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REASONS FOR STAGNATION IN RIVER TRANSPORT IN POLAND AT THE TURN OF THE 20TH AND 21ST CENTURIES

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ABSTRACT: The aim of the study was to identify the causes of the progressive stagnation in Polish river shipping (Polish inland navigation) since the middle of the 20th century. The methodology used, due to the type of research, was of a complex, eclectic nature. It was based on the analysis of empirical data, desktop research studies, a systemic analysis of relations and cause-and-effect relationships in the sphere of river transportation, and a critical interpretation of the goals contained in program documents on the development of river shipping. The studies focused on the macroeconomic level. The results obtained not only identified the causes of stagnation, but also indicated the most urgent directions for research in this area. Their implementation may allow to design such a strategy for the development of river shipping in Poland, thanks to which it will become an important part of the economy and sustainable transport. The research is original and unknown in this form in the Polish literature.

KEYWORDS: inland navigation, river transport, sustainable development, Polish economy, EU transport policy

Introduction

Transport has accompanied mankind from the very beginning of the development of civilisation. It is, in addition to communication, a branch of the economy that increases the usefulness of goods and services by moving them in space. Transport is closely related to the rest of the economy – production and consumption. Its development determines their development and vice versa – worse development of the economy or transport is associated with the deterioration of the situation in transport and economy, respectively. This sector of the economy constitutes, on average, about 5-8% of the gross national product in individual countries and employs about 7-10% of the total number of people employed in a given economy.

Transport is a necessary condition for all mass production and for the existence of a commodity market and a market economy, irrespective of the socioeconomic system. It integrates economic, cultural and political undertakings, both in the local, regional and international dimensions. It is also an important factor in the growth of the communication mobility of the population (including tourism). It also plays an important role in the defense of any country.

Inland navigation is part of the transport sector. Rivers are the world's oldest transport routes. Thanks to the man-made use of the river network and supplementing it with artificial waterways (canals, water reservoirs, locks, slipways), in many countries, land water transport has developed, which has become competitive with other modes of transport in the transport of bulk cargo. Therefore, it is not surprising that inland navigation has aroused increasing interest after the periodic domination of rail transport, and in the last century, cars, especially in the conditions of increasing importance of environmental and climatic factors. Inland transport is more environmentally friendly.

The research problem focuses on the challenges of Polish inland navigation, its current state, potential, needs and neglect. The aim of the study was to identify the reasons for the stagnation in river transport in Poland at the turn of the 20th and 21st centuries.

The research hypothesis takes the form: stagnation in Polish inland navigation is the result of many years of negligence of public authorities responsible for its condition in the light of legal and institutional regulations, especially in the form of an ineffective strategy and policy in water management. The consequences of this situation concern not only inland navigation but also diminishing drinking water resources and the progress of ground drought in Poland. On this basis, the final identification of the causes of stagnation in river transport in Poland in recent decades was made.

The study mainly uses methods and techniques for the analysis of statistical and empirical data (especially for the description of the current situation of river transport), as well as a critical assessment of official documents of the European Union and Poland. Proprietary research on the role of rivers in the economy and the natural environment was also important. There was also support for the *desktop research* method, which uses research by other authors. Taking into account the above research methods and techniques, two forms of logical inference dominated – deduction and induction.

In summary, the research methodology therefore includes:

1) analysis of empirical data, particularly useful for describing the real situation of inland water transport (IWT), as well as showing the change in this situation over the time studied (statistical data of the Central Statistical Office available on the official pages of the office),
2) desktop research studies, useful for assessing various perspectives, including political ones, on the situation of inland waterway shipping in Poland,
3) a systemic analysis of relations and cause-and-effect relationships in the sphere of river transportation, which is very important for understanding the stagnation that has occurred here,
4) a critical interpretation of the goals contained in program documents for the development of river shipping, especially in the context of the effectiveness of their achievement (Official website of the Ministry of Infrastructure – Inland navigation (Ministry of Infrastructure, 2021), Law of 21 December 2000 on inland shipping (Act, 2000), programs and policies for the development of inland shipping in Poland (Inland navigation yesterday, today, tomorrow in Poland and Europe, n.d.)).

The study consists of the following parts (in addition to the introduction):

- part two presents a brief review of the rather scarce Polish literature and the history of the development of inland shipping in Poland after 1918,

DOI: 10.34659/eis.2024.88.1.622

- part three identifies the factors influencing the development of inland shipping in general,
- part four identifies the role of river transportation in modern transportation,
- part five presents the evolution of river transportation in Poland over the past few decades,
- part six characterises the role of river transport in the European Union's transport policy,
- part seven identifies the causes of the current stagnation in river transportation in Poland,
- and research conclusions and general recommendations for overcoming the current stagnation in inland waterway transport in Poland.

The realization of the main research objective and the verification of the main hypothesis determines this structure of the study.

Inland transport in the light of research – a short review of the national literature

When starting research on the causes of stagnation in domestic inland shipping (mainly freight), it is worth formulating one conceptual explanation: in the following study, the concept of inland transport and river transport will be treated as synonyms, primarily covering the transport of goods by rivers and canals. Inland transport includes river and lake shipping, not including road and rail. River transport excludes swimming in lakes, but in Poland, it does not play a major role apart from tourist trips and recreational and leisure travel to some natural water reservoirs[1].

National literature, especially the most recent ones, does not contain many studies analytically related to the situation of Polish inland navigation. Particular attention should be paid to the publications of the employees of the University of Gdańsk, which focus on the problems of inland navigation and transport in general, and the publications of researchers from technical universities. Among these studies, there are works devoted to:

- problems of the history and development of inland transport,
- issues of prospects for the development of inland water transport in Poland and the European Union,
- transport infrastructure issues,
- innovative solutions in transport,
- the possibilities of using inland transport for the sustainable development of transport in general,
- technical aspects of the functioning of inland waterway navigation,
- inland navigation regulations.

Immediately after independence in 1918, interest in inland navigation increased in Poland, which was favoured by the favourable river system in the Second Polish Republic (relations between Western Europe-Russia and the Baltic Sea and the Black Sea) and the previous achievements in this field from the time of the partitions (Różański, 1920). Therefore, it is not surprising that there is a significant share of transport and river investments in Kwiatkowski's plan (Czaja & Fiedor, 2021). According to the interwar estimates, $^1/_3$ of the cargo was to be transported on the rivers. The Vistula, the second navigable river in Central Europe after the Rhine, was of particular importance. The first draft of its regulation was created as early as 1925. Of the over one hundred million zlotys spent in the years 1918-1936 on river investments, almost 80 million zlotys were allocated for the modernisation of the Vistula. This made it possible to increase the volume of freight weight in river transport by more than 50% in the years 1931-1936. Further investment and development works were interrupted by World War II. Each more extensive work on inland navigation devotes more or less attention to the experiences of the interwar period in this area (Gan, 1978).

In the national literature, quite a lot of space is devoted primarily to the prospects for the development of river navigation in Poland in the context of the plans and programs of the European Union. These analyses are prepared with a focus on different points of view (Adamiak & Baczyńska, 2018;

[1] Pursuant to the act, inland navigation can be defined as the so-called common or special form of water use, consisting in transport, i.e. the transport of people and goods. When the activity is carried out off waterways, in order to be subject to special regulation, which is the Act on inland navigation, it should apply only to: (1) inter-coast transport, (2) commercial passenger transport, (3) cargo, (4) commercial fishing, (5) performance of technical works and (6) exploitation of aggregate deposits.

DOI: 10.34659/eis.2024.88.1.622

Christowa, 2018; Deja et al., 2017; Dwojacki, 2011; Skupień et al., 2016). The legal and institutional as well as economic and financial aspects are of the greatest importance. There are several conclusions in them. Firstly, in Poland, a "huge" number of documents are prepared, which are characterised by a lack of consistency between them, a low level of implementation possibilities and a negligible level of purposefulness and compatibility with European Union documents (Dwojacki, 2011). The documents themselves are a very interesting field of research on the development of non-Weberian bureaucracy. However, they are not particularly useful for the development of inland navigation. There has been no positive change in this matter, which is confirmed by the recent case of the degradation of the waters of the Odra River. Secondly, most of the documents are characterised by an insufficient level of achievement of the assumed goals. This is one of the weakest points of both the state's policy in this area and the documents themselves (Christowa, 2018). It is often exhibited in scientific and research works, especially carried out in centres independent of state institutions. Thirdly, rarely prepared cost-benefit analyses for river infrastructure investments do not always indicate their economic effectiveness, which is often related to the methods of recognising individual elements and the shortcomings of the accounts themselves (Markowska & Valasiuk, 2021).

An important, even basic element supporting the development and efficiency of inland waterway navigation is a properly constructed and maintained infrastructure, which includes waterways, ports and reloading facilities, the fleet and technical facilities. In the case of rivers, canals, and lakes, special skills, knowledge, and wisdom are required. Polish technical thought has extensive experience in this field (Rolbecki et al., 2020; Kulczyk & Winter, 2003; Głowczyński & Gronowski, 1979; Babiński, 2008). Unfortunately, in recent years they have been used less in practical activities taking place in our country, despite the fact that they are supported by official documents (ECORYS, 2011).

Transport as a whole and inland waterway transport in the 21st centuryare subject to particular pressure from technical and technological, environmental, economic and organisational innovations. This is reflected in the published studies, although they relate more to solutions found in other countries than in Poland (Wojewódzka-Król, 2021). Few innovative solutions created with the participation of Polish researchers and constructors are not yet used in domestic inland navigation, such as the results of the project "e-Busi-Net – The impact of electronic connections on the course of economic processes in inland navigation", carried out in cooperation with the University of Duisburg and the Department of Transport of the Warsaw School of Economics (Paprocki & Pieriegud, 2004).

Interesting aspects can be found in studies devoted to the values of inland waterway transport in the context of balanced and sustainable development (Rolbecki et al., 2020). It is this form of transport that meets many important criteria for such development. This is shown by the studies and research conducted in the world, and also fragmentarily in Poland. Inland navigation is, therefore, of increasing interest to ecologists (WWF, 2020).

The hydrotechnical qualities of inland water transport devices are confirmed by research conducted at technical universities. This type of research and related publications were popular when domestic inland navigation reported a need for new staff at the level of secondary and higher education (Głowczyński & Gronowski, 1979). The currently existing three secondary schools do not arouse much interest among young people[2]. There are also no courses related to inland navigation at Polish universities. However, there are still studies of professional literature for employees of inland navigation (Czajewski, 2020; Zajfryd, 1976).

To sum up, Polish literature in the field of shipping and inland transport is not very rich, although it does not lack interesting studies. At the same time, its social significance and impact are very limited, both due to the small circle of readers and low social and economic viability. In other words, shipping and inland transport do not arouse wider public interest, and the lack of demand for its services is not conducive to the development of the market for this type of services and, therefore, does not create permanent jobs in Poland.

[2] The mentioned schools are: Inland Navigation Technical School in Wrocław, Inland Navigation School Complex of Bohaterów Westerplatte in Kędzierzyn-Koźle and the Inland Navigation School Complex of Commander Bolesław Romanowski in Nakło nad Notecią. At present, they train staff for German and Dutch transport companies.

DOI: 10.34659/eis.2024.88.1.622

Factors influencing the development of inland navigation

Theoretical studies and empirical research make it possible to identify several important groups of factors that affect both the development of shipping and inland transport and, more broadly, the development of the entire transport sector. They can be summarised as follows (Figure 1). The most important are: (1) natural and geomorphological factors, including the river network, the state of water in individual watercourses or weather and climatic conditions, (2) the condition and possibilities of development of transport infrastructure, including, in the case of river navigation, harbors and ports, navigation facilities, weirs, locks, mainstream capacity maintenance devices or retention reservoirs, (3) applicable legal and institutional regulations in the field of water management and river transport, under which all program documents, including those describing the transport policy of the European Union and a given country, are also valid (4) costs of transport investments, both for maintaining the current condition of infrastructure, as well as for modernization and development, as well as the method and sources of financing such projects, (5) the size of the demand for transport services, depending on many factors, such as their prices, the level of society's wealth (income) or the availability of the offer, (6) water management and river navigation management system in a given country, in particular its competence transparency, efficiency, including decision-making effectiveness, (7) the level of industrialization and urbanization of riverside areas, determining both the demand and supply of transport services, (8) various possibilities development of the transport services market and export of this type of services.

Natural and geomorphological factors may be particularly favourable, both for the development of inland transport and for creating the basis (limiting conditions) for such activity. Certain limitations in this respect can be overcome with infrastructure investments, but they are usually very costly. For example, the main investments of this type in Poland amount to PLN 100 billion, at pre-inflation prices, including (1) Odrzańska Droga Wodna with the Gliwice Canal, about PLN 30.7 billion, (2) the lower and middle section of the Vistula Gdańsk, over PLN 31.5 billion, (3) the Silesian Channel connecting the Odra and the Vistula, around PLN 11 billion and (4) the Warsaw-Brest waterway over PLN 25.5 billion. The outlays planned in the inland navigation development strategy are even greater and assume unrealistic amounts of PLN 370 million at pre-inflation prices (Dwojacki, 2011; ECORYS, 2011).

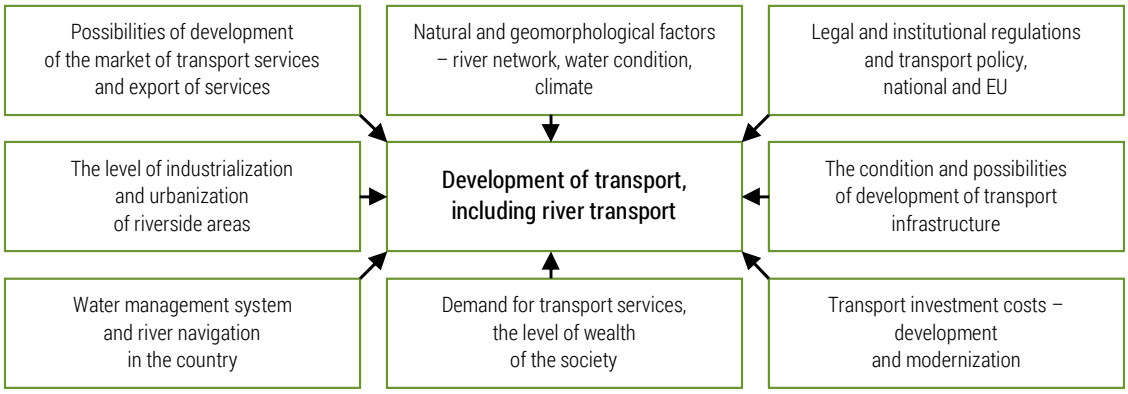

Figure 1. Factors influencing the development of transport, including inland navigation

Legal and institutional regulations and transport policies implemented at the national and EU level are also very important. While the European approach is coherent and transparent, national regulations and solutions raise serious problems (Dwojacki, 2011). They are generated in significant amounts and often corrected, causing information noise, competence, and decision chaos. They do not have a high level of implementation effectiveness, most often having the nature of unrealistic documents, without adequate financial and organisational support, as well as consistency in implementation on the part of state agencies.

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When analysing the factors supporting the development of shipping and inland transport, it is also worth remembering the importance of market determinants, both on the side of demand for transport services in this form and supply, especially with the significant participation of private entities. This applies to both the domestic market and the export of services. In Polish inland navigation, the latter element accounted for only 7% of cargo in 2020, and since 1990, it has never exceeded 10% of total cargo transport. The entire river transport services market is small, considering the possibilities and size of the Polish economy.

The role of river transport in modern transport

Inland transport has special advantages in the transport of bulk goods, in particular: (1) metal ores and other mining or quarrying products, such as stone and aggregate; (2) products of agriculture, hunting, forestry and fishing; (3) hard coal and lignite, crude oil and natural gas. Such products dominate the structure of river navigation in all European Union countries. More detailed comparative studies should be carried out for inland navigation and rail and road transport in terms of broadly understood economic, environmental and technical efficiency (WWF, 2020).

Poland has quite favourable geomorphological conditions (the dominance of lowlands and the drainage system of space) in terms of the river, network compared to other European Union countries (Figure 2). It ranks fifth in the length of waterways among the European Union countries.

The empirical data presented below should make you aware of several facts. They show the natural potential of selected countries in terms of owned lengths of river roads, which, varied, is significant in Europe, especially since they are technically good, properly maintained and systematically upgraded (Figure 2). This situation applies to various forms of these roads (Figure 3), although not to all countries. In addition, they show the discrepancy between the infrastructural potential and the share of river transportation in the overall transport, which is evident in some countries, especially in Poland (Figure 4). This can be seen in the data depicting the development of the size of this transport in our country. This is especially important given the subject of the study (Figure 5).

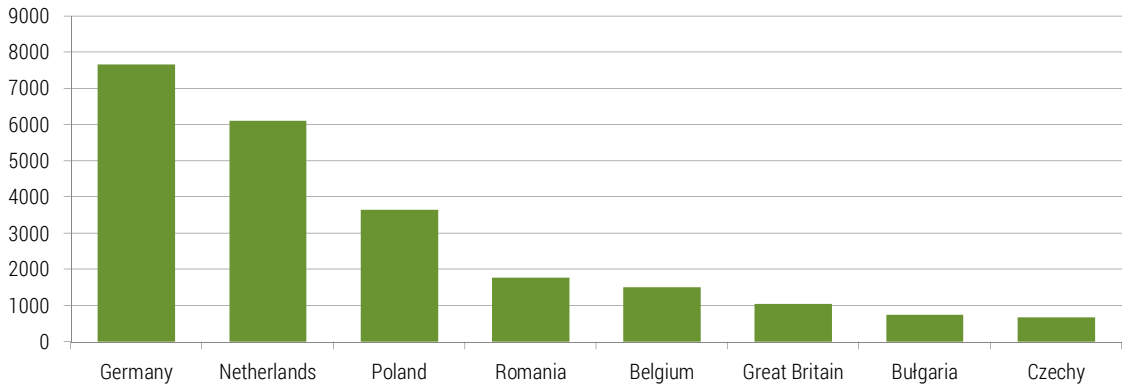

Figure 2. Length of waterways in selected European countries in 2016 [km]

Source: authors' work based on WWF (2020).

Regulated navigable rivers dominate Poland ($^2/_3$ of the length of navigable roads), followed by canalised sections of rivers (about $^1/_5$ of navigable roads) and canals (about $^1/_{10}$ of the length of navigable roads). The importance of navigable lakes is insignificant, apart from tourist and fishing activities (Figure 3).

River transport plays a very limited role in the transport of goods and even less in the transport of passengers in Poland. Comparing the situation of domestic river navigation with other European Union countries is also not very good. Poland occupies one of the worst places in the European Union in terms of the fleet, its number and cargo capacity, the size of the goods transported, and the length of waterways. This is confirmed by the data of the Central Statistical Office.

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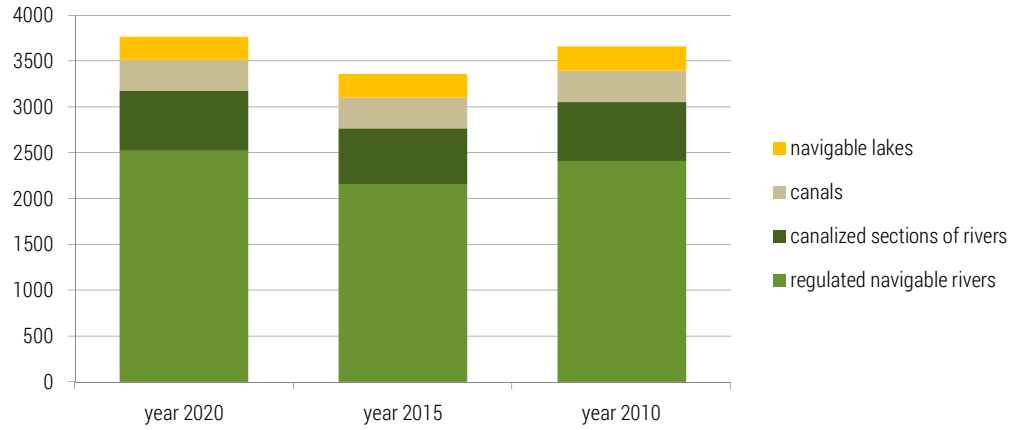

Figure 3. The length and structure of inland waterways in 2010-2020 in Poland [km]

Source: authors' work based on Urząd Statystyczny w Szczecinie (2011).

Table 1. Advantages and disadvantages of inland waterway transport

Advantages	Disadvantages
• capacity and mass of the river fleet (one large vessel can replace several hundred cars) • the possibility of transporting large-volume bulk cargoes (sand, wood, coal, building materials, metal ores) and goods that do not require fast deliveries • popularity in the tourism industry (cruises, sailing) • organizing restaurants, hotels or other attractions on board ships • low harmfulness to the natural environment and low emission of pollutants • lower risk of communication security • relatively low transport prices resulting from a large unit cost reduction in the case of transporting large batches of cargo over long and medium distances • low transport costs • relatively low energy expenditure • it enables communication links in underdeveloped or hard-to-reach areas • increasing the share of inland transport as an environmentally friendly mode of transport • strengthening the role of seaports at the mouth of the Odra and Vistula rivers thanks to inland transport facilities • socio-economic development of riverside areas • increasing flood protection • production of „clean" electricity from water installations • reduction of road congestion, i.e. the chronic phenomenon of greater traffic intensity than the capacity of the infrastructure used by them	• slow transport, dependent on the weather and water level fluctuations • limited transport of goods susceptible to moisture • expensive infrastructure, its construction and maintenance • insufficient regulation of the main rivers in Poland • neglect of investments in the maintenance of waterways and deteriorating navigation conditions on the main rivers of the country • the need to renew inland water tonnage • failure to adjust inland navigation to the changed demand for transport • low share of inland navigation in servicing sea ports • long delivery times resulting from low operational speed and high irregularity of transport as a result of dependence on weather and climatic conditions • poor spatial accessibility related to the inadequacy of the waterway network to the distribution of supply and sales markets • potential destruction of naturally valuable areas and the Natura 2000 network • destruction of valuable habitats, especially wetlands, extermination of reophilic fish and easier migration of invasive species • lowering of the erosion base of the river, lowering the water table in relation to the groundwater, deepening of the ground worm

This situation occurs in conditions where inland water transport has many advantages related to the transport of bulk goods, which are an important product of the Polish economy, and the system of rivers and canals allows for the movement of such products throughout Europe.

These advantages relate to:

1) logistic capabilities (capacity and bulk of the river fleet and the ability to transport large-volume bulk cargo, for example, sand, wood, coal, construction materials, metal ores and goods that do not require fast deliveries),
2) leisure and recreational values (popularity in the tourism industry as cruises or sailing, and the possibility of organising restaurants, hotels or other attractions on board),

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3) low impact on the natural environment (in the form of low pollutant emissions or less threat to transport safety, i.e. environmental disasters),
4) economic, price and cost advantages (low transport prices resulting from the high degression of unit costs when transporting large batches of cargo over long and medium distances, as well as low transport costs and low energy expenditure),
5) communication values (shipping enables communication in underdeveloped or hard-to-reach areas).

Inland waterway transport also has its disadvantages (Table 1), although they occur especially where there is no adequate infrastructure or there is clearly neglect in this respect. If the water network is maintained in terms of its communication and transport values, then a significant part of these disadvantages does not occur.

Evolution of river transport in Poland

In Poland, there were 3 768 km of waterways in 2020. Most of them were not used very intensively for economic purposes (transport and extraction of raw materials), tourism or recreation. The services market operating in this space is quite characteristic and stable, both on the supply side of such services and on the demand side.

On the supply side, the structure of entities in the water and inland waterway transport market in Poland was significantly fragmented in the 1990s. Relatively large state-owned enterprises went bankrupt or were privatised (Odratrans and Żegluga Bydgoska). The services market was liberalised, especially after Poland joined the European Union. Currently, the largest company providing transport services in this area is the Odratrans S.A. group, which has approximately 70-75% share in the domestic market, and the remaining part of the market is covered by approximately 200 small shipowners. This makes the river transport services market an oligopolistic market with a clear leader. Small shipowners are primarily family businesses. The main barrier to their development is relatively high outlays for the purchase of the fleet. Due negligence in inland transport plays a completely marginal role in the transport of products (Figure 4).

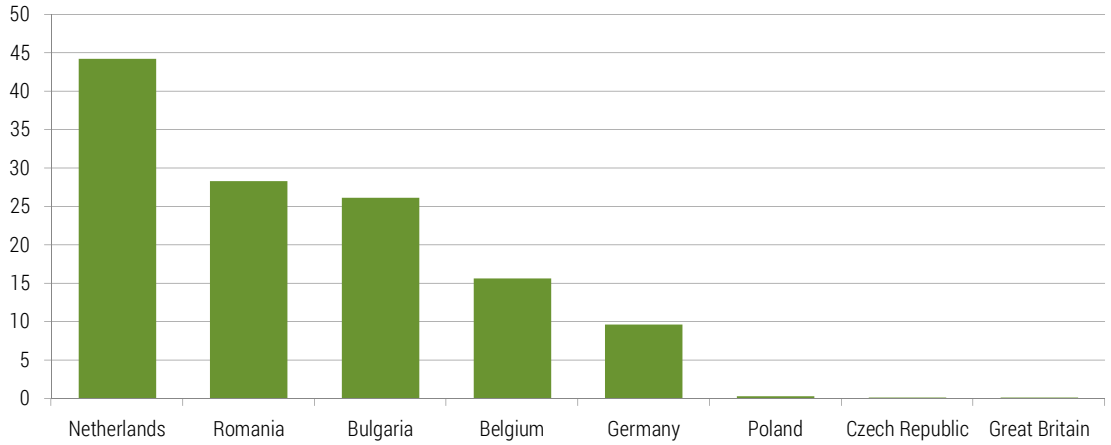

Figure 4. The share of inland navigation in the total freight transport in 2019 in selected countries [% of the total freight transport]

Source: authors' work based on Eurostat (2022).

From the demand side, we have been observing an increase in the demand for transport services in Poland for many years (since 2000). However, they do not apply to services offered by inland transport. This demand is met primarily by road transport, followed by rail. Inland navigation did not observe such a trend. On the contrary, we see a systematic decline in its importance (Figure 5).

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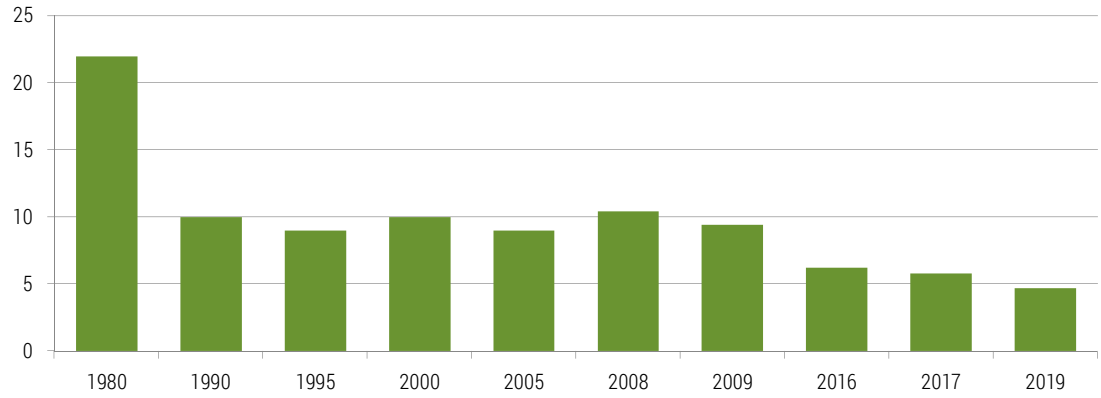

Figure 5. Freight transport of inland waterways in Poland in 1980-2020 [million tons]
Source: authors' work based on GUS (2022).

In recent years, about 0.3-0.1% of the total cargo has been transported via waterways, which gives an annual weight of about 5.5 million tons. In Western Europe, this percentage is close to 6% of the total commodity weight.

An important element in the evolution of river transport in Poland is the nature of legal and institutional regulations, their detail and effectiveness. In Polish law, these regulations are based on the following legal acts:

1) Act of 4 September 1997 on government administration departments (Act, 1997),
2) the Water Law Act (Act, 2017),
3) the Act of 21 December 2000 on inland navigation (Act, 2000),
4) Act of 6 July 2001 on establishing a long-term program "Program for the Odra River 2006" (Act, 2001).

River transport requires detailed safety and navigation regulations. In the Polish legal system, the decisive role in this respect is played by the Regulation of the Council of Ministers of 7 May 2002, on the classification of inland waterways (Regulation, 2022). It regulates the minimum parameters of the navigable route, such as its width, depth, radius of bends and the size of the clearance under bridges. They must be met on average for 240 days a year, based on multi-year studies. It also determines the class of each waterway in Poland. An important program document is also the Water Strategy (Policy) of Poland of 13 September 2005, amended and supplemented many times (Ministerstwo, 2005).

The water management system has also changed. A catchment system was introduced, modelled on French solutions, and as part of it, the National Water Management Authority and seven regional water management boards located in Gdańsk, Gliwice, Kraków, Poznań, Szczecin, Warsaw and Wrocław were established. At the same time, the Inland Navigation Office operates and is subordinated to the Ministry of Infrastructure. Some decision-making powers also have marshal offices, poviatstarosties and commune offices in the field of water management. The owners of certain infrastructure objects are municipal offices, the State Treasury or private companies. The management system has become complicated and ineffective in this respect. As a result of many ill-considered activities, significant neglect in the field of water management and inland water transport was led to.

The financing system (Figure 3) of projects in the field of water management (flood prevention activities, construction and maintenance of retention reservoirs), inland water transport (shipping infrastructure) and service activities (fleet and outlays on day-to-day operations) has also become complicated.

It is made up of the resources of the central state budget, the budgets of individual voivodeships, as well as local government commune, poviat and voivodship budgets. Quite significant funds come from the National Fund for Environmental Protection and Water Management and provincial funds for environmental protection and water management. Aid funds and EU structural funds are also used in water management and inland navigation. Inland navigation projects are also financed from the Inland Navigation Fund, as well as from private funds of service and transport companies. Consid-

DOI: 10.34659/eis.2024.88.1.622

ering the neglect and poor technical condition of the infrastructure, the amount of these outlays is far from sufficient. The outlays on inland navigation are not enough to keep the property in good condition. This means deterioration of the technical condition of the infrastructure. Also, the support for shipping with European Union aid funds is insufficient, which is largely due to the domestic distribution of these funds.

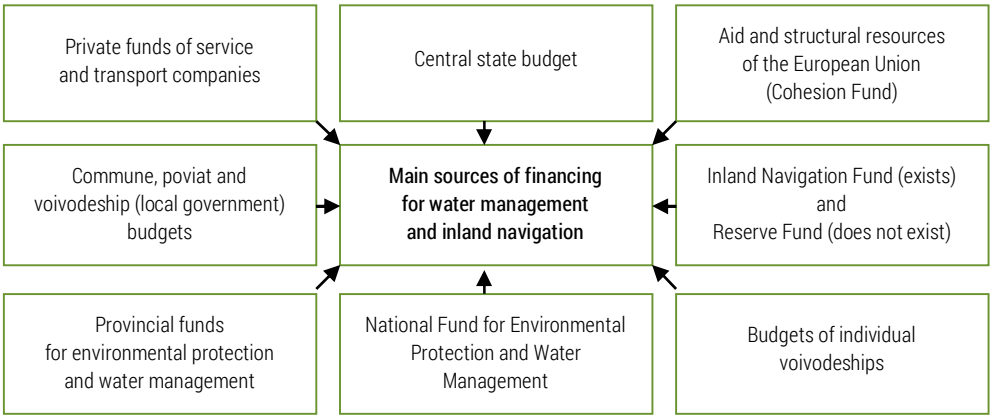

Figure 6. Main sources of financing for projects in the field of water management and inland navigation in Poland

Investing in waterway infrastructure is reserved for state or local government units without public-private partnerships. This essentially limits the possibility of including private capital in inland shipping and thus strengthens the stagnation of this form of economic activity in Poland. As entities providing transport services in inland navigation represent the private sector, and the infrastructure is owned by the State Treasury, the inability to use private capital to financially support investment projects creates a difficult situation for inland navigation.

In 2011, the document "Program for the Development of inland waterway transport infrastructure in Poland" was prepared, including: (1) a presentation of the technical infrastructure of Polish inland waterways, (2) an assessment of the effectiveness of inland waterway management in Poland and in the European Union, (3) assessment of conditions economic, legal and operational functioning of inland navigation in Poland, (4) characteristics of the inland waterway transport market in Poland, (5) assessment of international conditions, (6) presentation of benefits from the development of inland water transport infrastructure and (7) presentation of water tourism in Poland. Its weakest point is the identification of appropriate sources of financing for individual projects (ECORYS, 2011).

The role of river transport in the transport policy of the European Union

Already in March 2011, the European Commission published a White Paper containing the creation of a single European transport area by 2050 as the overarching goal of the European transport strategy and policy (European Commission, 2011). The document assumes that by 2030, about 30%, and by 2050, more than 50% of goods transported over a distance of more than 300 km should be carried out by means of transport other than road. Obviously, this requires the improvement (modernisation and development) of the transport infrastructure (corridors).

The main task of the transport policy is to build a uniform transport system. The state has two important tasks: (1) to coordinate the principles and conditions of transport development with the adopted criteria for other economic sectors, and (2) to coordinate the development and functioning within individual modes of transport and in terms of inter-branch connections. Transport plays many important roles in the economy and society. First, it stimulates economic growth and civilisation progress. Secondly, it develops socially and economically undeveloped or underdeveloped areas and improves the development of developed areas thanks to the appropriate location of the network of transport systems. Third, it is a factor that activates economic processes in a given socio-economic

DOI: 10.34659/eis.2024.88.1.622

space. Fourth, transport plays an important role in creating a global product. Fifthly, thanks to the transport infrastructure, fixed assets are co-created, which are part of the national wealth. Sixth, transport meets the transport and communication needs of the population. Seventh, it creates opportunities for economic, tourist, social and cultural exchange. Eighth, it facilitates multilateral international cooperation and ninth, it decides about a country's defence system.

The transport policy of the country and the European Union defines several basic goals that should be achieved (Table 2).

Table 2. Basic goals of the national transport policy

Goal number	Description
Goal one	**Improvement of transport accessibility and quality of transport** as a factor of improvement of living conditions and removal of barriers to development of the economy
Goal two	**Supporting the competitiveness of the economy** as a key instrument of economic development
Goal three	**Improving the efficiency** of the transport system
Goal four	**Integration of the transport** system – in the branch and territorial system
Goal five	**Improvement of safety** leading to a radical reduction in the number of accidents and limitation of their consequences, as well as to the improvement of personal safety of transport users and protection of cargo
Goal six	**Limitation of the negative impact** of transport on the natural environment and living conditions of the population

The aim of the common EU transport policy is to remove barriers in all modes of transport. This is to be achieved through the harmonization of technical, tax and social regulations, promotion of free competition and the elimination of discrimination against a carrier based on its seat.

The main directions of the EU transport policy are:

- liberalisation of international transport conditions between the Member States,
- increasing safety in all modes of transport,
- improving the quality of transport through the development of an integrated system of connections using the latest technologies,
- better protection of the natural environment against pollution caused by transport,
- common labour standards and uniform employment conditions for employees of the transport sector,
- increasing the economic cohesion of the European Union by creating a trans-European transport network,
- facilitating the access of Community entrepreneurs to foreign markets.

The basic features of the European Union's transport policy include, inter alia, such elements as: (1) expansion of the branch scope of the transport policy; (2) aggravating the problem of non-discrimination of carriers, the problem of unfair competition, the problem of tax harmonisation; (3) issues related to environmental protection, the introduction of euro logistics, the use of intelligent transport systems; (4) spatial extension of the area covered by the EU transport policy; (5) reinforcement with instruments; at the beginning, only legal regulations were used, then more effective instruments were used, including funds – the enterprise receives them only when they are in line with the objectives; Galileo program – electronic taxation (state, entrepreneurs); (6) too slow development compared to other sectoral policies; (7) abandoning the problems of regulating the demand for transport – the transport user is not limited – it is not imposed on the carrier or time. There are only constraints in supply.

The European Union applies consistently defined rules in its transport policy (Table 3). They are at the heart of the long-term activities planned and implemented by the EU institutions in the field of transport policy in general and inland navigation policy. An important observation is that these principles are not reflected in Poland, not only in inland waterway activities but in the entire transport sector. The interference of government agencies is chaotic, very often unprofessional and focused on the implementation of particular or narrow group interests, often political and economic.

DOI: 10.34659/eis.2024.88.1.622

Table 3. Principles applied in the transport policy of the European Union

(1) Fair (controlled) competition
(2) The freedom of the user to choose the means of transport
(3) Financial and commercial independence of transport entrepreneurs
(4) Harmony of transport development with the environment
(5) Solving the social problems of transport and consumer protection
(6) Equal treatment by authorities of means of transport and carriers
(7) Coordination of infrastructure investments within the community
(8) The contribution of transport to strengthening the spatial cohesion of the community
(9) High security of means of transport and transport systems
(10) Promoting the integration of the transport markets of the new Member States

One of the most important elements of the EU's transport policy is the European Agreement on Main Inland Waterways of International Importance (AGN) (United Nations, 1996). According to it, some waterways in Poland are included in the network of international waterways, namely:

- E-30 – connecting the Baltic Sea with the Danube in Bratislava, including mainly the Odra River in Poland, from Świnoujście to the border with the Czech Republic,
- E-40 – connecting the Baltic Sea in Gdańsk with the Dnieper in the Chernobyl region and further through Kyiv, Nowa Kachówka and Kherson with the Black Sea, covering in Poland the Vistula River from Gdańsk to Warsaw, the Narew River and the Bug River to Brest,
- E-70 – connecting the Netherlands with Russia and Lithuania, and in Poland, including the Oder from the mouth of the Odra-Havel canal to the mouth of the Warta in Kostrzyn, the Wisła-Odra waterway and the lower Vistula and Szkarpawa or the Vistula Gdańska from Bydgoszcz.

Poland has permanent problems with the implementation of EU arrangements for shaping international European waterways. The conditions of roads of class IV and V, i.e. international roads, are met in Poland only by 206 km (data from the Central Statistical Office in 2020).

There can be many reasons for an inadequate transport policy. The most important ones include: (1) incorrect assessment of regularities and economic development phenomena – identification error, (2) unjustified treatment of current regularities and economic structures as unchangeable in the future – invariability error, (3) failure to take into account the postulates of various pressure groups – desocialisation error, and (4) ignoring the increasing complexity of the domestic and world economy and increasing the scope of connections between various spheres of human activity – a simplification error.

Economic and non-economic instruments are used in transport policy. The first group includes, among others: tariff, tax, customs, insurance, depreciation rates, subsidies, subsidies, tax breaks, credit conditions, norms in the field of profit distribution, depreciation, creation of special purpose funds, obligatory deposits and deposits, wages, their systems and rates, government orders and official prices. Among non-economic instruments, one can distinguish administrative instruments such as: orders and resolutions of authorities, concessions and limits, permits, personnel policy tools, location decisions and others, recommendations of the Sanepid, OHS and others, assignments, distribution and rationing of resources as well as, establishing, liquidating enterprises). There are also legal instruments, such as normative acts relating to organisational, functional, and ownership structures of entities and systems, as well as technical norms relating to the construction and operation of fixed assets. The last group are information instruments, including tasks of annual and long-term plans and programs, information on the expected changes in spatial development in the national economy and in the world, as well as information on the demand and supply situation and demographic forecasts. In Polish shipping, the above-mentioned instruments are used in an unprofessional and chaotic manner, often serving to implement projects that are not constructive for the development of water transport and the economy. Some important instruments are not used at all due to the ignorance of state decision-makers. This leads to both the degradation of this form of economic activity and a decline in confidence in government decisions, i.e. a decline in social capital resources.

Compared to other European countries, Polish inland water transport plays a minor role. This is mainly due to: strong competition from other transport subsystems (road and rail transport), the systematically deteriorating condition of the waterway infrastructure for years and, as a result, the low technical quality of the infrastructure, which causes restrictions in barge operation in higher

DOI: 10.34659/eis.2024.88.1.622

parameters; Only 5% of the length of the network meets the requirements for roads of class IV and V and (EU standards) in relation to waterways of international importance, the difficult financial situation of shipowners and the resulting restrictions on the possibility of restoring and renewing the river fleet.

The growing importance of inland waterway transport depends on the condition of the waterways and, at the same time, creating conditions for Polish inland shipowners to enable them to compete and cooperate with other carriers, including road and rail. The waterways of the Odra and the lower Vistula are essential for the development of inland water transport. Increasing the technical parameters of these sections would result in an increase in cargo transport (including intermodal transport). However, the limitations of naturally valuable river valleys within the Natura 2000 network must be taken into account. In connection with the above, it is assumed: that increasing the standards of the Odra and lower Vistula waterways, selection of sections, scope and schedule of implementation are the subject of analyses, supporting the renewal of the fleet for freight, promoting and supporting local initiatives aimed at: activation of inland navigation in servicing the supply of agglomerations, including the development of distribution centres located in river ports, the development of passenger transport, mainly as an element increasing the tourist attractiveness of the areas.

The reasons for the stagnation of river transport in Poland at the turn of the 20th and 21st centuries and prospects for overcoming such a situation

Various analyzes of inland waterway transport analyze the causes of stagnation in this industry in the Polish economy. Its strengths include: experience in inland navigation, presence on the European market of transport services, diversification of the activities of service companies and low barriers to exit from the industry.

The weaknesses include: weak position of the industry in comparison to other transport segments, aging workforce, high barriers to entry into the industry, technically and economically outdated fleet, weak institutional organization of the industry as well as degradation and fragmentation of port ownership rights.

Opportunities for inland navigation are seen, among others, in: the full opening of the market in Western Europe, the existence of a small group of stable customers, low costs of water transport, the ecological character of inland navigation and the transport policy of the European Union.

The threats are: state policy supporting road and rail transport, deficiencies in technical infrastructure, instability and heterogeneity of regulations, growing fiscalism, increasing requirements and costly technical requirements, poor organisation of technical service, deepening shortage of staff and inefficient education system, ecological anti-shipping lobby and difficult climatic conditions.

Undoubtedly, a serious barrier to the development of river transport is the relatively high fees for using the technical infrastructure. These include: (1) fees for navigation and the use of locks or slipways, (2) annual fees for the use of land under flowing waters, (3) fees for the use of water facilities owned by the State Treasury, (4) contributions to the Shipping Fund Inland. The fees also apply to the navigation of empty barges, navigation of passenger and cruise ships, towing and rafting of timber, the use of locks and slipways, port fees, wharfage fees and tonnage fees. This means that in Poland, such fees account for as much as 15-20% of the total cost of operating ships, while in Germany, they do not exceed 8.5% (European Commission, 2008).

The hydrotechnical condition of waterways is a serious barrier to the development of inland water transport. Too small capacity of retention reservoirs does not allow for obtaining stable water levels and transit depths. Additionally, the different parameters of individual sections result in the lack of communication continuity of the routes. Another problem is the length of the navigation season, the opening hours of the locks (at most until 4:00 p.m.) and the marking of the routes. Night communication is practically impossible in Poland.

In the case of river ports, there are also specific difficulties related to access, such as the lack of container handling facilities and intermodal transport. According to Polish shipowners, in ports: (1) there is no publicly available information on mooring, unloading and handling places; (2) there is a cumbersome procedure for reporting the vessel's call in writing, not by radio. Therefore, there is an urgent need to accelerate work on the RIS (River Information Services) system.

DOI: 10.34659/eis.2024.88.1.622

Another problem is the management of inland ports, which do not have the status of public ports. The shipyards are not used for major refurbishments or for the construction of new vessels. These types of ships are purchased from Chinese shipyards. In the 1960s and 1970s, the Polish river fleet was modernised and complied with European standards. Since then, a constant technical and age regression of the Polish river fleet has been observed. The vast majority of ships are over thirty years old (all towing barges, almost all self-propelled barges, ¾ pushers and tugs, $^2/_3$ passenger ships and half of the push barges).

The Polish river fleet is quite small, ranging from 450 to 650 tons, which accounts for almost 85% of the total rolling stock. For comparison, in the Netherlands, this percentage is less than 50%. There is a shortage of units for transporting containers and liquid substances (Kulczyk & Nowakowski, 2008).

Polish river navigation is also beginning to experience an increasing shortage of qualified personnel. This is the effect of limiting the education of young technicians, ageing the current staff, and causing economic emigration to German and Dutch companies.

"Inland shipping in Poland has a number of features of the declining industry, i.e. one in which the determinant of the strategy is the sooner or later expected necessity to narrow down or stop operating on the Polish market. The features of such a strategy include: avoiding investments, diversification of activities (geographic and sectoral), and disposal of assets (infrastructure) – which is justified by the current and anticipated state of external conditions. Alternative development and efficiency strategies (cost reductions, etc.) are not applied. The "declining industry" strategies have been imposed on inland navigation in Poland from the outside by the condition of the waterway infrastructure and the environment – stakeholders – who see other than shipping, the use of existing water resources and potential waterways" (ECORYS, 2011).

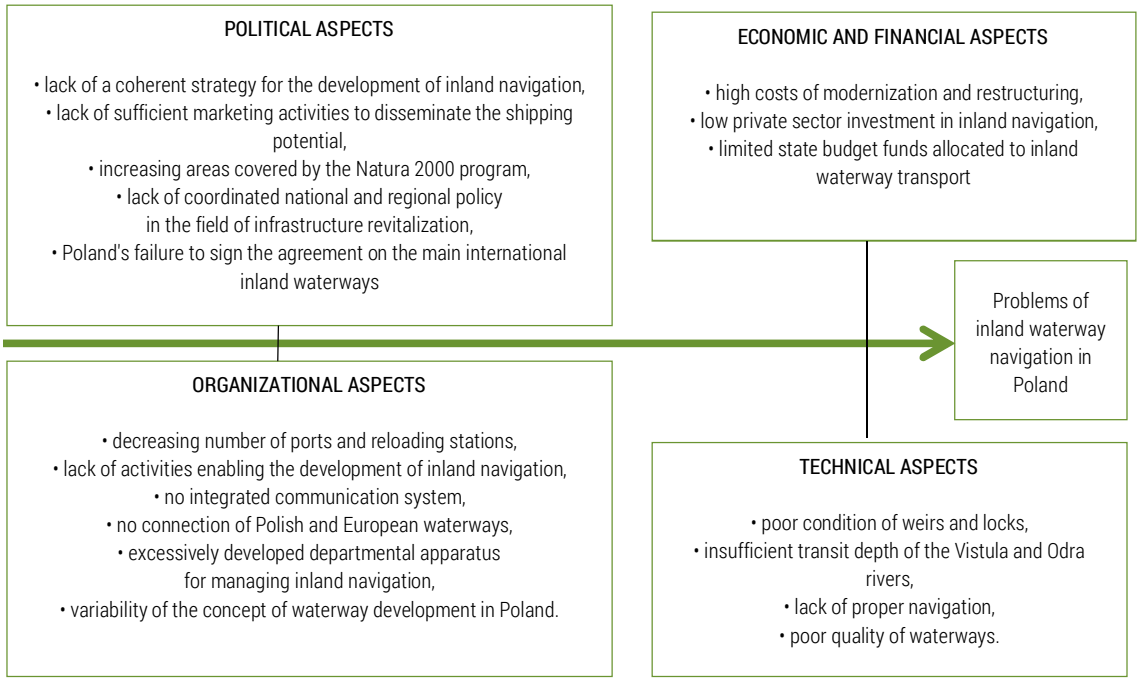

Figure 7. Ishikawa diagram for the problems of inland waterway navigation in Poland

Source: authors' work based on Babiński (2008).

The few speeches made by officials of the Ministry of Maritime Economy and Inland Navigation testify to the lack of a sensible idea for the development of inland water transport in Poland and even to the ignorance of those responsible in this regard (NIK, 2020). This situation is confirmed by the assessments of control institutions. In 2020, the Supreme Audit Office carried out an assessment of the situation in inland navigation in Poland. Its basic conclusion is as follows: "*While the role of inland*

DOI: 10.34659/eis.2024.88.1.622

water transport in the European Union is growing, the trend is reversed in Poland. This is influenced, among others, by the decreasing length of inland waterways and many years of neglect of investment in them. It is true that the public administration undertook activities and initiatives for the development of navigable routes, however, they were not fully effective, as not all planned activities in this area could be implemented. First of all, it was not possible to create a financing system for investments related to the modernisation of inland waterways or to complete work on long-term development programs for these roads on the Odra and Vistula rivers" (NIK, 2020).

Already at the beginning of the 21st century, the first ordered Ishikawa diagram was developed for the problems of inland waterway navigation in Poland (Figure 7).

It seems interesting, but it does not take into account certain additional aspects necessary in the analysis of the causes of stagnation in this area of economic activity, such as legal and institutional or environmental issues and EU proposals. Therefore, at the end of the analysis, it is possible to try to compile the most important, according to the authors, factors that caused stagnation in Polish inland navigation and river transport at the turn of the 20th and 21st centuries (Table 5). Their stagnant significance and the strength of their impact changed after 1990, but no disappearance of any of the groups of causes was observed throughout the analysed period. They were all significant and, in addition, generated synergistic effects that would also be worth investigating. However, it is difficult to expect financial support for such research. Government agencies and government officials are partially aware of their negligence, and inland waterway operators lack the resources to do so.

Table 5. The causes of stagnation in Polish inland navigation at the turn of the 20th and 21st centuries

Group of causes	Specification
Political factors	• many years of preferences of national authorities for the development and modernization of road and rail infrastructure • neglect of navigation and river transport (transport cannibalism)[3] • very weak lobbying of the inland navigation community • failure to fully implement the principles of the EU transport policy in Poland • ignorance and unprofessionalism of inland waterway decision makers
Economic factors	• systematic shifting of limited investment outlays on road and rail infrastructure at the expense of river infrastructure • insufficient investment in the development of navigation and inland transport • lack of properly targeted marketing and promotion of inland navigation services in the country and internationally • the chaotic and often ignorant use of economic policy instruments in inland navigation • lack of comprehensive cost-benefit analyzes for inland navigation
Social factors	• activity of pressure groups from the road and rail transport lobbies • lack of relevant traditions of interest in inland navigation, even in riverside towns • no conditions for public-private partnerships in inland transport
Technical and infrastructural factors	• progressive degradation of the existing infrastructure in inland navigation • progressing technical degradation of the river rolling stock • insufficient number and capacity of retention reservoirs and barrages • too slow development and implementation of new technologies and technical devices in inland transport
Ecological factors	• the belief that river transport collides with the values of the natural environment and landscape • insufficient knowledge of the relationship between inland navigation and the natural environment • lack of interdisciplinary research on the river environment in Poland
Legal and institutional factors	• failure to implement EU regulations and a passive attitude of abandonment in this respect • excessive number of legal documents, including strategic ones, with a low level of their implementation in practice, aggravating the instability of functioning conditions and information chaos • persistent information and decision-making chaos, which leads to a reduction in the social capital of trust and incapacitation of entities operating in inland navigation • low temporal stability of legal and institutional regulations in inland navigation

[3] The concept of transport cannibalism means the development of land transport while devastating waterways. It was introduced by Dwojacki (2011).

DOI: 10.34659/eis.2024.88.1.622

The great diversity, strength of impact and the long-term occurrence of the causes of stagnation (the stagnation triad) must have led to the collapse of shipping and inland transport in Poland in the last three decades. Not without significance, synergistic effects and feedback were also less exposed, enhancing the effects of various causes (Figure 8).

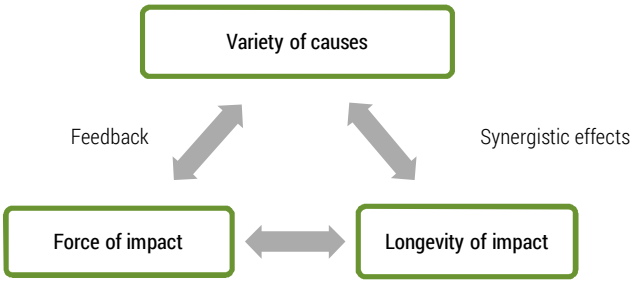

Figure 8. Stagnation triad in shipping and inland transport in Poland

The above diagram can be transformed into an economic model, thanks to which it is possible to determine (measure) not only the role of individual causes (in the form of the strength of correlation or rank ordering relationships), but also to measure the depth of stagnation in shipping and inland transport in Poland at the turn of the 20th and 21st centuries. centuries. However, this requires further research, both empirical-statistical and model-constructional.

So, what is the prospect of inland shipping in Poland in the coming years? Is the above assessment true? The answer is not clear-cut. It is different for water freight transport, different for analogous passenger transport, and still different for the use of rivers for recreational and leisure shipping. Using the PESTEL[4] method, the analysts of the Ecorys consulting company point out the main positive and negative impacts on the political, economic, social, technical, natural, geographical and ecological, as well as legal and institutional levels. The author's assessment of the strength of the impact of individual factors is also varied (Figure 9). Particularly large disproportions between unfavourable and beneficial interactions can be seen in the following dimensions: economic and financial, legal and institutional and technical and technological. A slightly smaller relationship between unfavourable and favourable factors for the prospects for the development of inland water transport is felt in the political and social dimensions. A situation close to the equilibrium occurs in the natural and geographical dimensions.

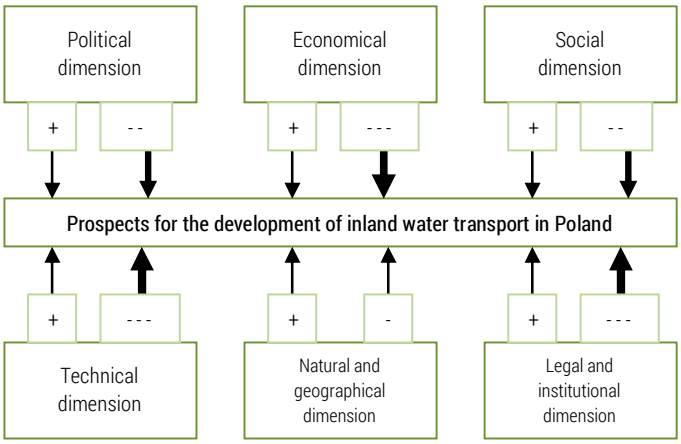

Figure 9. The strength of positive and negative impacts in the sphere of water management and inland navigation in Poland

4 The PESTEL method consists in identifying the strongest positive and negative political (P), economic (E), social (S), technical (T), natural-geographic-ecological (E) and legal-institutional (L) influences.

DOI: 10.34659/eis.2024.88.1.622

The positive political conditions include an incorrect branch structure of transport in Poland and an excessive predominance of road transport. It is also important for Poland to participate as a signatory state to the International Waterways Agreement, and the National Spatial Development Concept takes into account the use of the Odra Waterway. On the other hand, there is a negative nature of the lack of perception of environmental shipping as an alternative mode of transport. As a result, when designing bridges or energy devices, the transport function of rivers is not taken into account. Often, river shipping is not included in international agreements. Additionally, for purely political reasons, there is no water crossing to Belarus. In addition, Poland has a dual, inefficient water management and inland shipping management system. On this level, the advantage of negative influences over positive ones is clear.

In the economic dimension, a factor supporting projects in the field of water management and inland navigation is a high level of flood losses. Moreover, socio-economic development will increase the demand for transport services. On the other hand, deficiencies in infrastructure financing, lack of proper EU funding, unstable tax and fee policy, and poor development of water ports have a negative impact. The size of the necessary expenditure on inland navigation also has a negative impact. Additionally, the lack of a proper cost-benefit analysis within the economic calculus generates views on the ineffectiveness of outlays on waterways. Here, too, there is a clear advantage of negative influences.

In the social dimension, the growing number of social initiatives in the field of river use and the expected slow increase in environmental awareness have a positive impact. The negative, slightly stronger impact is the ageing of the crews and the low level of pro-ecological education in the Polish education system.

In the technical dimension, the links between the technical infrastructure of inland navigation and the fire protection system as well as the systematic expansion of knowledge about the balanced and sustainable development of waterways have a positive impact. On the other hand, the negative impact of the technical degradation of port infrastructure and the high age of the fleet are much stronger. Moreover, the shipping function in new water bodies is not sufficiently taken into account.

In the case of the natural, geographical and ecological aspects, the positive impact is the low nuisance of river transport for the natural environment and the significant longitudinal and latitudinal potential of the Vistula and the Odra as waterways. Similarly strong is the negative impact of unstable weather conditions and the gradual "wildness" of rivers due to revitalisation activities. Retention reservoirs and regulation of the water level in individual rivers play a special role here. Retention reservoirs will play an increasingly important role in water management, especially in conditions of global climate change, which accelerate water circulation and increase the number of extreme weather events such as floods and droughts. A properly built and operated retention reservoir, apart from providing water for people, agriculture and industry, plays a few more important roles, namely: (1) it allows the maintenance of ecologically safe water levels in rivers, (2) it serves flood protection, (3) it may be used for the production of electricity, which does not emit excessive amounts of CO_2 and other pollutants, (4) has tourist values and is conducive to the development of inland transport.

In the last analysis of the legal and institutional dimensions, positive influences are related to the Act on the Odra River Waterway and the work on the Polish Water Policy 2030. The negative impact of the location of water transport problems in the Ministry of the Environment is much stronger, and there is a lack of understanding of this issue in the Ministry of the Environment, the National Board of Water Management, and regional water management boards. The consequences of applying the procedures of the Public Procurement Act in the case of urgent intervention works are also negative. The poorly implemented program "Odra 2006" also has a negative impact on the development of inland navigation.

As a result, we can conclude that there are currently no strong enough determinants to overcome the stagnation and future development of inland waterway transport in its various forms, especially product transport. There are greater opportunities for the development of passenger shipping and the greatest for the use of rivers in the form of tourism and recreation. Certain changes may occur provided that the European Union's transport policy is consistently implemented and the country's approach changes.

DOI: 10.34659/eis.2024.88.1.622

Conclusion

The purpose of the study was to identify the reasons for the stagnation in the development of inland shipping in Poland at the turn of the 20th and 21st centuries.

The research yielded several conclusions and insights useful for science and economic and social practice. The research unequivocally confirmed the fact of progressive stagnation in Polish river shipping, which may be particularly surprising in the context of its potential and the idea of sustainable transport. After all, river transportation is regarded as more environmentally friendly, which should also be investigated. The research also shows the need to continue it in order to properly understand the potential of river shipping, investment and modernisation needs, and the possibility of changing the share of this transport in the structure of passenger and people transportation in Poland. This should be a scientific study of the actual state of affairs and not the creation of further political strategies and program documents, not based on an analysis of the possibility of their implementation, the level of public acceptance or the development of political consensus in the sphere of implementation. These elements are conspicuously missing from the studies to date. There is also a deficiency in the popularisation of river transportation issues in Polish society and riverine communities. The research succeeded, using appropriate methods and techniques, such as the Ishikawa diagram or graphical system analysis, simplified PESTEL-type analysis or impact diagram, to identify the leading causes of stagnation in Polish inland shipping, according to the authors. Some of these have been confirmed by EU teams in studies (Europejski Trybunał Sprawiedliwości, 2015). Particular attention should be paid to examining the strength of negative (destimulants) and positive (stimulants) influences of factors on water management and river shipping in Poland (Figure 9).

The research hypothesis in the form: stagnation in Polish inland navigation is the result of many years of negligence of public authorities responsible for its condition in the light of legal and institutional regulations, especially in the form of an ineffective strategy and policy in water management, has been verified, according to the authors.

The research carried out additionally allows us to formulate the final conclusion that, at present, there are not strong enough determinants to break the stagnation and future development of inland waterway transport in its various forms, especially the transportation of products. There are more opportunities for the development of passenger shipping and the greatest for the use of rivers and lakes in the form of tourism and recreation. Some broader changes may occur under the condition of consistent implementation of the European Union's transport policy and policy changes in Poland.

The contribution of the authors

The authors' contribution is the same for all elements of the article.

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Stanisław CZAJA • Jerzy TUTAJ

PRZYCZYNY STAGNACJI W TRANSPORCIE RZECZNYM W POLSCE NA PRZEŁOMIE XX I XXI WIEKU

STRESZCZENIE: Celem opracowania była identyfikacja przyczyn postępującej stagnacji w polskiej żegludze rzecznej (polskiej żegludze śródlądowej) od połowy XX wieku. Zastosowana metodologia, ze względu na rodzaj badań, miała złożony, eklektyczny charakter. Opierała się na analizie danych empirycznych, badaniach desktopowych, systemowej analizie relacji i związków przyczynowo-skutkowych w sferze transportu rzecznego oraz krytycznej interpretacji celów zawartych w dokumentach programowych dotyczących rozwoju żeglugi rzecznej.

Badania koncentrowały się na poziomie makroekonomicznym. Uzyskane wyniki nie tylko zidentyfikowały przyczyny stagnacji, ale także wskazały najpilniejsze kierunki badań w tym obszarze. Ich realizacja może pozwolić na zaprojektowanie takiej strategii rozwoju żeglugi rzecznej w Polsce, dzięki której stanie się ona ważną częścią gospodarki i zrównoważonego transportu. Badania są oryginalne i nieznane w tej formie w polskiej literaturze.

SŁOWA KLUCZOWE: żegluga śródlądowa, transport rzeczny, zrównoważony rozwój, gospodarka polska, polityka transportowa UE

DOI: 10.34659/eis.2024.88.1.622