

## THE IMPACT OF THE TRANSPORT SECTOR ON REGIONAL DEVELOPMENT. A CASE STUDY

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**Purpose:** The aim of this article is to study the impact of the transport sector on regional development and compare the respective situation of the Greater Poland and Pomeranian Voivodeships according to the state of their transport sector.

**Design/methodology/approach:** Based on the study of literature sources and the use of an inductive approach, the need for special attention to the transport sector and its importance in the development of regions and the economy as a whole was identified. The next step was to investigate the situation in the Greater Poland and Pomeranian Voivodeships, which are large and economically significant regions of Poland.

**Findings:** According to the comparison of GDP data in the Greater Poland and the Pomeranian Voivodeships, the presence of seaports in Pomeranian Voivodeship cannot be singled out as an advantage that outweighed other factors in the development of the Greater Poland region which has high level of transport infrastructure.

**Research limitations/implications:** The limitations of the study are related to the incomplete availability of statistical data. The specific nature of the case study does not allow for theoretical and generalisable results, but it does allow for the study of a certain situation, which is of practical importance.

**Practical implications:** The practical significance of this study lies in the possibility to analyse the differences and identify the development potential of the studied voivodships.

**Originality/value:** This study consisted in comparing the situation of transport sector development and economic development of Pomeranian Voivodeship and Greater Poland Voivodeship.

**Keywords:** region, Greater Poland Voivodeship, Pomeranian Voivodeship, transport, infrastructure.

**Category of the paper:** Research paper, case study.

## 1. Introduction

The development of the region is a complex and multicomponent task, the solution of which depends on both internal and external factors. The well-being of the region depends on objective and subjective reasons, so it is important to identify those reasons that can be influenced and adjusted in the direction of growth and efficiency. Important systemic components of the development of the region are both economic and social, so the approach to the study of regional issues should be comprehensive.

The research of Fudge et al. (2021, p. 143) mentions that “synthesising wellbeing and regional development within a carefully designed interdisciplinary approach is required”. According to Chen et al. (2022), accounting for water resources is important for rational regional planning; Yang et al. (2022) highlight geographical differences; Zhou et al. (2022) consider it necessary to study regional climatic effects and pay attention to infrastructure. Klóska 2015 innovativeness considers the determinant of regional development in Poland. Copus et al. (2022) believe that as a result of the COVID-19 pandemic, the spread effect is weakening, which is reflected in the need to rethink the importance of cities in regional development.

Among the many heterogeneous factors of regional development, it is important to find fundamental ones, as well as those that have a multilateral influence both on the economy of the region and on social processes in it. These characteristics clearly correspond to the transport sector, which, on the one hand, is a public good, on the other hand, the basis for business performance in the region. The OECD report indicates that there are not only direct benefits from the impact of an efficient transport sector on the region, but also indirect ones (OECD, 2002). Ishikura (2020) emphasizes that such infrastructure as ports and airports is substantial for international trade and highlights a special role of the “trade gateway” regions that have such infrastructure.

Poland is a country with a favorable geographical position, which carries great potential. Many regions have airports that are used for both passenger and freight traffic. In connection with access to the Baltic Sea, Poland also has ports, which also provide opportunities for the development of international trade. This study focuses on the situation of the Greater Poland and Pomeranian Voivodeships, which differ in geographical features and have unique opportunities for the development of regions and the transport sector.

The aim of this article is to study the impact of the transport sector on regional development and compare the respective situation of the Greater Poland and Pomeranian Voivodeships according to the state of their transport sector.

## 2. Literature review

In the current realities of the digital age, the creation and implementation of innovations is widely considered to be the main source of regional development. Yan et al. (2024) outlined the unique potential of introducing place-based policies targeted development programmes for individual territories into regional innovation systems. Furthermore, the authors find that for effective enforcement of these policies it is necessary to take into account the configuration of space and place-builder conditions. The concept of a Smart City emerges from the proliferation of ideas and technologies, which “uses information and communication technologies to increase the interactivity and efficiency of the urban infrastructure and its components, as well as to raise the awareness of citizens” (Gajdzik et al., 2024, p.11). Against the background of the megatrend of studying the role of innovation on regional development, in our opinion, it is necessary not to exclude from the research the influence of other factors, including transport (Farahmand et al., 2024; Li, Liu, Wang, 2024; Hu, Guo, Gao, 2023; Liang, Li, 2023; Horoshko et al., 2021; Binz, Coenen, Murphy, Truffer, 2020; Losacker, Liefner, 2020). “The transport system is a crucial component of economic development in any country” (Roy, Ciobotaru, 2024, p.1).

Chen, Cheng, & Zhang (2023), studying the impact of geographical proximity on development at the microeconomic level, emphasise the key importance of transport links also for regional development. As Hodgson (2018, p. 59) observes, “economic theory suggests that reduced trade costs and greater market access should increase economic activity at locations close to transport hubs”. An interesting aspect of the role of transport, as well as its speed, in development in the region is not only its ability to transport local and imported products, but also to enable knowledge transfer through the easy movement of highly skilled labour (Dong, Zheng, Kahn, 2020; Kong, Liu, Yang, 2021). Cao & Su (2024) found that improved transport infrastructure increases the efficiency of resource allocation in the region, with the authors' heterogeneity analyses showing differences in the degree of efficiency for some regions depending on the effects of market integration, in other regions on industrial agglomerations, and in others on the high compactness of cities. Thus, studying the differences in particular regions, specific needs and impacts of transport sector development is an appropriate and relevant objective.

In assessing the differences in coordinated development between different regions, it is also necessary to take into account such features of some regions as the presence of marine industry, which is characteristic of marine economy regions (Zhang, 2024). Mogila et al. (2024), by studying maritime activities in the regions of Poland, have identified their broad impact also on the development of other regions through the operation of direct and indirect influences. Meanwhile, Dąbrowski, Klimek, & Rolbiecki (2023) emphasise that the current level of accessibility of seaports in Poland limits their development potential and competitiveness

compared to foreign ports. The relevance of the study of the region's potential and the need to form effective and appropriate development strategies for its unique characteristics is presented in the work of Balcerowicz (2023), which focuses on the Polish agglomeration of Tricity.

Although at the national level there are already works in the economic context concerning the transport sector in Poland, but against the background of other problems these works are relatively few, and there are also relatively few studies of the transport sector at the regional level (Chmiel, Żukowska, Połom, 2024; Fajczak-Kowalska, Tokarski, 2024; Jurczak, 2024; Macioszek et al., 2024; Masłowski et al., 2024; Przybyłowski, Kaszuba, Suchanek, 2024; Fajczak-Kowalska, Tokarski, 2023).

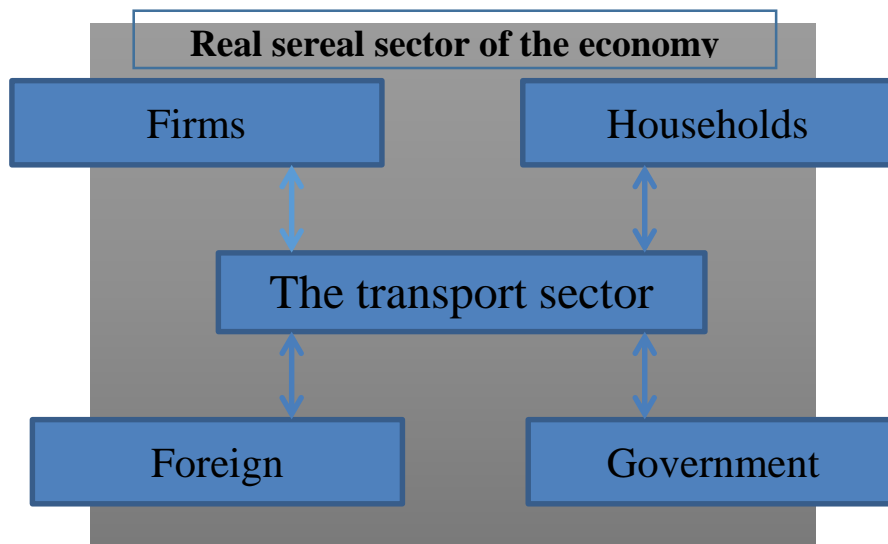
Pokharel, Bertolini, & te Brömmelstroet (2023, p. 1) undertook a heuristic literature review that includes 122 papers on the impact of transport on regional economic development and concluded that “despite the long history of research, the relationship between transport infrastructure and economic development remains elusive”.

### **3. The role of the transport sector in the national economy and region development**

The national economy is a complex system in which some characteristics, subsystems, sectors play a major and decisive role, some are secondary and serving. Some of them are finally formed; others are in constant dynamics, while absolutely new ones may appear in parallel. The development process is multifaceted and includes both quantitative and qualitative transition from one state to another, at the same time, the old may die off and something unique, innovative and previously unknown may appear. Today, development is most often associated with the emergence of something new, with innovation. However, the fundamental foundations, without which economic development is not possible, cannot be written off.

Banister and Berechman (2000) show the clear benefits of investment in transport for economic development using macroeconomic and microeconomic approaches. It should be noted that transport in general advances the national economy by contributing to social and economic development, the level of competitiveness and the improvement of international economic relations, which confirms the importance of taking into account the transport sector in the study of the problem of the development of the national economy and regions.

The particular feature of transport is its interconnection with almost all other sectors and agents (Figure 1). In the price of each product or service, to some extent, there are transportation costs. Thus, transport creates additional costs, on the one hand, but allows products to appear on the markets, on the other hand. The insufficient level of the transport sector can become a bottleneck that will limit the development of other economic areas.



**Figure 1.** Interaction of the transport sector with the main agents of the national economy.

Source: own elaboration.

Considering the role of transport in the development of regions, special attention should be paid to the economic, social and environmental components (Figure 2). From an economic point of view, transport creates opportunities for delivery and expansion of markets. From a social point of view, transport creates the possibility of passenger movement, social comfort and tourism development. From an environmental point of view, transport can cause damage to the region, so it is necessary to find a balance and take into account possible risks. Thus, the development processes of the region must be coordinated with the conditions, which will also be ecologically safe.

So the long-term aim of national and regional policy should involve the transport sector as one of majority objectives for support and enhancement, meeting standards of social and ecological expectations.

#### 4. The role of the transport sector in the national economy of Poland

Poland is located in the center of Europe and has an advantageous geographical position, which contributes to obtaining economic benefits. However, the use of an advantageous geographical position is impossible without a sufficient level of the transport sector. Therefore, high throughput and developed transport infrastructure are important for unlocking its potential.

Litman and Burwell (2006) note that community livability in nowadays requires integrated solutions including improved approaches to transportation problems. As Szczuraszek and Chmielewski (2018) mention in Poland, an important problem of transport is the need for its sustainable development.

According to Statistics Poland (GUS, 2024) the total increase in volume (tonnage) handled by Polish carriers in the years 2018-2023 is over 20%. In 2023, 43.3% more goods was transported by air transport than a year ago, the number of passengers transported has increased up to 12,9%. Płachta (2018) notes that railway connections have crucial meaning as intercity transport.

Transport of goods by mode of transport in 2022 and 2023 years is shown in the Table 1.

**Table 1.**

*Transport of goods by mode of transport*

SPECIFICATION	2022	2023		
		in thousand tonnes	in % 2022 = 100	in % 2021 = 100
Railway transport	218 381	237 915	108.9	101.8
Road transport	1 919 193	1 952 465	101.7	101.6
Pipeline transport	51 489	49 854	96.8	95.2
Maritime transport	8 135	9 587	117.9	109.9
Inland waterway transport	3 991	3 465	86.8	74.0
Air transport	63	91	143.3	117.7

Source: Statistics Poland.

According to the Table 1, the smallest number of tons was transported by air, although the dynamics of this mode of transport is the highest. By sea, 105 times more cargo was transported than by air, which underlines the importance of seaports for Poland. The growth dynamics of cargo transportation by sea took the second place after air transportation. At the same time, in absolute terms, road transport occupies the first place by a wide margin, although the dynamics of growth in this mode of transport is insignificant.

One of the main quantitative indicators of the development of the national and regional economy is the gross domestic product (GDP). Consider the dynamics of GDP in Poland in recent years, as well as the contribution of the transport sector to it (Table 2).

According to the Table 2, over the past 9 years in Poland there have been no sharp jumps in the gross value added created by the transport and warehouse sector, and it ranged from 5.42 to 6.15% of total GDP. Thus, due to the absence of sharp fluctuations, it can be assumed that the transport sector corresponds to the level of development of the national economy of Poland.

**Table 2.**

*Main macroeconomic indicators in Poland in 2014-2021 years (mln PLN)*

Indicator	Years								
	2014	2015	2016	2017	2018	2019	2020	2021	2022
GDP	1 711 244	1 801 112	1 863 487	1 989 835	2 121 555	2 293 199	2 338 996	2 622 184	3 078 324
Total gross value added (current prices)	1 516 480	1 598 028	1 646 287	1 747 525	1 857 482	2 016 064	2 060 380	2 279 794	2 736 095
Total gross value added by transport and warehouse management (current prices)	95 487	103 523	105 897	119 623	130 518	140 649	137 771	156 724	166 744

Cont. table 2.

Percentage of transport and warehouse management in GDP	5,58	5,75	5,68	6,01	6,15	6,13	5,89	5,97	5,42
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Source: Statistics Poland.

## 5. The state and role of the transport sector in the Greater Poland Voivodeship and Pomeranian Voivodeship

Capabilities that shape the economic development in Poland are strongly related to the situation in its regions. At the same time, regions as separate categories in their functioning should be directed to the positive dynamics of the main parameters of their activities. Intent attention should be paid to balanced resource reproduction and economic potential usage, as well as reduction of regional disparities (Kumar, 2002).

Regions in Poland have different performance indicators due to historical, economic and other backgrounds. In terms of geographical location, the Greater Poland Voivodeship is closer to the center of the country and not far from such developed countries as Germany and the Czech Republic, while the Pomeranian Voivodeship is located far from the center, but has access to the sea. To get acquainted with the economic situation in these regions, consider the GDP indicator and its dynamics over the past four years (Table 3). According to statistics, the absolute GDP in the Greater Poland Voivodeship is significantly higher than in the Pomeranian, namely 1.7 times higher. It should be noted that in dynamics, the indicator had almost the same trend for the entire period except for the last year 2020, when in the Pomeranian voivodeship there was a decline in the indicator, and in the Greater Poland voivodeship, an increase. According to Statistics Poland, GDP per capita in Greater Poland Voivodeship is also higher than in Pomeranian Voivodeship and, for example, in 2021 was PLN 74224 in Greater Poland Voivodeship and PLN 66920 in Pomeranian Voivodeship, while in 2022 GDP per capita was PLN 85867 and PLN 81149 respectively. Talley W. (1996) emphasizes that the linkages between a region's transportation infrastructure investment and its economic production are more complex than it might seem.

**Table 3.**

*Gross domestic product by regions*

Year	Greater Poland Voivodeship		Pomeranian Voivodeship	
	in mln PLN (current prices)	in % (previous year = 100)	in mln PLN (current prices)	in % (previous year = 100)
2017	196889	107	115988	105
2018	208190	106	120775	104
2019	226378	109	136063	108,9
2020	231 752	102,4	135 333	99,5

Cont. table 3.

2021	259 958	111,3	157 785	116,0
2022	300 216	115,5	191 386	121,3

Source: Statistics Poland.

According to Perdał (2018) the crucial factors determining regional development are “region’s settlement and transport networks”. As Meersman and Nazemzadeh 2017 note that infrastructure investment is found to have some of the highest multipliers of GDP not only in the short run but also over the long run.

Górny (2014) highlights the path of modernization of Poznań from the first moments of accession to the EU and highlights the benefits of investment activities aimed at the sustainable development of the transport sector in the region. As Bała (2018) notes that thinking about the railway as a factor in the development of the Greater Poland Voivodeship requires an integrated approach to both organizational and investment changes.

Beim et al. (2019) present transport conditions of investment activity in the development of the railway system in Greater Poland. Due to the “Railway Plus” program adopted by the government the station network would extend and benefit people providing them alternative ways of transportation. Suszczewicz (2018) in the study shows the importance of interregional communication for the Greater Poland Voivodeship.

Regional Operational Program for the Greater Poland Voivodeship in the 2014-2020 years was aimed to reduce the disparities within the region in such fields as:

- Research, technological development, and innovation.
- Entrepreneurship.
- Transport.
- Environment.
- Supporting a low carbon economy.
- Increasing employment.
- Lifelong learning.
- Social inclusion.

In the transport sector the program was directed into improvement of the road networks with the amount of 484 330 712 € investments, where namely 72 649 607 € of national contribution and 411 681 105 EU contribution (ROP 15 Regional Operational Program for Greater Poland Voivodeship).

In the Table 4 the state of transport infrastructure in the Greater Poland Voivodeship is shown.



**Table 4.***Transport infrastructure in the Greater Poland Voivodeship*

Transport infrastructure	2010	2015	2020	2022
	in km			
Railways lines operated	2131	1888	1889	1892
Hard surface public roads	26944,6	28463,5	30211,0	30728,0
<i>urban</i>	4868,5	5121,4	5416,0	5447,2
<i>non-urban</i>	22076,1	23342,1	24795,0	25280,8
Roads for bicycle	-	1268,9	1963,8	2163,2

Source: Statistics Poland.

Over the past 10 years in the Greater Poland Voivodeship, only the rail transport infrastructure has had a negative trend, while among the other types there has been a constant increase.

According to statistics domestic freight/mail unloaded from aircraft arriving at Poznań Henryk Wieniawski airport in 2010 was 628 tonnes, in 2015 was 202 tonnes and in 2020 was only 9 tonnes. While foreign freight/mail unloaded from aircraft in 2010 was 29 tonnes, in 2015 was 33 tonnes and in 2020 was 1227 tonnes. Freight/mail loaded into aircraft departing to airports from Poznań Henryk Wieniawski airport in 2010 was 505 tonnes, in 2015 was 231 tonnes and in 2020 was only 21 tonnes. While foreign freight/mail unloaded from aircraft in 2010 was 61 tonnes, in 2015 was 21 tonnes and in 2020 was 1381 tonnes. This dynamics indicates the strengthening of the position of international shipments in the Greater Poland Voivodeship.

The uniqueness of the geographical position of the Pomeranian Voivodeship for Poland lies in its location on the Baltic Sea due to which the region is distinguished by the presence of the largest ports. According to Statistics Poland the share of individual ports in the national turnover in 2020 was as follows: Gdańsk - 45.9%, Gdynia - 24.0%, Świnoujście - 17.1%, Szczecin - 10.8%, Police - 1.9% and other ports - 0.3% (Dmitrowicz-Życka, 2021). These data testify to the significant role of the Pomeranian Voivodeship for maritime transport in Poland.

The investment plans that are currently being implemented in Poland in the field of maritime transport are aimed, among other things, at the modernization of the breakwaters system in the Northern Port in Gdańsk. In accordance with the provisions of the updated plan for the development of Polish ports until 2030, investments will be carried out in the Central Port in Gdansk and the Outer Port in Gdynia. As part of the Central Port project in Gdańsk, the construction of 9 terminals, 4 turntables and 3 approach tracks are planned. The investment also provides the construction of 19 km of service quays and 8.5 km of breakwaters. The port will include, among others, two new container terminals, an offshore terminal, and LNG space for shipyards and passenger ships. The first terminals will be completed in 2029 (Bawelska et al., 2020).

Regional Operational Program for the Greater Poland Voivodeship in the 2014-2020 years was aimed to increase the competitiveness of the region, ensuring in parallel the improvement of living conditions of its inhabitants through the principles of sustainable development including total investment amount of 302 580 689 € in network infrastructure of transport (ROP 11 Regional Operational Program for Pomeranian Voivodeship).

Thus, when analyzing the statistical data should be highlighted the constant growth of transport infrastructure in the Greater Poland Voivodeship, as well as foreign air transportation. According to the comparison of GDP data in the Greater Poland and the Pomeranian Voivodeships, the presence of seaports cannot be singled out as an advantage that outweighed other factors in the development of the Greater Poland region which has high level of transport infrastructure. Numerous investment programs in the Pomeranian and Greater Poland voivodeships contribute to the development of the transport sector, which is reflected in quantitative and qualitative indicators.

## 6. Discussion and Summary

The issue of regional development is a complex and multifaceted category. Among the many heterogeneous factors of regional development, it is important to find fundamental ones, as well as those that have a multilateral influence both on the economy of the region and on social processes in it.

An important condition for the improvement of the regional economy and ensuring its competitiveness is a developed transport sector, which creates development opportunities for other sectors of the economy, connects producers, suppliers and consumers. Insufficient transport capacity, on the contrary, inhibits the development of regions in case of the impossibility of delivering of goods at all or in the required quantity. Transport costs are included in the price of almost every product, and therefore the efficient use of the transport sector is an important price-forming factor.

Considering the role of transport in the development of regions, special attention should be paid to the economic, social and environmental components. The long-term aim of national and regional policy should involve the transport sector as one of majority objectives for support and enhancement, meeting standards of social and ecological expectations.

Poland is a country with a favorable geographical position, which carries great potential. Many regions have airports that are used for both passenger and freight traffic. In connection with access to the Baltic Sea, Poland also has ports, which also provide opportunities for the development of international trade. An important goal in Poland of transport is the need for its sustainable development.

Analysis of statistical data showed that road transport occupies in Poland the first place. The smallest number of tonnes was transported by air, although the dynamics of this mode of transport is the highest. By sea, 105 times more cargo was transported than by air, which underlines the importance of seaports for Poland. The growth dynamics of cargo transportation by sea took the second place after air transportation. According to statistics, over the past 8 years in Poland there have been no sharp jumps in the gross value added created by the

transport and warehouse sector, and it ranged from 5.42 to 6.15% of total GDP. Thus, due to the absence of sharp fluctuations, it can be assumed that the transport sector corresponds to the level of development of the national economy of Poland.

Numerous investment programs in the Pomeranian and Greater Poland voivodeships contribute to the development of the transport sector, which is reflected in quantitative and qualitative indicators.

Comparison of GDP in the Greater Poland and in the Pomeranian Voivodeships shows that it is significantly higher than in the Greater Poland, namely 1.7 times higher. Over the last 10 years in the Greater Poland Voivodeship all types of transport infrastructure except the rail transport has been in a constant increase. Analysis of statistical data showed that the Pomeranian Voivodeship has the majority role for maritime transport in Poland.

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