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SELECTED PROBLEMS OF INFRASTRUCTURE DEVELOPMENT FOR RESIDENTS OF THE MIDDLE POMERANIAN REGION: CASE STUDY

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Purpose: The main purpose of the article is to identify and evaluate the impact of selected infrastructure elements on the development of the Middle Pomeranian region. Efforts were made to prove that infrastructure of appropriate quality is the basic condition for the development of the region.
Design/methodology/approach: In the study, quantitative and comparative methods were used in the data analysis. The article uses a comparative analysis of the road infrastructure of two counties: Koszalin and Slupsk. The analysis was supplemented by a diagnostic survey using a questionnaire survey technique among the inhabitants of both counties.
Findings: In Koszalin, significant changes included: installation of ticket machines and e-tickets (94%), increased availability of city bikes (72%) and scooters (26%), and connection to Mielno by rail bus (56%). In Slupsk, on the other hand: extension of bicycle paths (38%), modifications of some routes for city buses (24%) and improvement of connections with suburban towns (16%).
Research limitations/implications: After the completion of the S6 and S11 developments, a repeat survey should be carried out. According to the authors, these investments affect the quality of life of the residents in the areas studied. Surveys should be carried out on a larger group of respondents, particularly taking into account rural areas.
Practical implications: Investments in the modernisation and development of infrastructure, including road infrastructure, were central to strategic regional development activities. They attracted investors for the development of business and were also a factor in the construction of the logistics center in Koszalin.
Social implications: The development and increase in transport options for residents has directly improved the quality of life for residents. The completed road investments also contribute to improving living conditions and increasing the attractiveness of the region by making it more accessible. The well-developed transport infrastructure of the Middle Pomeranian Region gives specific benefits by increasing the number of tourists.
Originality/value: The analysis of the interaction between transport infrastructure and the economy, as well as the measurement of the satisfaction effect of this interaction, is an important issue in the context of the implementation of the strategic development plan adopted by local governments and the government.
Keywords: development, infrastructure, Middle Pomeranian Region.
Category of the paper: Research paper.

1. Introduction

Development is perceived as an interdisciplinary and very broad meaning (Mitra et al., 2023; Hajian, Kashani, 2021; Payán-Sánchez et al., 2021; Sen, Kumar, 2023). It is also difficult to clearly define development in the area of transport (Guirao, 2021; Wiktorowska-Jasiak, 2016). This may result from the specificity of transport and its types (Oviedo, Nieto-Combariza, 2021; Wiśniewska et al., 2017). The role of transport and (more broadly) logistics infrastructure in economic growth is one of the most frequently discussed topics in recent times. Compared to development expenditures such as education and health, which produce results in a very long time horizon, the progress of investments in infrastructure is physically visible and can bring results in a shorter time. In the field of economics (especially political), it is widely believed that the development of the logistics sector can change the economy in a few years (Guirao, 2021; Chia-Lin2021; Arshed et al., 2022). Road infrastructure is part of the transport infrastructure. It includes elements of the transport network used by means of transport during movement and standstill (Harańczyk, 2015). The road transport infrastructure is divided into linear infrastructure (road network) and point infrastructure (passenger, cargo, means of transport and people services) (Wojciechowski et al., 2009). However, the development of infrastructure to a large extent, if we consider its pace, depends on the number and size of problems, deficiencies, incompatibilities, etc. The linear infrastructure of road transport can be classified according to the criterion of the function performed and the following roads are distinguished: national, voivodship, poviat, commune, company, local and municipal roads. Such a correlation may occur, for example, between regional development and the condition of road infrastructure or public transport (Guirao, 2021; Oviedo, Nieto-Combariza, 2021; Vulevic, 2018). Therefore, an important element of development is improvement. Transport logistics infrastructure is defined as a complex of interconnected elements ensuring material flows. Its key functions include, among others, improving the regional level of socio-economic development (thanks to the efficient functioning of various types of transport and building a sustainable transport network), meeting the needs of economic entities for transport facilities (including logistics), or improving the functioning of the storage system.

In recent years, the problems of transport logistics require a comprehensive study, namely, a thorough consideration of the processes and objects of transport logistics infrastructure in the context of their interaction as a complex system (Bychkov et al., 2016). The term "infrastructure" comes from the Latin language, namely the word "infra" is understood as foundations or foundations, while "structure" means the arrangement of elements of some undefined configuration. As defined in the Cambridge Advance Learner's Dictionary & Thesaurus (2016), "infrastructure" is basic systems and services such as transport and power, that a country or organization uses to operate effectively. Infrastructure is an element of the territorial structure of the national economy, which consists of transport, communication, trade,

energy and water management, as well as housing (Skorobogatova, Kuzmina-Merlino, 2017). In the case of the development of transport infrastructure, three of the many effects that are of particular importance are mentioned. Among other things, these are direct benefits for users, achieved through the impact of investment projects in road infrastructure on traffic safety. The effects include a smaller number of road accidents, which are not only personal tragedies, but above all financial. For over several decades, in efficient and developed economies, the loss of health or life has been converted into measurable economic and financial losses (lower tax revenues, lower consumption, loss of part of the national income, payment of compensation, costs of treatment and rehabilitation, etc.) (Górczyńska, Krawczyk, 2014). Improvement is one of the significant determinants of pro-development activities, in particular in terms of organizational, material and social conditions, including in the area of transport (Wojewódzka-Król, Załoga, 2016). This may result from the necessity and essence of the implemented changes, in particular to increase the existing transport potential (of the country, individual territorial units) as well as the satisfaction of market stakeholders (Kaczyńska, Korycińska, 2014). Because it is them: entrepreneurs, residents, offices, tourists, etc. who build loyalty, image and also affect the profitability of investments (e.g. road, public transport infrastructure) and transport entities. By increasing the safety of road users, both individual and public, we can influence the individual location decisions of the stakeholders of a given market. Therefore, it should be remembered that by improving the quality of life of the society, as part of the development of infrastructure, we increase the socio-economic and economic opportunities of both local government units in a given region and entities operating there (Olkiewicz, 2020).

The analysis of the literature shows that all transport development activities are carried out according to identified needs (area of aware market needs), action planning and action (method of achieving technical parameters in accordance with the assumptions), compliance control and improvement of previous stages (verification and standardization of the effect achieved) form a comprehensive whole (Gibbons et al., 2019; Meijer et al., 2018). Therefore, they cover the areas of strategic management (e.g. creating long-term development of road infrastructure), operational management (e.g. efficiency and optimization of executive processes), organizational (e.g. making activities related to issuing permits, tender procedures, etc.) more flexible, resources (e.g. financial), safety (e.g. in environmental protection aspects), quality (e.g. performance of individual elements of infrastructure (technology and raw material applications), projects (e.g. implementation of innovation or creating cooperation between various research and development centers, etc.), and others (Persia et al., 2016; Qi et al., 2020; Reshetnikova et al., 2021). It also indicates the complexity of identifying factors determining the development of transport. Each of the above-mentioned areas of management, or its components, may have a greater or lesser impact on the implementation of changes in transport.

Global threats to the development of the transport system (passenger and freight) resulting, among others, from transport congestion, climate change, negative impact on the natural environment and living conditions of society, make it necessary to apply a sustainable transport

policy. According to the OECD, the transport policy should be based on the principles of: access to transport services while maintaining the requirements of health and environmental safety; reducing the negative impact on the environment; economic efficiency or intergenerational justice (OECD, 2004; Farhadi, 2015; Churchill et al., 2021). Meeting such expectations requires a broader perspective on the region's logistics, mobility, access to the infrastructure of "green zones", etc. through the prism of time and investment financing opportunities. It is also in line with the state's transport policy, as it is aimed, among others, at: reducing the nuisance of transport for residents; protection of the natural environment and its non-renewable resources; reduce the risk of accidents; ensuring equality in access to means of transport, or creating appropriate conditions for the functioning of public, freight and individual transport (Kalisiak-Mędelska, 2017; Wolniak et al., 2019). Poland's road infrastructure still requires large expenditures on development and ensuring appropriate standards of the existing network in order to be able to meet the needs of the market resulting from the increase in the exchange of goods and the constantly growing passenger traffic. A well-developed and modern network of motorways, expressways and expressways is a prerequisite for the proper functioning of economically developed countries (regions).

2. Materials and methods

The aim of the study was to show the impact of selected infrastructure elements on the sense of development of the region among the inhabitants. As part of the research, the following hypotheses were put formulated:

- H1 – an increase in expenditure on the modernization and development of infrastructure increases the attractiveness and satisfaction of the inhabitants of a given region.
- H2 – an increase in the number of individual infrastructural linear elements increases the efficiency of communication and improves the quality of life of residents.

The research conducted in December 2022 in the Middle Pomeranian region focused on two main cities (of this region), i.e. Koszalin and Slupsk, making a comparative analysis. Respondents in the amount of 100 people (50 people from each city) took part in the survey in June 2022. In Koszalin, 37 women and 14 men, aged 18-30 (47%), 30-45 (17%) and 56 and over (36%) participated in the study. Due to the specificity of the scope of the study, it was found that as many as 92% of the respondents are professionally active in the surveyed population. In Slupsk, 32 women and 18 men, aged 18-30 (58%), 30-45 (14%) and 56 and over (28%), participated in the study. Due to the specificity of the scope of the study, it was found that as many as 91% of the respondents are professionally active in the surveyed population.

3. Results

Analyses and research in the field of transport development usually begin with the identification and assessment of the condition of road infrastructure. This is due to the fact that it fulfills many different tasks and can contribute to competitiveness and/or improve cohesion between neighboring territorial areas. Figure 1 shows the current condition of road infrastructure as of April 28, 2023. Green color indicates very good or good condition, yellow - average or slightly deteriorated, orange - bad (critical). The blue color indicates roads under repair.

Figure 1. Condition of road infrastructure as of April 28, 2023.

Fig. 1 shows that the quality of roads in the Middle Pomeranian region is not that bad. Of course, there are visible fragments of roads requiring immediate corrective action. Therefore, as part of the measures taken to develop the infrastructure of motorways and expressways, both in Zachodniopomorskie (approx. 20,406 km of roads, including 8% national, 27% municipal, 15% provincial and 50% poviat) and Pomorskie (approx. 22,827 km of roads, including 6% national, 45% communal, 13% voivodship and 36% poviat) activities are carried out that significantly affect the quality of road infrastructure in the Middle Pomeranian region, Poland. The currently implemented activities are presented in Fig. 2.

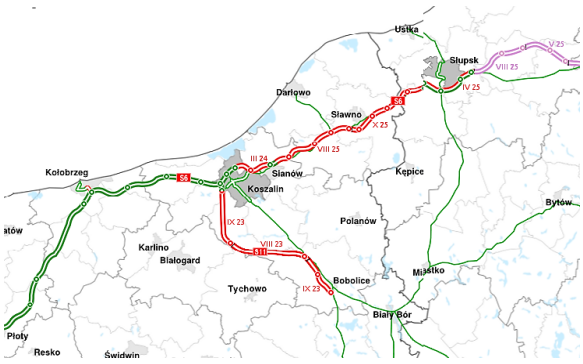

Figure 2. Construction status of highways and expressways.

Figure 2 shows that the main activities are the works carried out on the S6 connecting the Zachodniopomorskie and Pomorskie voivodeships and the S11 being created connecting the Middle Pomeranian region (the area of the Zachodniopomorskie voivodship) with the Wielkopolskie voivodship. A section of the S6 road along the Koszalin bypass and the S11 road from Koszalin to Bobolice, 48 km long, are under construction. The S6 road connecting both voivodships from Koszalin to Lebork, and the S11 road from Bobolice to Szczecinek are in the design phase.

The key element determining the economic development of the Middle Pomeranian Region is undoubtedly the construction of appropriate infrastructure. It should be remembered that it must also be constantly modernized and expanded so as to adapt it to the constantly changing conditions and expectations of market stakeholders. Figure 3 presents data on the % increase in km of roads compared to the base year (2015).

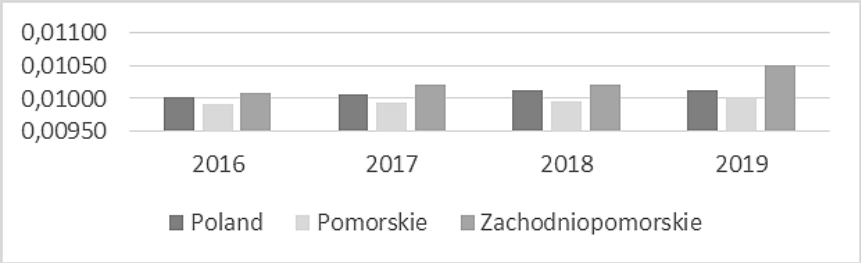

Figure 3. Value of the road increment in [%].

The analysis of Fig. 3 shows increasing trends in all cases. However, the greatest increase is visible in the Zachodniopomorskie voivodeship, in particular in the Middle Pomeranian region. It should also be added that along with the development of road (linear) infrastructure in the Middle Pomeranian region, the number of bridges increased (4 pcs.), 15 road culverts, 4 roundabouts, and embankments along expressways and national roads (e.g. Szczecinska Street in Koszalin). For example, in the city of Koszalin, the implemented urban infrastructure investments required a significant financial contribution from the city, i.e. modernization and construction of roads along with the infrastructure accompanying:

- Str. Mlynska - Kilinskiego square, cost approx. PLN 10 million (of which government funds amount to PLN 1.5 million).
- 2 viaducts (str. Wladysława 4 and Monte Casino) - cost approx. PLN 50 million (24 million government funds).
- reconstruction of str. Franciszkanska 3.5 million (1 million government funds).
- str. Szczecinska (national road 30) 36 million (30 million government funds).

The data indicate that the implementation of infrastructural investments requires significant financial resources. In particular, in own investments, i.e. municipal (municipal), government aid is visible in a small percentage.

Also, along with the development of the identified infrastructure, problems have arisen regarding e.g. with access to real estate (necessity to buy real estate from natural persons), financing of tasks (mobilization of reserves and other sources of financing), traffic difficulties (use of detours or road narrowing), impact on nature (necessity to use culverts, fences, etc.), or the presence of groundwater (S6 – area of the Sianow commune). All the difficulties significantly affected the pace of investment implementation, which directly translated into the quality of life of the residents. At the same time, the infrastructure created in Koszalin increased investment opportunities, i.e.:

- The economic zone was extended by 75.3 ha, creating infrastructure for production facilities, warehouses and warehouses. The permissible development of the building plot area is 65-75% and the minimum area of the investment area is 0.4 ha. The entire area in the period 2020-2023 is developed by m. entities such as: DPD, Romex Koszalin, Bałtyk-Trans-Spedition, James Windows or ASWO.
- The attractiveness of areas for single-family and multi-family housing has been increased.
- By increasing the capacity to the coastal areas, development, commercial and gastronomic activity has increased.
- Expenditures on the development of tourist activities, including agritourism, were increased.

The study of infrastructure and its importance for the inhabitants of the Middle Pomeranian region, in particular from the main cities, should be considered mainly through the prism of the respondents' ability to use public transport. This is important because it directly relates to both the assessment of the quality of services provided and other facilities of the vertical infrastructure. Therefore, the study tried to select a population that uses the existing infrastructure, as shown in Fig. 4.

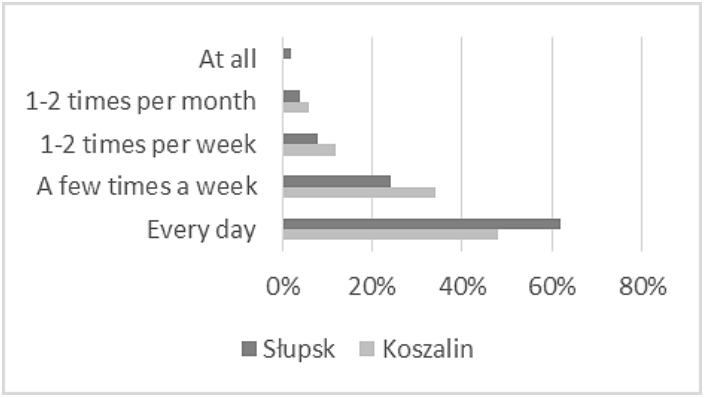

Figure 4. Frequency of use of vertical infrastructure.

The data shows that as many as 62% of respondents from Slupsk, compared to 48% from Koszalin, use the road infrastructure every day. Table 1 shows information on which means of transport are most often used by the respondents.

Table 1.
Preferred public transport

	City bus	Suburban bus	City bike	City scooter	Passenger ship	Railbus
Koszalin	86%	14%	12%	4%	4%	12%
Slupsk	83%	40%	18%	0%	0%	0%

The choice of transport preferences results from various reasons, e.g. lower transport costs, convenient connections (indicated by 65% of respondents from Koszalin, 72% from Slupsk) or the lack of their own means of transport (indicated by 23% of respondents from Koszalin, 18% from Slupsk). The study also showed that, according to the respondents, the communication system is positively assessed, i.e. it is well adapted to the needs of residents (indicated by 46% of respondents from Koszalin, 53% from Slupsk), despite the fact that the frequency of courses was limited (64% of respondents from Koszalin, 66% from Slupsk). However, it should be emphasized that the respondents would expect some changes regarding, among others: increasing the frequency of bus routes (indicated by 94% of respondents from Koszalin, 97% from Slupsk), modification of city bus routes (indicated by 96% of respondents from Koszalin, 98% from Slupsk), or more bicycle routes (indicated by 25% of respondents from Koszalin, 32% from Slupsk). Summing up, the study shows (Fig. 5) that the respondents' assessment of the existing state of infrastructure and the possibility of using public transport is quite negative.

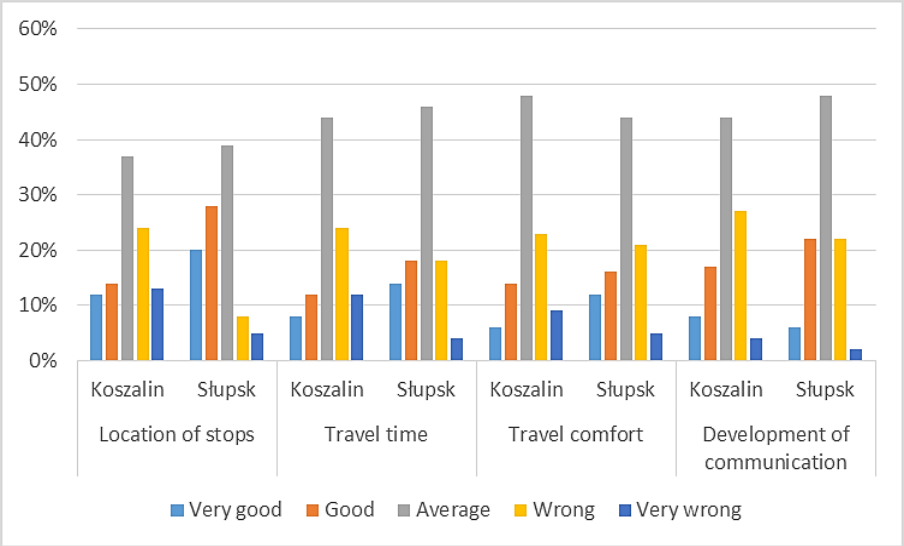

Figure 5. Assessment of selected factors shaping the satisfaction of respondents.

This means that those responsible for planning investments in transport, in particular transport infrastructure, have a lot to do. It should be noted, however, that in the assessment of activities implemented in the period 2019-2022, respondents indicated positive changes. In Koszalin, significant changes included: installation of ticket machines and e-tickets (94%), increased availability of city bikes (72%) and scooters (26%), and connection to Mielno by rail bus (56%). In Slupsk, on the other hand: extension of bicycle paths (38%), modifications of some routes for city buses (24%) and improvement of connections with suburban towns (16%).

4. Conclusions

The plan of road investments in the area of Middle Pomeranian Region for the coming years assumes high investments. It plans to expand national roads, bypasses, motorways and expressways on a large scale. The most important goal of the Program adopted by the Council of Ministers is to shorten the travel time between major Polish cities by at least 15%. It is important that the government allocates funds for this, as well as for the maintenance of existing roads, which is proved by the analysis presented in the article. One of the major problems related to the road infrastructure is the poor condition of the road surface, which is emphasized by the inhabitants of Koszalin and Slupsk, and the related renovation needs. Only half of the national roads managed by the GDDKiA (General Directorate for National Roads and Highways) meet the conditions for classifying them as being in good condition. Renovation of linear infrastructure elements (such as viaducts in Koszalin) may affect not only the quality of movement of the city's inhabitants, but also the entire area of Middle Pomeranian region.

The transport and logistics integration of Middle Pomeranian region is based on the concept of the Northern Transport Corridor and a number of key projects in the development of transport. The transport network that has not been completed should be supplemented as currently S11. It is advisable to perform additional research to determine the role of road infrastructure projects not only for residents and tourists, but also in the area of potential cargo turnover. There is no doubt that countries such as Poland, with greater capacity due to, for example, transit, certainly have a greater impact on economic growth, not only in Middle Pomeranian region, Poland, but also in Europe.

On the other hand, in addition to the socio-economic factors described in this study, it was also shown that improved transport contributed significantly to economic growth. Therefore, the inclusion of these factors in further research could definitely provide a more comprehensive overview of the factors affecting the economic growth of the region, country and Europe.

Changes resulting from the expectations of market stakeholders and socio-economic conditions had a significant impact on the size and pace of development of the infrastructure elements of the Middle Pomeranian Region. All activities carried out by the entities managing this area (the Koszalin City Hall and the Slupsk City Hall) were aimed, among others, at improving the quality of infrastructure and the quality of life of the region's inhabitants. Ensuring efficient transport connections significantly increases the processes of goods exchange between regions and countries, and increased transport needs are connected with the functioning of economies and social (local) life. As part of the conducted research, it was shown that selected elements of the structure have an impact on the development of the region. It was also shown that investments in the modernization and development of infrastructure,

including road infrastructure, were key in the strategic activities of regional development. On the one hand, it attracted investors to the development of entrepreneurship, and on the other hand, communication opportunities increased, which directly improved the quality of life of residents. Also implemented road investments (Fig. 2) contribute to the improvement of living conditions and increase the attractiveness of the region by increasing their accessibility. Transport is a priority development direction for Middle Pomeranian Region. Adequate infrastructure is a basic prerequisite for a national transport system. Transport has a significant direct and indirect impact on economic efficiency and growth, and there is a reciprocal relationship between the quality of transport infrastructure and regional development. The well-developed transport infrastructure of the Middle Pomeranian region gives specific benefits by increasing the number of tourists. Therefore, the analysis of the interaction between transport infrastructure and the economy, as well as the measurement of the satisfaction effect of this interaction, is an important issue in the context of the implementation of the strategic development plan adopted by local governments and the government.

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