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Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:
Marciniak, P. (2023). A New Shipping Canal Through the Vistula Spit as a Political and Transportation Project. *Urban Planning*, *8*(3), 289-304. https://doi.org/10.17645/up.v8i3.6737

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Urban Planning (ISSN: 2183–7635)
2023, Volume 8, Issue 3, Pages 289–304
https://doi.org/10.17645/up.v8i3.6737

Article

A New Shipping Canal Through the Vistula Spit as a Political and Transportation Project

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Submitted: 29 January 2023 | Accepted: 10 April 2023 | Published: 26 September 2023

Abstract
In September 2022, a new shipping canal was opened connecting the Polish part of the Vistula Lagoon to the Baltic Sea. Largely political, the project links the lagoon and the port in Elbląg to the southern part of the Baltic, independent of the Russian Federation. In addition, its economic dimension enables the handling of small ships, as well as supporting tourism and yachting without the need to pass through the Russian-controlled Piława Strait. The scale of the new canal is relatively small—one and a half kilometre long and 25 metres wide. Nonetheless, it is sufficient for the navigation of small marine vessels of up to five-metre draft. The shipping canal through the Vistula Split is certainly not as important as the Corinth or North Sea Canals, still, it frees maritime and tourist traffic from Russian jurisdiction. The planned key port in the Vistula Lagoon is the port in Elbląg, a historic city that was once a member of the Hanseatic League, which brought together all the major cities of the Baltic Sea basin in the 14th and 15th centuries. The purpose of this article is to present the project's historical context, its urban, technical, and shipping solutions, as well as the correlations between the new transport development and its anticipated impact on the environment (including the natural environment). The findings are complemented by a PESTEL analysis which shows the leading trends that are relevant to the implementation of the project in the region. The analysis identified areas that have a significant effect on the social, political, and economic settings of the new canal.

Keywords
Elbląg; PESTEL analysis; port city; shipping canal; transport; Vistula Lagoon; Vistula Spit

Issue
This article is part of the issue "Shipping Canals in Transition: Rethinking Spatial, Economic, and Environmental Dimensions From Sea to Hinterland" edited by Carola Hein (Delft University of Technology), Sabine Luning (Leiden University), Han Meyer (Delft University of Technology), Stephen J. Ramos (University of Georgia), and Paul van de Laar (Erasmus University Rotterdam).

1. Introduction

Throughout history, access to the Baltic Sea has been a major issue in Polish foreign and economic policy. An independent connection between the Vistula Lagoon and the Baltic Sea had been considered for many years. Hence the construction of a canal connecting the two is largely an outcome of the difficult Polish-Russian relations and the division of the lagoon between Poland and the Soviet Union. In the early 2000s, the Polish government formally decided to build a new waterway to Elbląg and a cross-cut through the Vistula Spit. This generated discussions and antagonisms that polarised public opinion on the project's rationale.

The new canal between the Polish part of the lagoon and the open sea is an important development due to both its scale and the potential impact on the wider environment. The project is largely political but has also an economic dimension associated with higher ship traffic and the expansion of the port in Elbląg. Furthermore, it may affect the growth of tourism by making yachting independent of Russian jurisdiction.

The article aims to present the wider historical, political, and economic context to evaluate the project and

the solutions that affect the economic, environmental, and transport-related settings. The analysis is based on small-scale research and strategic analysis methods. Desk research (gathering and analysing information, secondary data, available texts, documents, planning, and design studies) provided a historical review of the Vistula Lagoon and the role of the Elbląg port. It also provided a scientific evaluation of the planning and design solutions and their impacts. An analysis of press publications explored trends and public sentiment, whilst a PESTEL analysis presented an overall assessment of the project.

The literature addressing the problem of the cross-cut through the Vistula Spit and the construction of a new canal is scarce. In general, it is available in Polish and covers a range of environmental issues (Cieśliński, 2013; Dobrzycka-Krahel & Kozakiewicz, 2011; Dubrawski & Zachowicz, 1997; Kaczmarek, 2009; Szydłowski et al., 2019), legal concerns (Palmowski, 2008), and technical problems (Drążkiewicz, Golan, Hińcza, et al., 2020; Drążkiewicz, Golan, Kasprzak, et al., 2020; Zwolan & Czaplewski, 2015). A few problem-based studies have been produced to date (Fabiszewski, 2020; Jednorał, 2004; Modzelewski, 2017; Puzdrakiewicz & Połom, 2021; Sajkiewicz, 2016). A large number of texts concerning the canal are of an informative nature, published on institutional websites (Maritime Office in Gdynia) and in the press (Chudzyński, 2019; Krawiel, 2022; Pałczyński, 2023).

2. The Vistula Lagoon and the Importance of the Elbląg Port

2.1. The Vistula Lagoon and the Vistula Spit

The Vistula Lagoon is an inner body of seawater, approximately 91-kilometre long and up to 13-kilometre-wide, with an average depth of about 2.7 metres. In the north, the shoreline touches the Vistula Spit, and in the west, the Vistula Fens. The western and southern parts are divided by Elbląg Bay and the River Elbląg. The lagoon is a freshwater reservoir with a periodical inflow of saline seawater through the Piława Strait (Cieśliński, 2013, pp. 15–16). Important locations include the seaports in Kaliningrad and Baltiysk, ports in the area of Svetly and Pribrezhny (on the Russian side), the Elbląg port, and the towns/villages of Krynica Morska, Frombork, Tolkmicko, and Kąty Rybackie (on the Polish side). There are also two large Polish seaports near the lagoon, namely Gdynia and Gdańsk located on Gdańsk Bay (Puzdrakiewicz & Połom, 2021, p. 3).

The Vistula Spit is a narrow sandy strip of land located between the Baltic Sea and the Vistula Lagoon. It stretches for 96 kilometres, starting near Gdańsk in the west to Lochstedt in the northeast. The western, longer part lies in Poland, and the shorter part is in Russian territory. Its width ranges from several hundred metres on the Russian side to approximately two kilometres on the Polish side. The western part adjoining the Vistula Fens is divided into three locations lying at the former and present Vistula estuary (Martwa Wisła, Wisła Śmiała, and Przekop Wisły). The eastern side is divided by the Piława Strait (now the Strait of Baltiysk) situated within the territorial waters of the Russian Federation. Up until now, this was the only waterway connecting the Vistula Lagoon with Gdańsk Bay. The spit is sparsely urbanised and the former fishing villages are now holiday resorts (Mikoszewo, Jantar, Stegna, Kąty Rybackie, Krynica Morska, and Piaski).

The Vistula Lagoon has shipping routes to Gdańsk and Elbląg, as well as fairways to the ports and harbours on the Vistula Spit, for example to Kąty Rybackie and Krynica Morska in the north, and Suchacz and Tolkmicko in the south (Palmowski, 2008). The deepened seaway through the new canal across the spit is now a key element as far as accessibility is concerned (Salomon, 2018, pp. 103–105; Figure 1).

2.2. Importance of the Elbląg Port

The construction of the fairway and canal aims to create new access by water to Elbląg, the largest port city in the Polish section of the Vistula Lagoon. Elbląg is a city located on both sides of the River Elbląg, in Warmińsko-Mazurskie Voivodeship, with a population of approximately 118,000 (Statistics Poland, 2021). Its history begins in 1237, when a settlement and castle were built on the site by the Teutonic Order. Surrounded by favourable natural conditions (located at the mouth of the River Elbląg on the Vistula Lagoon and sheltered from the open sea), it became an important port in the 14th century.

At that time, the depth of the fairway was sufficient for navigation and handling marine vessels, albeit the most conducive to the port's development was Elbląg's economic rank, contingent on its convenient connection with the River Vistula and the Baltic Sea. Elbląg was connected with the Vistula through the River Nogat, and further with the sea through several isthmuses in the delta of the Vistula Spit. Until the end of the 15th century, the main fairway to the open sea led through the nonextant Balga Strait. From 1510 onwards, it led through the Piławska Strait, which was adapted to the navigation of larger ships (Palmowski, 2001, pp. 169–170).

Apart from Gdańsk, Elbląg was an important port and centre of commerce within the Gdańsk Bay. Its seaport status granted by the Peace of Toruń in 1466 (Palmowski, 2001, pp. 170–171) was further strengthened by its membership in the Hanseatic League. This was a major trading, political, and military force, whose member cities developed a common organ, the so-called Hansetage, to promote their economic interests. At its peak, the League counted around 160 cities united under the German city of Lübeck (Wójtowicz & Nalepa, 2015, pp. 105–106). Consequently, merchant ships from Elbląg reached all the Hanseatic cities in the Baltic and North Sea regions (Figure 2).

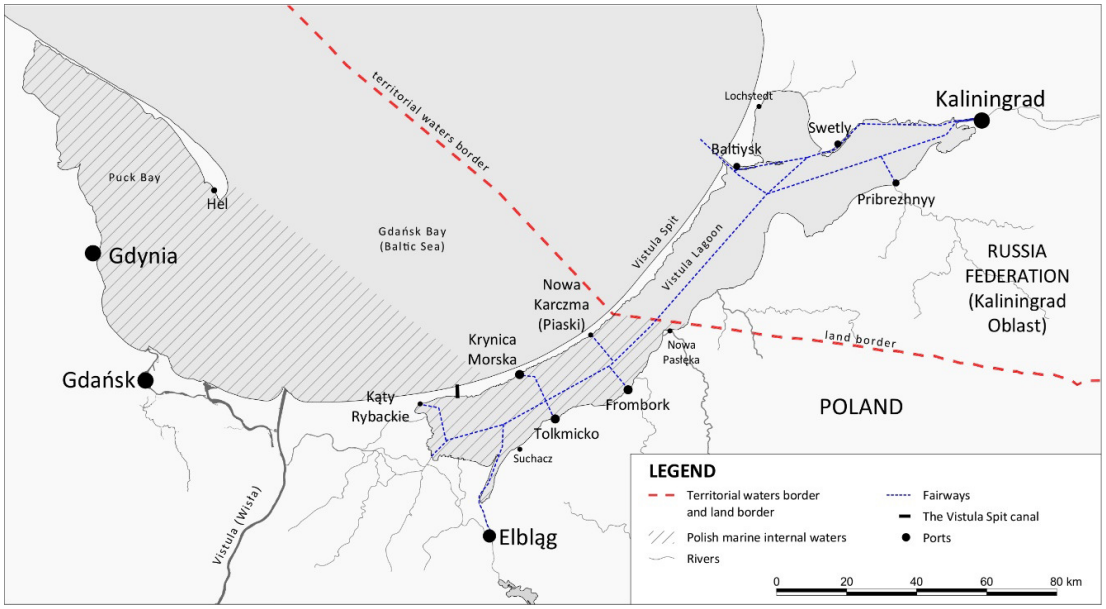

Figure 1. Vistula Spit and Gdańsk Bay region with major towns and cities.

3. Construction of a Canal Through the Vistula Spit: Background Information

3.1. History of Planning and Design Studies

The first concept of a canal through the Vistula Spit emerged following the Gdańsk rebellion of 1577. The then king, Stefan Batory, saw Elbląg's potential to compete with Gdańsk, contingent on a canal connecting it with the Vistula Lagoon. Another plan was proposed after the First Partition of Poland (1772), but the idea was ultimately abandoned after the Second Partition (1793) when Gdańsk was incorporated into Prussia (Figure 3).

In the 19th century, Elbląg experienced an economic revival following the construction of a railway line. Moreover, Friedrich Wilhelm IV of Prussia commissioned the Elbląg Canal, an inland shipping route connected with the Vistula Lagoon (completed in 1860; Wójtowicz & Nalepa, 2015, p. 105). With a total length of 187.2 kilometres and a height difference of 99.5 metres above mean sea level, the canal featured a course of five lakes lying at different levels between the town of

Figure 2. Extent of the Hanseatic League, ca. 1400. Source: Droysen (1886).

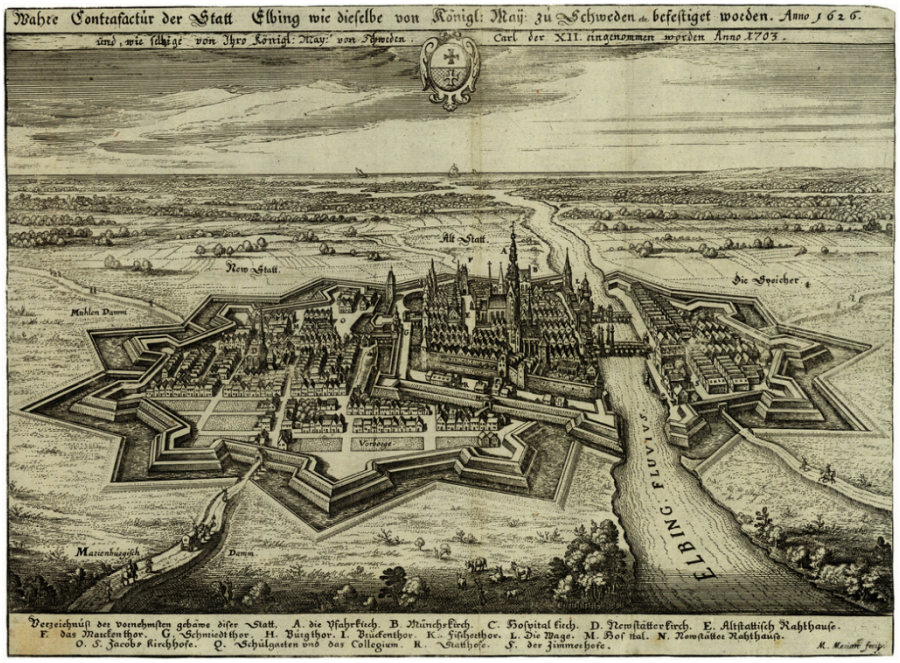

Figure 3. Elbląg in an engraving. Source: Merian (1635).

Ostróda and the Vistula Lagoon. The interesting technical solution combined five slipways for shunting ships on platforms which moved on rails (Furgala-Selezniow et al., 2006). The canal played an important economic role in the development of the Masurian Lake District in the 19th century, connecting it with the ports of Elbląg and Gdańsk for transporting industrial and agricultural products. It later lost its economic significance and now serves as a tourist attraction (Kowalski & Wawrzyński, 2012).

Following WWII and the incorporation of East Prussia into Poland, the concept of a navigable canal through the Vistula Spit was proposed by Eugeniusz Kwiatkowski (who also suggested the construction of the port and city of Gdynia). At that time, the proposal was not taken up (Sajkiewicz, 2016, p. 4) and it was not until much later, in 1996 and 2004, that further concepts were put forward by Polish hydrologist Tadeusz Jednorał (2004).

3.2. Elbląg as a Seaport

In 1945, Elbląg returned to Poland. Left in ruins in the aftermath of WWII, the city was rebuilt and the largest Polish port on the Vistula Lagoon was constructed. The port is located on the River Elbląg, six kilometres from its mouth on the lagoon. It connects to the Gdansk Bay via an inland waterway through the River Szkarpawa and Vistula, and until recently, through the Piława Strait in the Kaliningrad Oblast (Russian Federation).

Elbląg is a regional port serving coastal cargo shipping and passenger/ferry traffic around the lagoon and Gdańsk Bay (Krośnicka et al., 2021). It covers an area of 404 hectares with 3,686 kilometres of quays and an up to 2.5-metre-deep fairway. Three terminals handle cargo, passenger/ferry traffic and the transhipment of coal and breakbulk cargo. The cargo terminal covers five hectares (including 3.1 hectares of storage area). The key infrastructural elements are quays (196 metres), which can handle two vessels simultaneously. The maximum dimensions of the vessels are 85 by 15 metres, with a draught of 2.3 metres and a load capacity of 1,200 tonnes (Zarząd Portu Morskiego Elbląg, 2022). There is also a ramp for ro-ro ships. The passenger/ferry terminal located within the port can receive 30 cars at a time and check in 200 people. The specifications of these vessels are slightly smaller than those of cargo ships, i.e., 65 by 12 metres, with a draught of 2.5 metres. The port's logistics supra-structure includes a warehouse, roofed areas, a storage yard, and service barges. The port does not have facilities for handling container transhipment (Salomon, 2018).

The analysis of the port's location, infrastructure, and handling capacity shows that the highest growth rate in cargo turnover occurred up to the end of the 1990s (approximately 640,000 tonnes). Between 1999 and 2006, the volume of cargo did not exceed 100,000 tonnes. Between 2007 and 2009, trade fell dramatically due to the Russian blockade, causing the port considerable loss (Modzelewski, 2017, pp. 244–245). Moreover, before the Russian restrictions, the Elbląg port handled most tourist and freight traffic between Poland and the Kaliningrad Oblast. In the following years, the cargo volume fell to around 36,000 tonnes (Modzelewski, 2017, p. 235). Poland's accession to the EU further slowed it down to 3,500 tonnes in 2007. Two years later, a Polish-Russian agreement led to the revival of shipping and an increase in turnover. Consequently, transhipment grew steadily, reaching 358,300 tonnes in 2014. In recent

years, there has been a decline to approximately 125,000 tonnes in 2021. The level of passenger traffic has fluctuated somewhat less (the highest number of passengers, 85,000, was recorded in 1993) and remains at an average level of 30,000 to 40,000 per year (Elbląg Maritime Port Authority, 2022; Figure 4). Despite the existence of a border checkpoint, traffic has been limited to tourist groups on domestic trips on passenger vessels (Kadłubowski, 2017). In the early 2000s, it was anticipated that in the future the port would depend on shipping beyond the Vistula Lagoon and the construction of connections with the ports of Gdańsk and Gdynia, as well as the Baltic ports in Scandinavia and Germany. The actual development was specified in Elbląg's development strategy, depending on the construction of a navigable canal through the Vistula Spit and on deepening the fairway to the port (Palmowski, 2001, p. 184).

4. Construction Conditions and Project Specifications

4.1. Construction Conditions

A key element impacting the fluctuating and declining turnover of the Elbląg port was the geopolitical situation associated with Poland's accession to the EU in 2004 and the subsequent deterioration of economic relations with the Russian Federation. Russia's sanctions on the import of food and construction products between 2005 and 2007 almost brought freight traffic to a halt. Access to the open waters of the Gdańsk Bay through the Piława Strait was restricted, and the bilateral agreements that were to ensure the passage of Polish ships were not respected, which fundamentally limited cargo and tourist traffic (Modzelewski, 2017). In later years, free navigation through the strait was a convenient blackmail tool used by the Russian Federation, since the strait was a passage whose access to international shipping was regulated solely by Russian law (Bugajski, 2006).

In practice, the Russian Federation had been blocking the passage of Polish vessels since 2006 and this was one of the main economically and historically-determined reasons for building a new shipping canal through the Vistula Spit.

4.2. Design and Construction of a Canal Through the Vistula Spit

Without direct access to the Baltic Sea, Elbląg lies over 20 kilometres away in a straight line from the Gdańsk Bay. It is separated by a narrow spit, whilst the only route through the Piława Strait is approximately 57-kilometre-long and takes about six hours to navigate. Hence analyses and studies were conducted to create a feasible concept for a new shorter shipping route across the Vistula Spit (Fabiszewski, 2020; Kaczmarek, 2009; Zwolan & Czaplewski, 2015).

In 2008, the Maritime Office in Gdynia commissioned a feasibility study, which considered four locations: the villages of Skowronki and Nowy Świat in Sztutowo municipality, and Przebrno and Piaski in Krynica Morska municipality (Figure 5). The study focused on creating a direct connection between the Vistula Lagoon and the Baltic Sea to make shipping independent of the Russian Federation. The plans featured a seaport in Elbląg that would be accessible to marine vessels under all flags. Ultimately, the village of Skowronki was chosen as the best option to provide the shortest and fastest route connecting Elbląg with the Tri-City (Gdańsk-Sopot-Gdynia).

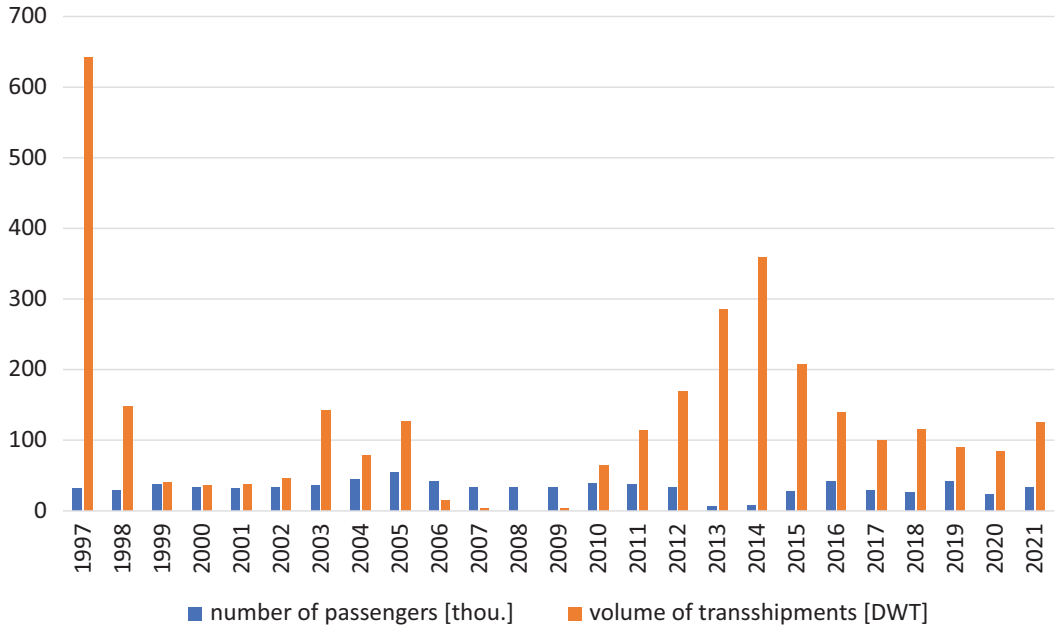

Figure 4. Shipping load and passenger traffic between 1997–2021 in the port of Elbląg. Source: Zarząd Portu Morskiego Elbląg (2022).

The planned canal was to be about 1.1-kilometre-long, 40 to 80-metre-wide and 5-metre-deep, equipped with one lock. Construction work was initially scheduled for 2009, to be completed in 2012. In response to these plans, the Russian side undertook diplomatic steps culminating in a Polish-Russian agreement on navigation in the lagoon (September 2009). Accordingly, the shipping route through the Piława Strait was reopened and work on the canal halted. Some years later, however, the Ministry of Infrastructure announced that the construction of the canal would commence in 2017 (Modzelewski, 2017, pp. 235–239).

In the following years, no action was taken regarding the canal, but the project re-emerged in 2014. Since the early 2000s, the construction of the canal was a subject of political contention between the pro-European Civic Coalition and the United Right parties. When the latter won the elections in 2015, it became a major regional socioeconomic programme. On 24 May 2016, the Polish Council of Ministers passed a resolution on a long-term project titled Construction of a Waterway Connecting the Vistula Spit with the Gdańsk Bay with an estimated cost of PLN 880 million. On 24 February 2017, Polish Parliament passed a special law on the cross-cut through the Vistula Spit to ensure efficient implementation (Law 217). By mid-2019, the value of the project more than doubled, reaching PLN 1.987 billion, to be financed entirely from the government budget. Finally, a location was chosen near the village of Nowy Świat, which had been abandoned since WWII (one of the locations considered in 2008).

The construction work has been divided into three stages, with the ultimate goal of providing a direct fairway to Elbląg. Currently, the planned total length of the route is 22.88 kilometres divided into three sections: a fairway of 10.38 kilometres on the River Elbląg; a fairway of 10,18 kilometres on the Vistula Lagoon; and (the key element) 2.32-kilometre-long shipping lane through the Vistula Spit with a sheltered outer harbour (Drążkiewicz, Golan, Kasprzak, et al., 2020, p. 231). Thus, the actual canal is only part of the discussed project, i.e., the waterway connecting the Vistula Lagoon with Gdańsk Bay. Construction work on this section commenced in late 2019 and Stage 1 was completed in summer 2022. The canal was officially opened on 17 September 2022. The two remaining stages include the deepening of the Vistula Lagoon (Stage 2) and the Elbląg River with an approach canal to the Elbląg port (Stage 3) to be completed in 2023.

4.3. Technical Specifications

As mentioned above, the canal is situated in the vicinity of the abandoned fishing settlement of Nowy Świat, between the villages of Przebrno and Skowronki (detailed technical specifications and design solutions are available in Drążkiewicz, Golan, Hińcza, et al., 2020 and Drążkiewicz, Golan, Kasprzak, et al., 2020). The actual canal forms a section of the fairway leading from the Gdańsk Bay to the Elbląg port. (Figure 6). The original tender documents specified the dimensions of the largest vessels to navigate the waterway as follows: Ships of up to 100 metres in length or barge convoys up to 180 metres in length, with a beam of 20 metres, and a 4.5-metre draught. The specifications apply to conventional vessels based on the largest dimensions. This

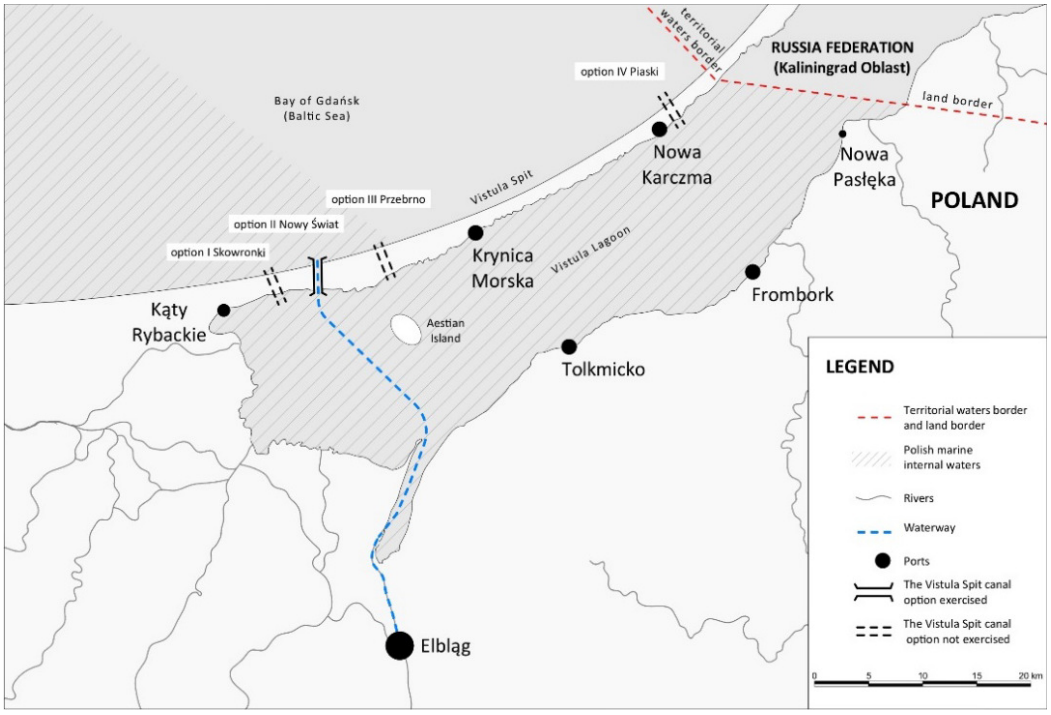

Figure 5. Alternative locations for the cross-cut through the Vistula Split and the new shipping canal.

corresponds to seagoing general cargo vessels of 2,500 DWT, 105 metres in length, with a 15.8-metre beam, and a 4.5-metre draught; or to barge convoys of 2,000 DWT, 180 metres in length, with a 9.0-metre beam, and a 2.5-metre draught. The planned maximum draught of 4.5 metres makes the canal navigable at medium water levels and above. An important caveat is that at lower water levels, navigation will not be possible (Drążkiewicz, Golan, Hińcza, et al., 2020).

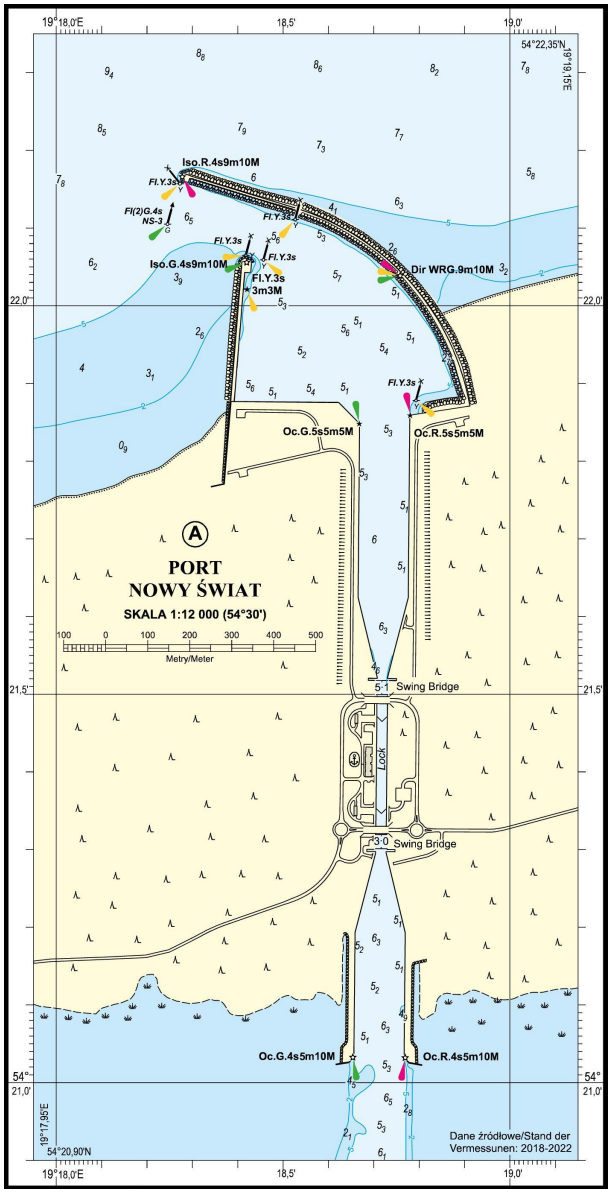

Figure 6. Nautical map of the Nowy Świat Port. Source: Naval Hydrographic Office (2022).

The approximately 1.526-kilometre-long shipping canal at Nowy Świat comprises: (1) a shipping canal and sluice, (2) a wharf with a "northern" waiting berth, (3) a sheltering harbour on Gdańsk Bay, (4) a road system in the canal area, (5) buildings including the harbour master's office, (6) a wharf with a "southern" waiting berth on the lagoon, (7) the Estyjska Island on the lagoon, (8) a swing bridge at Nowakowo, and (9) a fairway on the lagoon. The mainland transport route on the Vistula Spit is province road no. 501 situated transversely to the axis of the canal. Due to the planned increase in tourist traffic, a system of two crossings over the shipping canal was built featuring swing bridges. The bridges and sluice gates will open alternately to maintain traffic flow. Furthermore, navigational signage will be provided in the shipping canal (Drążkiewicz, Golan, Kasprzak, et al., 2020; Figure 7).

The sheltering harbour located on the Gdańsk Bay consists of two breakwaters (eastern and western), a "northern" berth with 20-metre-wide layby berths and a technical depth of 5.0 metres, a 200-metre-long by a 25-metre-wide lock with a water depth of 6.8 meters, and a "southern" berth with layby berths of similar specifications to the "northern" berth (Drążkiewicz, Golan, Hińcza, et al., 2020; Figure 8).

One of the key features of the new waterway connecting the Gdańsk Bay and the Elbląg port is a small artificial Estyjska Island. This is to serve as reclamation grounds for material dredged up while deepening the fairway in the lagoon and the River Elbląg. It is of an elliptical shape along a 1.932-metre-long axis and covers an area of 181 hectares. It is situated in the western part of the lagoon, about 1.65 kilometres from the shore of the Vistula Spit, and 1.6 kilometres to the east of the fairway (Drążkiewicz, Golan, Kasprzak, et al., 2020, pp. 232–233). Its name derives from the historical name of the lagoon (Old Prussian Aīstinmari). Since its mounding, it has become a refuge for waterfowl and vegetation.

The next stage of the fairway, starting in 2022, includes deepening and widening the shipping route on the Vistula Lagoon and the River Elbląg to 60 metres, financed from the government budget. A point of contention is the last section of 0.9 kilometres on the approach to the port, which is entirely the property of the local authorities who, according to the central government, should finance the works.

5. Analysis of Economic, Planning, and Transportation Solutions and Their Environmental Impact

5.1. Context

From its conception, the project has been highly controversial among politicians, economists, urban planners, and environmentalists. It has triggered a wide range of public responses from supporters and opponents alike. It has also been used in politics, especially in election campaigns, e.g., the early mayoral elections in Elbląg in 2013, won by a United Right candidate. When the project was formally announced in 2006 by Jarosław Kaczyński (Law and Justice), the then-opposition parties were very sceptical. Later, in 2013, the then Prime Minister Donald Tusk (Civic Platform) spoke of "a very expensive project, questionable economically and used by the opposition for political purposes" (Modzelewski, 2017, p. 249).

Figure 7. View of the completed canal through the Vistula Spit. Photo by EPA bought from Polish Press Agency.

He also emphasised its environmental safety. Attention was drawn to the high cost, estimated originally at around PLN 880 million (€186.4 million), which eventually rose to around PLN 2.0 billion (€423.7 million), excluding the last two stages.

The arguments criticising the project's rationale have included other issues. For example, the lagoon is a memorial site and a huge cemetery of victims fleeing the Soviet Army in early 1945, displaced from the former area of East Prussia. The number of people trying to cross the Vistula Lagoon is difficult to estimate due to the chaos of the time, but it is likely that only half of around one million made it to the other side. Ultimately, the number of victims who drowned with their belongings in the lagoon due to Soviet airstrikes is unknown (Gliniecki, 2021).

One of the most significant arguments against the canal is its adverse impact on the natural environment. Critics have pointed out the potential displacement of native species by invasive ones carried in with ballast water. Furthermore, the turbidity of water in the vicinity of reclamation works and the associated photosynthesis could significantly reduce vegetation and zooplankton. Studies have also suggested potential interference with biodiversity in the lagoon and other natural losses (Dobrzycka-Krahel & Kozakiewicz, 2011, pp. 212–213, 217). Another potential effect is increased salinity caused by water exchange with the Baltic Sea by approximately 1.3% in the Polish part of the lagoon and by 0.4% in total. This may change the composition of fish species, including the loss of freshwater fish (Dubrawski & Zachowicz, 1997). Ship traffic could also have a negative effect on fish spawning grounds and bird colonies in the Vistula Spit Landscape Park (Modzelewski, 2017). Other analyses, however, showed that water exchange between the bay and the lagoon would be negligible and would only occur during sluicing. A positive effect would be higher oxygenation of water in the lagoon due to the inflow of water from the sea (Salomon, 2018).

Another major concern is the impact of the canal and the artificial strait in the Vistula Spit on the hydrodynamics of water in the lagoon. Findings indicated, however, that the new canal could help reduce flood risk in a nearby polder area (Cieśliński, 2013; Kaczmarek, 2009; Szydłowski et al., 2019).

The Russian invasion of Ukraine in February 2022 has significantly changed the approach to the canal through the Vistula Spit. Until now, all vessels entering the Vistula Lagoon had to pass through the Russian-controlled Piława Strait where, in recent years, the Russian authorities have repeatedly blocked or obstructed transport and tourist traffic. An independent entry into the Vistula Lagoon from the sea is considered a strategic asset. According to government officials, the situation in Ukraine and the Russian invasion proves that "this type of infrastructure protects us from potential blockades, if only of ports" (Krawiel, 2022). On the other hand, military analysts respond that "from a military point of view, the cross-cut will not affect Poland's defence system" (Krawiel, 2022).

5.2. Arguments for and Against the Canal

Both the preparation and construction stages of the project have triggered a strong public response from the advocates and opponents of the canal. Several

Figure 8. Southern view of the completed canal through the Vistula Spit. Photo by Adam Warżawa bought from Polish Press Agency.

analyses, studies, and publications list arguments aiming to identify its strengths and weaknesses. Importantly, it has been observed that the evaluation should not only focus on the actual canal but also on the entire project, which encompasses a shipping route from the Baltic Sea to Elbląg and the development of the port (Chudzyński, 2019; Duczyc & Wendt, 2019; Modzelewski, 2017).

5.3. PESTEL Analysis

Using the PESTEL strategic planning tool, the author has produced an analysis to evaluate the objective of the project Construction of Shipping Canal with a Cross-cut through the Vistula Spit (Table 1). The process of surroundings general segmentation aims to single out the areas that are significantly related to the project. Using this method to enhance the earlier-mentioned conditions allows for obtaining complementary results. A PESTEL analysis involves determining the most significant factors and relating them to particular areas (political, economic, social, technological, environmental, and legal). They are then used to evaluate the impact of these factors on the project and to determine their interdependencies and mutual relations. Knowing the nature of particular factors, they were identified based on the author's observations of the existing situation in the Vistula Lagoon area, and on the author's research, including analyses of literature and source materials.

The analyses present the project and its impacts based on political factors interfering with project operation; economic factors affecting the economic environment and the ability to generate revenue; sociocultural factors determining the impact on society and its cultural dimension; technological factors affecting business operations, distribution processes, and product and service marketing; environmental factors related to the wider environment; and legal factors affecting the way the entire project operates (Kałkowska et al., 2010; Kozłowska, 2020; Yüksel, 2012).

The analysis was carried out in accordance with the PESTEL procedure (Table 2). The columns of the table show individual factors categorised in each group (political, economic, socio-cultural, environmental, and legal). To assess the impact on project implementation, point values were assigned on a scale of 0–5 (author's assessment, where 5 means a factor of significant importance, and 0 means a factor of marginal importance) and the probability of its impact on three phases: increase, stabilisation, and decrease of each factor's impact on project implementation. The total probability value for these must equal 1. Based on the calculations it was possible to interpret the trend (the dynamics of progressivity, indifference, and regression of each factor in each group). Factors (P), (I), and (R) stand for progressivity, indifference, and regression, respectively.

The growth trend for political factors shows the highest progressive dynamic in political independence, the significance of Elbląg, creating naval policy, and current internal affairs. Factors without direct impact include effective international cooperation and EU unity.

Table 1. Selected arguments for and against the canal.

Arguments for the canal	Arguments against the canal
• Open access to the Baltic Sea and using the full potential of Elbląg and other ports in the lagoon area • Economic development of Elbląg and adjacent municipalities, better trading conditions • Greater independence from Russia and limiting Russia's political and economic influence • An advantageous location for potential economic links with Baltic and Nordic countries • Better conditions for yachting and water sports • Higher attractiveness and tourist traffic in the Vistula Lagoon area • Sea traffic between localities on the southern shore of the Vistula Split and Tri-city • Better flooding prevention with an opening/locking canal	• High costs and doubtful economic rationale • Adverse impact on the natural environment and damage to the Natura 2000 protected areas • Insufficient transport accessibility for shipping routes • No military rationale • Ecologic and environmental risks, including increased salinity and impact on biodiversity • Annual expenditure on fairway conservation, dredging, and winter maintenance • Doubtful commercial and military advantages due to the small draught of ships • Public protests in some localities in the lagoon area • Impact on memorial sites in the lagoon area

The economic dynamic trend clearly shows higher transportation diversity and potential development of the Elbląg port, as well as higher tourist traffic and competitiveness in the region. The project's impact on the value of investment expenditure, higher budget deficit, and investment-related growth in the region is definitely regressive.

The growth trend in sociocultural factors shows a slightly progressive dynamic in social antagonisms, changes in lifestyle and quality of life. Factors with

Table 2. PESTEL analysis: Political factors.

		Increase/Progress		Stabilisation		Decline/Regress	
Factor	Trend	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]
P (Political) factors							
Independence from the Russian Federation foreign policy	P	5	0.7	1	0.2	3	0.1
Importance of Elbląg in creating regional development policy	P	3	0.5	1	0.4	1	0.1
EU internal unity dynamic	I	2	0.2	1	0.7	1	0.1
International cooperation effectiveness	I	4	0.3	2	0.6	1	0.1
Higher level of safety and impact on military conflicts	P	1	0.3	3	0.5	1	0.2
Creating a naval policy	P	3	0.4	2	0.3	3	0.3
Current internal politics (parliamentary and local government elections)	P	4	0.7	3	0.2	1	0.1
Politics of remembrance and commemorative space	I	1	0.1	3	0.8	1	0.1
Factor (P)	P	**1.86**		**0.62**		**0.16**	
Factor (I)	I	**0.56**		**1.43**		**0.50**	
Factor (R)	R	—		—		—	

Table 3. PESTEL analysis: Economic factors.

Factor	Trend	Increase/Progress		Stabilisation		Decline/Regress	
		Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]
E (Economic) factors							
Development of a seaport in Elbląg	P	5	0.7	3	0.2	1	0.1
Investment attractiveness and growth rate of developments in the region	P	4	0.3	3	0.6	1	0.1
Higher transportation diversity on a regional and international scale	P	3	0.6	3	0.3	1	0.1
Value of investment expenditure and condition of public finance	R	2	0.2	3	0.3	4	0.5
Higher competitiveness of the region	P	5	0.4	3	0.4	1	0.2
Level of tourist traffic	P	5	0.4	3	0.4	1	0.2
Higher local government budget deficit	R	4	0.1	2	0.3	3	0.6
Increased business attractiveness of the region	P	4	0.4	3	0.5	1	0.1
Factor (P)	P	**2.02**		**1.20**		**0.13**	
Factor (I)	I	**—**		**—**		**—**	
Factor (R)	R	**0.40**		**0.75**		**1.90**	

Table 4. PESTEL analysis: Sociocultural factors.

Factor	Trend	Increase/Progress		Stabilisation		Decline/Regress	
		Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]
S (Sociocultural) factors							
Public antagonism related to constructing the canal	P	5	0.4	2	0.3	4	0.3
Higher life stability in the population	I	5	0.2	3	0.5	3	0.3
Higher cultural and recreation potential of the towns and localities	I	4	0.2	2	0.6	2	0.2
Migration	I	3	0.1	1	0.8	1	0.1
New quality of life	P	4	0.4	2	0.5	2	0.1
Change in lifestyle and cultural traditions	P	4	0.3	1	0.6	2	0.1
Population prosperity	I	4	0.1	2	0.8	1	0.1
Factor (P)	P	**1.6**		**0.63**		**0.53**	
Factor (I)	I	**0.63**		**0.33**		**0.38**	
Factor (R)	R	**—**		**—**		**—**	

Table 5. PESTEL analysis: Technological factors.

Factor	Trend	Increase/Progress		Stabilisation		Decline/Regress	
		Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]
T (Technological) factors							
Development of transport infrastructure in the region	P	5	0.8	2	0.1	1	0.1
Number of engineering and technical professionals in the region	I	4	0.2	3	0.7	3	0.1
Development of energy-saving and pro-ecologic technologies	I	5	0.2	2	0.7	2	0.1
The emergence of substitution technologies	P	4	0.2	1	0.7	1	0.1
Factor (P)	P	**2.40**		**0.45**		**0.10**	
Factor (I)	I	**0.90**		**1.75**		**0.25**	
Factor (R)	R	**—**		**—**		**—**	

no direct impact include life stability, cultural potential in towns, migration and generally higher prosperity of the population.

The growth trend in technological factors suggests progressive dynamics in transportation infrastructure development in the region, as well as the emergence of substitution technologies (e.g., renewable energy). Factors without direct impact include the education level of technical professionals and the potential development of energy-saving and pro-ecologic technologies.

There is an obvious declining trend suggesting high regressive dynamics concerning disturbing the ecosystem and changing water conditions in the Vistula Lagoon caused by chemical pollution, as well as impact on plant

Table 6. PESTEL analysis: Environmental factors.

Factor	Trend	Increase/Progress		Stabilisation		Decline/Regress	
		Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]
E (Environmental) factors							
Disturbing the Vistula Lagoon's ecosystem	R	5	0.1	3	0.2	5	0.7
Changed hydrological conditions in the Vistula Lagoon	R	1	0.1	4	0.4	3	0.5
Increased swell in the lagoon	I	4	0.2	2	0.6	2	0.2
Higher chemical pollution of the environment and water in the lagoon	R	3	0.2	2	0.4	5	0.4
Impact on the presence of plant species and nesting sites	R	4	0.3	3	0.3	5	0.4
Higher orientation towards care for public space	I	2	0.1	1	0.7	4	0.2
Impact on climate and environment	R	3	0.2	2	0.3	5	0.5
Factor (P)	P	**—**		**—**		**—**	
Factor (I)	I	**0.80**		**1.20**		**0.40**	
Factor (R)	R	**0.53**		**0.87**		**2.05**	

Table 7. PESTEL analysis: Legal factors.

Factor	Trend	Increase/Progress		Stabilisation		Decline/Regress	
		Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]	Impact [0–5]	Probability [0–1]
L (Legal) factors							
Maritime transport regulations	I	3	0.2	3	0.7	1	0.1
Scope of EU and Russian Federation formal and legal regulations	I	5	0.1	3	0.8	3	0.1
Maintaining EU funding for regional development	P	5	0.3	2	0.5	1	0.2
EU interference in construction of the cross-cut	I	3	0.1	3	0.8	2	0.1
Factor (P)	P	**1.50**		**0.60**		**0.20**	
Factor (I)	I	**0.47**		**2.30**		**0.2**	
Factor (R)	R	—		—		—	

species and nesting sites, and on climate and environment. Factors that have no direct impact include care for public space and swell in the lagoon.

Legal factors without direct impact include maritime transport regulations, EU and Russian Federation regulations, and the scope of EU interference in the construction of the canal. A slightly increasing trend can be seen in the scope of maintaining and receiving EU funding.

The PESTEL analysis of the project Construction of Shipping Canal with a cross-cut through the Vistula Spit assesses the progressive, stabilisation, and regressive dynamics for the particular factors in each group. The chart presenting the change dynamics of the planned investments suggests that there is a high potential (both internal and external) to implement the project based on the progressive trend. The findings show that the highest progressive dynamics are observed in particular groups of factors in the following order: technological (2.4), economic (2.02), political (1.86), sociocultural (1.6), and legal (1.5). As far as regression is concerned, it pertains primarily to environmental (2.05) and economic (1.9) factors. Interestingly, the analysis also shows that economic factors display similar progression and regression dynamics (Figure 9). This may stem from the fact that the region's economic potential, the significance of Elbląg as a port and existing infrastructure are conducive to growth dynamics, whereas financial outlays and subsequent burden on state and local budgets contribute strongly to regression. The highest regression concerns the middle indicators, which may stem from poorly implemented government policies and lacking consistent information policy.

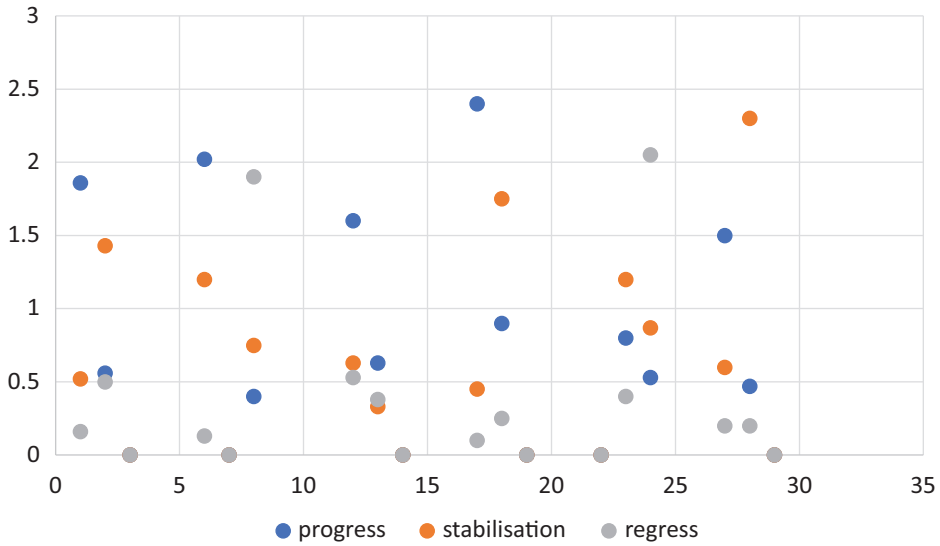

Figure 9. Factor change dynamics in the PESTEL analysis of the planned development.

6. Conclusions

The study of a wider context of building the cross-cut through the Vistula Spit and the new shipping canal proves the significant complexity of the project and the scale of the associated problems. The PESTEL analysis is complementary to the issues specified in the article and to the research carried out by the author. It is clear that the most significant factors are political, legal, and economic, including the key role of the Elbląg port within the economic environment.

Equally important is the historical, technical, and social context, which points to the commercial significance of the region as well as the effect of politics on its functioning. These determinants, combined with the factors from the PESTEL analysis, indicate leading trends in the region, both positive and negative ones, that impact project implementation. The author's analysis confirms evident significance of political, technological, and economic factors, whilst clearly observing disadvantageous environmental trends, which are indisputably regressive. The research indicates a potential for implementing the project based primarily on a progression trend that depends on obtaining financial support. This will enable not only the development of infrastructure but also the completion of the entire project, which seems crucial if it is to operate properly.

The construction of the canal through the Vistula Spit is now a fact. It certainly is an important project that changes the transport structure in the northern part of Poland. The planned facilitation of navigation and the higher importance of the Elbląg port will be contingent on the completion of the entire shipping route. This is a key element of the project as a whole. Without it, the forecasted benefits may prove illusory. At present, one cannot clearly estimate its economic impact, although based on analyses, it is likely that it may be important for local transport structure. However, this requires strong determination and a coherent transport policy on the part of central and local authorities. In view of international changes related to the politics of the Russian Federation and the war in Ukraine, the independence of local transport from transit through the Piława Strait (on Russian territory) is a substantial achievement. However, as far as military technology is concerned, the impact of the project is negligible. The key potential disadvantage is the project's regressive impact on the natural environment and its ecological consequences. A thorough review requires time and detailed studies to measure its effect on nature, whereas future assessments require a series of observations in a longer term. In a democratic country, the media have an important role to play, which consists of regular monitoring of the developments, and presenting practical dimensions and all possible outcomes of a project like this one.

The most recent report on the canal, from early 2023, reads:

> Currently, the statistics provided by the Maritime Office in Gdynia show that 467 boats and ships have crossed the Vistula Spit Canal up to 14 December 2022, including 309 in the first month, 194 in the first week and 95 on the first day. Looking at these figures, one can conclude that interest in the project is dropping. (Pałczyński, 2023)

This shows that as long as the project is not completed in full, it is, not possible to estimate its effect.

Acknowledgments

The author wishes to thank Joanna Kałkowska for her valuable insights and content-related suggestions and Filip Osiński for his support in developing the illustrations.

Conflict of Interests

The author declares no conflict of interests.

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