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Inland waterway transport in Poland – the current state and prospects for development

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Abstract

The dynamic development of road transport has caused an imbalance in transport systems. For the balance of the transport system, an increasingly important role should be played by networks such as railways and inland waterways, which, due to ecological aspects and minimal participation in the generation of external costs, are the most socially friendly. The layout and length of inland waterways in Poland has remained at a similar level for years. The specificity of the waterway infrastructure influences the factors that shape the demand for transportation by inland waterways. The navigation conditions impact directly the main design parameters of the ships used for transportation on inland waterways, including the relatively small carrying capacity of the barges, as well as the volume of traffic. An inadequate development of navigable waterways in Poland, concerning both natural elements (channeled rivers, free-flowing channels) and shipping parameters (discharge dimensions, depth and width of the trail, height of bridges), affects the specificity of inland navigation and relegates it to a marginal role in the Polish transport system. The share of inland waterway transport for total freight decreased from 0.8% to 0.4% between the years 2000 and 2014.

The aim of this article is to draw attention to the fact that inland shipping services, in the transport market, are sufficient to determine the existence of waterways. All other factors only stimulate or restrict its place in the transport system. The preferential use of natural waterways is the essential limitation which restricts their adaptation to the changing transport needs. Thus, the density of waterways is much lower compared to other transport networks and the development of potential inland waterway transport is primarily determined by the quality and spatial arrangement of the existing waterways.

Introduction

The common transport policy pursued by the European Union seeks to apply the principles of sustainable development to transport. This will ensure a genuine competition between the different modes of transport in favor of environmentally friendly solutions and the integration of freight transport corridors. Inland waterway transport is one of the cheapest and most environmentally friendly options.

The impact of inland navigation on the environment is relatively low compared to other modes of transport because of:

- relatively low power consumption;
- low emissions of air pollutants;
- relatively low water pollution;
- the ability to significantly reduce congestion on the roads resulting from the adoption of freight road transport;
- lower external costs.

The low energy consumption during inland navigation is a result of the smaller amount of fuel consumed in comparison with other modes of transport. In addition, the emission of air pollutants is significantly lower than the one deriving from road transport. An additional advantage of inland waterway transport is the capacity and the mass, allowing for efficient service of even the largest ships. One big barge or a pushed set can replace even hundreds of tracks. Smaller ships, operating in local waterways,

and replacing dozens of tracks, can help reduce congestion and security risks on the roads (Wojewódzka-Król, 2006).

Poland presents a modest network of inland waterways compared to both the highly developed EU countries, where inland waterways have been occupying an important position in dealing with transportation needs, which tend to integrate with the EU. Hungary, Czech Republic, Slovakia as well as Russia and Ukraine, are taking a number of actions to increase the role of inland waterways in the transport system in an attempt to catch up with the EU.

The main problems leading to the marginal importance of inland waterways in the Polish transport system have been the same for many years. Funds spent on inland water transport investment, not only did not allow for its development, but were also too small to prevent the decapitalization of existing infrastructure. This policy has led to the degradation of waterways. There has been a deepening disparity in the development of inland water, rail and road transport.

Characteristics of inland waterways in Poland

The length of the inland waterway network in Poland in 2015 remained at a similar level as in the previous year and amounted to 3655 km, of which 2417 km were regulated as navigable rivers, 644 km as canalized sections of rivers, 336 km as channels, 259 km as navigable lakes. Shipping actually took place along 3365 km of navigable waterways, amounting to 92.1% of the available network. Adjusting the size of vessels and waterways is the main factor determining the effectiveness of inland waterway transport. Requirements for roads of international importance (classes IV and V) were fulfilled in Poland in 2015 and accounted for 5.9% of the length of waterways (214 km). The share of inland waterways in this class, providing the parameters necessary for modern shipping, has not changed since 2007. The rest of the waterways have regional importance (class I, II and III), with a total length of 3441 km (94.1% of the total length of waterways) in 2015 (GUS, 2016). Table 1 shows operated inland waterways in 2015 in Poland.

The following list reports the waterways in Poland with the parameters of International Classes (state and prospects of development of inland waterway transport in Poland):

- Wisła, from the Przemsza estuary connected to the Canal Łuczyński – 37.5 km (Class IV);
- Wisła, from Płock to Włocławek – 55 km (Class Va);
- Martwa Wisła – 11.5 km (Class Vb);
- Lake Dąbie to the frontier with internal sea waters – 9.5 km (Class Vb);
- Odra, from the city of Ognica to Klucz-Ustowo and continuing as Regalica up to the mouth of Lake Dąbie – 44.6 km (Class Vb);
- Western Odra – 36.3 km (Class Vb);
- Parnica and Parnicki rivers, from Western Odra to the border with internal sea waters 11.5 km (Class Vb).

Table 1. Operated inland waterways in 2015 in Poland (GUS, 2016)

Specification	Navigable-river regulated	Channeled sections of rivers	Channels	Lake navigable
	in kilometers			
TOTAL	2152	620	334	259
The roads of regional significance				
Ia	641	101	168	54
Ib	608	137	–	–
II	691	106	106	168
III	115	207	47	28
The roads of international importance				
IV	–	14	–	–
Va	–	55	–	–
Vb	97	–	14	10

The existing network of waterways in Poland is based on the natural system of rivers and the connecting channels, built mainly between the eighteenth century and the first half of the twentieth century. In comparison with other EU countries, their length is significant and represents approximately 11% (11.4%) of the total network of inland waterways of the European Union. Only Germany (6636 km), Finland (8018 km), France (5872 km) and the Netherlands (5046 km) can boast a longer network of waterways. Poland is characterized by a relatively high-density network of waterways, with 11.6 km of navigable waterways every 1000 km^2, compared to the EU average of 9.3 km/1000 km^2. A higher density ratio is present the Netherlands (121.6 km), Belgium (50.2 km), Finland (23.7 km), Germany (18.6 km), Hungary (15.5 km) and Luxembourg (14.2 km) (Adamczyk, 2011).

The technical condition of the water transport infrastructure subsystem and its role in the country's transport system is reflected in cargo volumes. Poland, despite the well-developed network of waterways, has a very low share of cargo river transport in total land freight – approx. 0.1%, while

the share of inland waterway in other EU countries stands at 34.7% for the Netherlands, 5.8% in Belgium, 12.6% in Bulgaria, 12.3% in Germany.

Gliwice Canal, was built in 1938. It is about 41 km long, has 6 twin sluices (length L = 71.5 m width B = 12.0 meters), of which three (Łabędy, Dzierżno and Rudziniec) are located within the province of Silesia. This channel provides a connection between an important industrial district with the port of Szczecin and Western Europe through the Odra River and inland canals of Germany (for example: Dortmund-Ems, Elisabethfehnkanal etc.). In recent years, the Gliwice Canal has carried about 400–600 thousand tons of cargo (mainly coal from Gliwice to Wrocław). The length of the Gliwice Canal sluices allows operating a single barge or a set consisting of one barge and towboat. Currently, pushed convoys must be strained when passing through sluices, which is a serious encumbrance to navigation. This channel does not meet the requirements of modern inland navigation. As a result of ships exceeding the 8 km/h speed limit on the channel, and the frequent passage of fleet, as well as improper maintenance, the depth of the canal has been reduced to 1.80 m (Adamczyk, 2011).

The most important factors influencing the decline of inland waterways for the transport of goods are:

- the progressive depreciation of the infrastructure and the lack of investment action that decreases the attraction of the inland waterway;
- lack of action to adapt waterways to contemporary requirements (rebuilding locks Gliwice Canal);
- low competitiveness of water transport in relation to other transportation means;
- limited availability of waterways (in the Silesian's region navigation takes place only through the Port Gliwice currently being a part of the Silesian Logistics Centre SA);
- unfavorable conditions for navigation on the middle section of the Odra, which impedes navigation between the upper and lower sections of the Odra.

The layout and length of inland waterways in Poland has remained at a similar level for years. In 2014 there was an increase of cargo volumes transported by inland waterway ship owners. This increase was related mainly to domestic transport (GUS, 2015). Table 2 presents of goods by inland waterways in Poland in 2014. The information has been classified in terms of origin/destination.

In 2015, 11,928 thousand tons of cargo were transported along inland waterways, for a total of 2,186.8 million tkm. In comparison with the previous year,

Table 2. Inland waterways transport of goods by origin/destination in 2014 in Poland GUS, 2015)

Voivodship or country		Tonnes	Tonne-kilometres
From	To	In thousand	
National transport			
Dolnośląskie	Dolnośląskie	3715.3	29548.7
Kujawsko-pomorskie	Kujawsko-pomorskie	501.4	1622.9
Małopolskie	Małopolskie	53.1	826.1
Opolskie	Opolskie	7.3	36.5
Opolskie	Śląskie	23.7	1068.8
Świętokrzyskie	Świętokrzyskie	24.8	626.9
Zachodnio-pomorskie	Zachodnio-pomorskie	500.5	33597.6

there was and a 56.4% increase of freight, expressed in the number of transported tons, while the size of the transport increased by 180.9%. The largest increase was in shipped tons of cargo (146.0%), while increasing the size of transport work (298.6%) occurred in the first quarter (GUS, 2016). Figure 1 shows transport of goods by inland waterways by quarter in Poland.

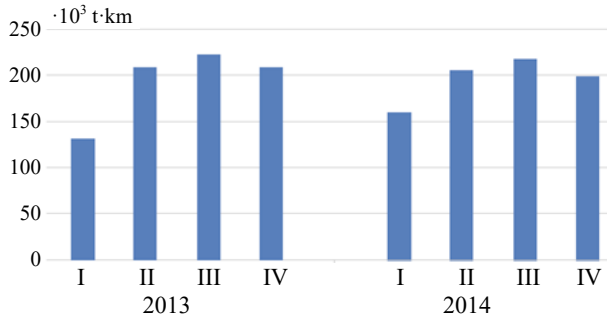

Figure 1.Transport of goods by inland waterways per quarter (GUS, 2016)

In 2014, the average distance for the transport of 1 ton of cargo amounted to 253.4 km (in 2013, 252.6 km) for international traffic, and 14.5 km (in 2013, 25.6 km) for domestic transport. The high average distance travelled in international transport is due to the dominant share of freight transport on the Western European waterways. Compared to 2013, there was a 116.8% increase of domestic carriage to 4833 thousand tons (mainly cargo from group aggregates, sand and stone), with an increase in traffic of 22.9%, up to 70.0 million tkm. Such a significant increase in traffic was associated primarily with the participation of inland waterway transport in the "Modernization of Wrocław Floodway System" project.

In 2014, international traffic amounted to 2,796 thousand tons of cargo (0.7% less than in the previous

year), which accounted for up to 36.6% of all cargo transported by Polish ship owners. The volume of traffic between foreign ports decreased by 3.9%, and their share of international transport in the total transport decreased from 70.2% in 2013 to 67.9% in 2014. Imported cargo was also reduced (40.7%), while there has been an increase in freight exports (16.6%). The main direction of export by inland waterways (representing 29.2% of total international transport) was towards Germany. The share of transport in this direction amounted to 92.0% of total exports using waterways (GUS, 2015). Figure 2 presents the structure of freight transport by inland waterways, according to the 2014 directions, and its changes in relation to 2013.

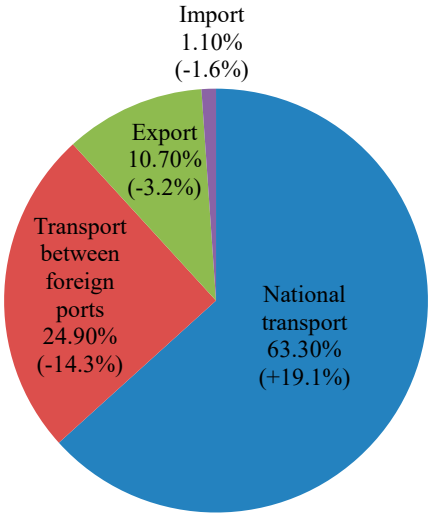

Figure 2. Structure of freight transport by inland waterways according to the 2014 directions and its changes in relation to the previous year (GUS, 2016)

In Poland, the structure of freight in 2014, as in previous years, was dominated by transport of metal ores and other mining and quarrying products (65.6%) and a group of hard coal and lignite, oil and natural gas (14.9%). Figure 3 presents structure of freight transport by inland waterways according to the main commodity groups in 2014 and its changes in relation to the previous year.

Prospects for the development of inland waterway transport in Poland

The key document determining the rationale for using Polish waterways is the European Agreement on the main waterways of international importance (Agreement AGN), signed in 1996. According to this document, the Polish territory possesses three international waterways, connecting the port of Silesia, Warsaw and waterways of Belarus, Germany and Russia. The document shows the advantages and prospects for the Polish inland waterways, particularly international navigation. Poland is the only country in Central Europe, which has not participated in the Agreement – its signatories include all the neighbors of Poland, including non-EU countries.

The "Diagnosis of Polish transport", prepared by the Ministry of Infrastructure states that "the Polish network of waterways does not create a uniform system of communication, but a collection of

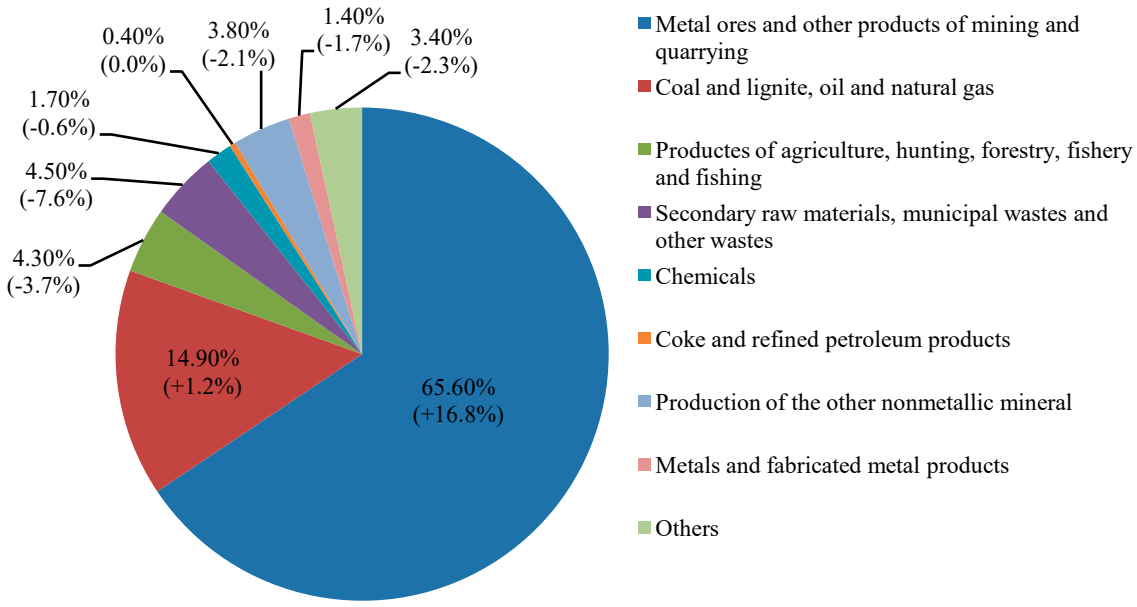

Figure 3. Structure of freight transport by inland waterways according to the main commodity groups in 2014 and its changes in relation to the previous year (GUS, 2016)

separate and qualitatively different shipping lanes" (Diagnosis Polish transport, 2011). As a result, the transportation on short distances dominates, often limited within the same province (Galor & Dwojacki, 2011).

Meanwhile, the "White Book 2011" proposes that distances over 300 km should be covered by alternative means of transport (railway, water transport). This switch should be obtained progressively, reaching 30% by 2030 and 50% by 2050. The White Paper (White Paper, 2011) postulated a tight integration of inland waterway transport with seaports. This means, in practice, joining at least navigable sections of rivers. Indeed, this would be a significant factor in increasing the possibility of cargo transport over long distances.

Poland has one of the most developed networks of rivers in Europe, which has a long history of intensive use for transportation purposes. The system of rivers is closely correlated with the structure of the settlement and distribution of economic potential, including all the key metropolitan areas and industrial centers. Estuaries and seaports are also present within the state border. The system of waterways is in line with the course of the main cargo flows. We hope that the implementation in Poland of techniques and technologies associated with the development of the rivers will, in the future, be directed towards a reduction in costs (including those of an environmental nature) (Dwojacki, 2011).

The increasing level of importance of transport for the competitiveness of a supplier will affect the development of inland navigation. The result is likely to be associated with lobbying and business initiatives for water transport.

Conclusions

Polish inland waterways play a marginal role in the Polish transport system. The share of inland waterway transport in total freight transport in the period 2000–2014 decreased from 0.8% to 0.4%. This results from an insufficient development of navigational roads, as well as navigational parameters (the dimensions of sluices, the depth and width of the trail, the height of bridges).

Polish strategies and national policies differ significantly from European documents. Poland primarily intends to participate in the AGN Agreement on the inland waterways of international importance. Polish waterways are attached to shipping routes considered vital for the integration of the European network of waterways, or category E. The AGN Agreement will apply to roads that already have the appropriate classification requirements and pathways that are intended to reach international standards in the future (Maritime, 2016). For Polish inland waterways of category E to meet the requirements of shipping routes of international importance, they must be developed or upgraded to class IV navigability.

In Poland, rivers and channels are important from the point of view of transport and will be awarded the international class IV navigable level. The Odra (along its entire length) and Wisła (from Warsaw to Gdańsk) will become international shipping routes by 2030.

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