIONAL SUPPLY CHAINS

In recent years, the intermodal services in Poland are clearly characterised by dominant services in international transport compared to national services. Taking into account transport output, the share of international services amounted on average to 70.6%, and national services only to 29.4% in recent years (UTK, 2016, p. 11). In order to refer these relations to issues presented in the title of article we need to perform additional analysis. In Poland, due to general conditions, the international supply chain flows of cargo fail to result only from the international trade of the

country. In such case we need to take into account three main[7] groups of factors managing the services:

- Polish international trade services (special attention shall be paid to the main trade partners and their geographical location);
- hinterland services of the Polish seaports to and from selected terminals in Poland and services from Poland to the seaports of Western Europe;
- transit services (mainly east-west and west-east) through Poland.

In recent years, within each of the defined areas we could observe changes contributing to the development of intermodal service market and to influence its specific character. Therefore, each of them were analysed below.

From the economic transformation the volume of foreign trade in Poland has steadily been increasing. Over the last years, it was influenced by the Polish accession to the European Union (in 2004) and the related freedoms of movement, goods, services and capital. Upon analysing the value of trade volume we can observe their rapid development after the accession. Still in 2000 the value of Polish import totalled 48 940 million USD, and export 31 651 million USD. In 2010 the value of Polish import reached 178 063 million USD, and export 159 758 million USD, and in 2015 the values totalled respectively: 197 682 million USD and 200 343 million USD (CSO, 2016, p. 327-328). We need to add that between 2005 and 2015 we could also observe significant increase in the volume of exported goods from 76.6 million tons to 106.1 million tons (Matczak, 2016b, p. 13). When analysing the directions of the flows of cargo within the international supply chains, we also need to pay attention to the main trade partners of Poland. From the 1990s, Germany has ranked first, both in export and in import. In recent years, significant changes have been observed at two subsequent places. It is worth mentioning that for several years China has been an important trade partner of Poland in terms of the import of goods. In 2015, the largest share in Poland's foreign trade volume in terms of import, belonged to the following countries: Germany (22,9%); China (11,6%) and Russia (7,3%), whereas in export they included: Germany (27,1%); Great Britain (6,7%) and Czech Republic (6,6%). In 2014 a group of countries – main trade partners of Poland was identical. The difference in terms of particular places referred only to export: the Czech Republic was second, and Great Britain third (CSO, 2016, p. 562). We can observe the relation between the main trade partners of Poland, and destinations of the majority of intermodal services per month, as for the number of trains provided by the carriers. We need to remember that in Poland ca.[8] 1700 intermodal trains (per month) started operations in 2014. It includes international freight services (export-import) from Poland to Germany (in 2014 – over 260 trains per month), from Poland to Belarus (in 2015 – over 130 trains per month) and from Poland to Czech Republic (ca. 70 trains per month) (UTK, 2016, p. 9-11).

In international services, apart from those related to the Polish foreign trade, we need to pay attention to transit services. As mentioned above, it is related to the location of Poland at the important transport corridors. In transit, from the East to the West, the majority of trains (136) started operations per month from Terespol (eastern

[7] For clarity, and due to limited length of the text it was reduced to those recently recognized as the most important.
[8] Data for 2014, later comprehensive information on the subject is not available.

border of the country – with Belarus) to Kunowice (western border of the country – with Germany). In total with transit routes to other directions (also to Czech Republic) there were 340 trains (UTK, 2016, p. 11).

We need to emphasize that the potential of Poland to play an active role in transport services from the East to the West and from the West to the East is not sufficiently used. Today, there comes an opportunity to improve the situation. The intensity of services in this direction may contribute to such improvement with the new concept „One Belt One Road" entering into force. The said solution constitutes favourable option for freight transport from China. The land route to Europe is ca. 11 thou. km (its sea route via Suez Canal - 17 thou. km), and the time of transport by land amounts to 12 to 15 days (sea route 28 to 35 days) (PKP Cargo after: Nietz, 2017, p. 29). Poland is located at the land section of that route. Its role should not only involve making railway lines available. With the current state of market development and further infrastructure investments scheduled there is an opportunity to make some of intermodal terminals in Poland operate as hubs where containerized cargo is handled and distributed among trains carrying them further to the west or north of Europe. Many European countries compete for such role for their terminals. One of the locations interesting for the partners from China is Łodź. There, on the area covered by the Special Economic Zone we could have intermodal terminal – dry port for train services from the Chinese city of Chengdu (Nietz, 2017, p. 30).

When we analyse the development of intermodal services in Poland from the East to the West and from the West to the East, we need to pay attention to the terminal in Sławków (near Katowice). It has direct access to the longest in Poland (nearly 400 km) section of wide track (1520 mm), running to the eastern border. It gives the terminal opportunity for further development in case of more services within the new Silk Road. The terminal in Małaszewice located at the eastern border of the country plays an important role for such services (Figure 4). Many terminal operators present their facilities as potential hubs for the trains from China.

The importance of the Polish intermodal market for handling the cargo of the new Silk Road will stem from ministerial contacts and business relations with Far Eastern partners. They include, e.g. initiatives of rail carriers (e.g. memorandum signed by PKP Cargo with the representatives of Xinjang region, where large dry port shall be built) (Nietz, 2017, p. 29). The cooperation is also being established by other entities of intermodal and logistics market, e.g. numerous logistics operators. The rail company managers emphasize that important approach for the future involves establishing business relations resulting in increased cargo export to the East. It would lead to better balance of cargo mass in intermodal services to the Far East (Nietz, 2017, p. 29).

When analysing another direction of services we need to pay attention to the services provided for the hinterland of the Polish seaports. In recent years, they have gone through very rapid development of containerized cargo handling (Table 6). Significant contribution resulted from the construction of Deepwater Container Terminal in the port in Gdańsk, which was opened at the end of 2007. The port is entered by container vessels of the largest shipping alliances (Urbanyi-Popiołek, Klopott, 2016, p. 521). In total in the country, in 2016 maritime terminals handled 2 031 369 TEU (Table 6). Moreover, we need to focus on handling unitized cargo at

Polish ferry and ro-ro terminals, which amounted to 537 964 freight units in 2015 (Matczak, 2016, p.4).

Table 6. Container handling in the largest Polish seaports (in TEU)

Port	2004	2007	2011	2013	2015	2016
Gdańsk	43 739	96 873	685 643	1 177 626	1 091 202	1 298 352
Gdynia	377 236	614 373	616 441	729 518	684 796	642 195
Szczecin-Świnoujście	27 680	56 276	55 098	78 439	87 784	90 822
Total	448 655	767 522	1 357 182	1 969 451	1 863 782	2 031 369

Source: own elaboration of the author based on: (Matczak, Ołdakowski, 2010; Matczak, 2016, p. 4; Borkowski, 2017, p. 34)

The majority of intermodal operators in Poland have in their offer services provided from container terminals located in the Polish seaports (in Gdańsk and Gdynia) with intermodal terminals in the hinterland of those ports. They include e.g.: PCC Intermodal (to: Kutno, Brzeg Dolny, Kolbuszowa, Gliwice), Polzug (to: HUB Gądki, Pruszków, Dąbrowa Górnicza), Erontrans (to: Radomsko, Stryków, Poznań), Maersk Polska (to: Kąty Wrocławskie, Sławków, Szamotuły), Loconi Intermodal (to: Warszawa, Łódź, Radomsko, Poznań), Spedcont (to: Łodź, Terespol), Baltic Rail AS Rail World Group (to: Siechnice, Włosienica) (Raport, 2017, p. 15,16; Railing Schedule, 2017, 20-21). Although in the reports the services are classified as national services, we need to realize that the transported freight includes mainly cargo in international supply chains. As a result of establishing more connections and participating in the initiatives of more and more entities, the share of intermodal services in container terminal handling in the Polish seaports has steadily been increasing year by year. In 2015, the share in the Polish container terminals exceeded 30%. At present, it increased and, e.g. in the Baltic Container Terminal (Gdynia) in 2016 the share totalled nearly 40%. However, further increase in the handling of containers in the ports of Gdańsk and Gdynia, with today's unsatisfactory condition of road and rail infrastructure leading towards the seaports, may soon result in significant difficulties in collecting and delivering the containerized cargo. In this context, an important initiative includes the construction (by PCC Intermodal) within dozens of kilometres from those ports - Intermodal Container Yard. The scheduled annual handling capacity of the terminal shall amount to 1 million TEU (PCC Intermodal, 2017).

As mentioned above, the hinterland intermodal services are also provided from the terminals located in the western part of Poland to the ports of Western Europe. Such connections are serviced mainly by the same operators who handle the hinterland of the Polish seaports. The service providers include, e.g.: Hupac (to: Duisburg), PCC Intermodal (to: Rotterdam, Hamburg), Erontrans (to: Rotterdam) (Raport, 2017, p.15). The important connection here is: Swarzędz (near Poznań) – to Rotterdam (22 trains per month) (UTK, 2016, p. 11). There are also regular connections from Poland to the port of Koper Luka (Slovenia), provided by Baltic Rail AS Rail World Group (Raport, 2017, p. 15).

4. CONCLUSIONS

The contemporary international division of labour and tendency to implement offshoring strategy increase the role of freight carriers on a global scale. The majority of countries worldwide operate today within the international supply chains and large flows of cargo are transported globally. Poland, with access to the Baltic Sea and modern container terminals, takes active part in handling these flows from the North to the South and from the East to the West, but the crucial role belongs to intermodal transport. The conducted analysis makes it possible to determine that the Polish intermodal market in many areas harmonizes and in many differs from the solutions and standards characteristic for the Western European countries. Modernization is necessary as well as the development of linear and nodal infrastructure of rail transport, replacement of rolling stock, and rationalization of track access charge. Moreover, we need actions taken by various groups of entities related to intermodal markets and their cooperation (e.g. representatives of ports, rail carriers and intermodal operators). Negligence, even if in one of the areas defined in the article, may not only have adverse effects on intermodal market but also threaten various aspects of the competitiveness of Polish economy and marginalize the importance of entities from Poland within the international supply chain system. It may prove hazardous, e.g. for the competitive advantage of Polish seaports. The increasing flows of containerized cargo will not be quickly transported to the hinterland, which will adversely affect the effectiveness of activities. The said fact may result in clients choosing the ports of Western Europe. In the transport from the East to the West there is also real threat of losing the flows of cargo. If, at the right moment, the infrastructure or carriers are not ready to take active part in servicing the new Silk Road, the transported cargo will bypass Poland since entities from other countries are eager and ready to render the services.

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