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ORIGINAL PAPER

DETERMINANTS OF THE COMPETITIVENESS OF THE WARMIŃSKO-MAZURSKIE VOIVODESHIP

Magdalena Wojarska
Faculty of Economic Sciences
University of Warmia and Mazury in Olsztyn
ORCID: https://orcid.org/0000-0002-4594-5863
e-mail: magdaw@uwm.edu.pl

Dominika Kopeć
Student of Faculty of Economic Sciences
University of Warmia and Mazury in Olsztyn
e-mail: dominika.kopec@student.uwm.pl

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Abstract

The aim of this study has been to identify the factors that have the strongest impact on the competitiveness of regions, with the focus on the Warmińsko-Mazurskie voivodeship. To achieve the aim, the linear ordering method developed by Z. Hellwig (1968) was employed, serving to build competitiveness indices (CI) for each voivodeship in Poland. The analysis included a division into competitive performance (measured with the GDP per capita) and competitive potential (analysed with the use of the Porter's Diamond Model). Competitiveness determinants were identified with the help of multiple regression. The study results indicate that the Warmińsko-Mazurskie voivodeship had the lowest competitive performance and competitive potential in Poland. Although most of the analysed indicators increased in years 2014-2022, and the competitiveness index showed the highest growth dynamics (63.72%), this region persistently remained at the bottom of most ranking lists. As for innovations in production, it occupied the penultimate position, scoring the lowest in terms of demand factors and business environment, and ranking third from the bottom in respect of support and associated branches. Additionally, using the regression model, it was determined that the competitive position of Polish voivodeships was most strongly affected by the level of innovativeness, followed by the business environment.

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DETERMINANTY KONKURENCYJNOŚCI WOJEWÓDZTWA WARMIŃSKO-MAZURSKIEGO

Magdalena Wojarska
Wydział Nauk Ekonomicznych
Uniwersytet Warmińsko-Mazurski w Olsztynie

Dominika Kopeć
Studentka Wydziału Nauk Ekonomicznych
Uniwersytet Warmińsko-Mazurski w Olsztynie

Kody JEL: R11, C29.

S ł o w a k l u c z o w e: konkurencyjność, determinanty konkurencyjności, województwo warmińsko-mazurskie, miara Hellwiga, regresja wieloczynnikowa.

A b s t r a k t

Celem artykułu była identyfikacja czynników najsilniej oddziałujących na konkurencyjność regionów, ze szczególnym uwzględnieniem woj. warmińsko-mazurskiego. Czynniki identyfikowano metodą porządkowania liniowego autorstwa Z. Hellwiga (1968) – zbudowano indeksy konkurencyjności (CI) poszczególnych województw. W analizie zastosowano podział na konkurencyjność wynikową (ocenioną za pomocą PKB na mieszkańca) i czynnikową (analizowaną modelem rombu Portera). Determinanty konkurencyjności zidentyfikowano za pomocą regresji wieloczynnikowej. Z wyników badania wynika, że woj. warmińsko-mazurskie charakteryzowało się najniższym poziomem konkurencyjności, zarówno wynikowej, jak i czynnikowej. Mimo że w latach 2014-2022 wartości większości wskaźników wzrosły, a dynamika indeksu konkurencyjności była najwyższa (63,72%), region plasował się w końcówce większości rankingów. W obszarze innowacyjności w procesach produkcji zajmował przedostatnią pozycję, w obszarach warunków popytowych oraz środowiska biznesu ostatnią, a w obszarze branż wspierających oraz powiązanych trzecią od końca. Dodatkowo za pomocą modelu regresji ustalono, że na pozycję konkurencyjną województw najsilniej wpływa poziom innowacyjności, a następnie otoczenie biznesu.

Introduction

Contemporary regions operate in a volatile environment, making their ability to respond quickly and adequately to the effects of economic, environmental, and social crises a key determinant of development and competitiveness. A significant challenge also lies in dynamic technological changes that contribute to the devaluation of resource-based and traditional industries – those that, in past centuries, determined the wealth of many regions (Korenik, 2023, p. 33). This is because digital transformation strongly influences changes in socioeconomic development factors, emphasizing specific endogenous resources of a qualitative nature while minimizing the importance of traditional factors.

Under these conditions, improving regional competitiveness requires a unique combination of resources such as innovation and creativity, knowledge, technology, history and culture, tolerance, social networks, trust, responsibility, etc. Investments in efficient and affordable digital infrastructure, as well as in human capital with relevant competencies, are also essential. Consequently, the scientific and technological revolution presents numerous challenges for less developed regions, particularly in strengthening their technological and innovation capacities and improving the quality of institutions. Their low competitiveness in the digital economy is rooted, among other things, in formal and informal ties between actors, historical trajectories that influence the richness of experience and tacit knowledge, and their position in foreign markets (Łaźniewska, 2022, p. 53, 138, 153).

The competitiveness of regions is a widely discussed topic in the literature. Between 1992 and 2024, the Web of Science database contained 280 publications with the keyword 'regional competitiveness' and as many as 685 publications in which this term appeared in the abstract. The importance of the issue is also evidenced by a high number of reported studies and ranking lists. Among the latter, the EU Regional Competitiveness Index (RCI), developed by the European Commission, and the Global Competitiveness Report, published by the World Economic Forum, are best known metrics.

The multidimensional and unequivocal understanding of regional competitiveness means it has been impossible to elaborate a specific set of factors, indicators or variables serving to make an empirical assessment of this phenomenon. Particular regional competitiveness factors can only be described with a set of its characteristics (Gołębiewski & Podlińska, 2015, p. 18). Considering the above, the objective of this article has been to identify factors with the strongest impact on the competitiveness of regions, with the focus on the warmińsko-mazurskie voivodeship. To achieve this aim, the linear ordering method developed by Z. Hellwig (1968) was employed to build competitiveness indices for all Polish voivodeships. An approach based on the Porter's Diamond Method was chosen to select variables. Afterwards, with the help of multiple regression, groups of factors with the strongest impact on competitiveness were identified.

Literature Review

The term 'competitiveness' entered the terminology of economic sciences in the 1980s, mainly owing to the research done by M. Porter (Łaźniewska & Chmielewski, 2012, p. 15), and the principal stimulus to undertaking studies in this area were the discrepancies between the economic theory and market reality (Kuberska *et al.*, 2020, p. 1336). Although competitiveness is now considered one of the paradigms of contemporary scientific thought, we still lack a single,

comprehensive theory comprising all aspects and dimensions of competitiveness (Karman *et al*., 2022, p. 31). The literature dealing with this concept provides a multitude and diversity of interpretations (cf. Bieńkowski *et al*., 2008). At present, competitiveness is analysed on three basic levels, i.e. macro-economic (competition among countries), meso-economic (competition among branches/sections of national economy and/or among regions), and micro-economic level (competition among companies) (Szczech-Pietkiewicz, 2019, p. 70). This division can be further refined by adding successive levels, e.g. meta- (competitiveness of future states), mega- (competitiveness of international economies) and micro-economic ones (competitiveness of commodities and services) (Borowiecki & Siuta-Tokarska, 2015, p. 53).

The ambiguity of interpretations and the varied conceptual scope also apply to regional competitiveness. The analysis of definitions coined by a number of authors which was made by Czyżewska (2012, p. 205-207) suggests that competitiveness is most often assigned such attributes as investment attractiveness, adaptability of changing socio-economic conditions, economic strength, success of regions in competing with other regions, or the ability to create new conditions for development. Definitions of regional competitiveness emphasise the importance of the ability to create conditions based on local resources that favour innovation and development of entrepreneurship. Such conditions should encourage potential investors to locate capital in a given region, thereby contributing to its greater competitiveness (Hyski & Chudy-Hyski, 2023, p. 16, 17). It is in this spirit that Annoni & Dijkstra (2019, p. 3) defined competitiveness, maintaining that this is the capability of a region to offer an attractive and sustainable environment for businesses and inhabitants to live and work in. González Catalán (2021, p. 19) after Storper (1997) viewed regional competitiveness as the ability of a given economy to attract and retain companies with stable or increasing shares in the market, while maintaining or improving the standard of living for those who participate in it. Smart companies, which manage better than others in terms of technological breakthroughs, social and cultural issues, in addition to which competing more successfully and developing in a way that is sustainable to the natural environment, play a special role in strengthening regional competitiveness (Adamik & Sikora-Fernandez, 2021, p. 1572).

To summarise the definitions found in the literature, regional competitiveness can be described as the ability to create high social prosperity owing to the economic development and scientific and technological progress (Ginevičius *et al*., 2023, p. 38). Competitiveness is a dynamic category inextricably linked to economic growth, development, and progress. A new dimension of competitiveness is digital competitiveness, which encompasses various factors of the digital transformation process. This issue is gaining increasing importance as a source of competitive advantage both at the enterprise level and for national economies (Grynia, 2022, p. 19, 22, 23). It means that regional competitiveness

is increasingly based on creativity, knowledge, and environmental conditions rather than accumulated wealth (Łaźniewska, 2022, p. 128). The competitiveness of regions is a product of mutually related factors, acting in different directions and with different intensities (Karman *et al*., 2022, p. 38). These factors can be classified in a number of ways, taking into account different criteria applied to the given economy or its environment (cf. Rubaj, 2019; Szczech-Pietkiewicz, 2019; Kouskoura *et. al*., 2024; Encarnacion *et al*., 2023; Shastitko, 2009; Grassia *et al*., 2024; Huggins *et al*., 2014).

One of the best known and universal sets of competitiveness attributes is the one proposed by M.E. Porter (cf. Ayon Ponce *et al*., 2024; Erboz, 2020; Zeibote & Muravska, 2018; Estevão *et al*., 2018; Zeibote *et al*., 2019; Kot & Kraska, 2018). The so-called Porter Diamond is composed of four interrelated determinants that – on a microeconomic level – decide about a national competitive advantage. These are: factor conditions (refer to a nation's resources necessary for competitiveness in a specific industry, such as skilled labour and infrastructure), demand conditions (involve the characteristics of domestic market demand for the products or services of that industry), related and supporting industries (encompass the existence of competitive supplier industries and other associated sectors within the nation), firm strategy, structure, and rivalry (pertain to the regulations and environment that influence how companies are established, organized, and managed, as well as the nature of competition among domestic firms) (Porter, 1990, p. 77). All these elements of the model are affecting one another (Cetin & Erkisi, 2023, p. 21). In order to enhance this model, it is frequently expanded by adding two other elements, i.e. the government and random events. Through its actions, the government has a positive or negative effect on the other elements. For example, it can affect the quality and availability of production factors by allocating more funds to higher education; it can stimulate the domestic demand by public procurement; or it can influence companies' competitive strategies through laws regulating competition. Likewise, random events (e.g. war, natural disasters, scientific breakthroughs), although difficult to predict, also affect (positively or adversely) the other elements of the model (Radło, 2008, p. 8, 9).

During the identification of competitiveness attributes, a significant role is played by the three stages of economic development, proposed by M.E. Porter. Each stage has different competitiveness determinants assigned to it. In an economy based on production factors, the most important are their costs and availability. In an economy reliant on investments, efficiency is the key determinant of competitiveness. And in the final stage, in an innovation-based economy, the main source of competitiveness are knowledge and innovativeness (Sokołowska-Woźniak, 2005, p. 189).

At present, regional competitiveness is to a large extent dependent on knowledge-based factors. Business activity conducted in this manner creates a basis for 'being attractive in space' and for further development. The key factor is therefore the proximity to the science sector, which stimulates the

flow of knowledge to companies. An example is the impact of the presence of universities on the growth of innovativeness of regions (Łaźniewska, 2013, p. 28, 29). In addition, regional competitiveness largely relies on the rareness and uniqueness of resources. Moreover, in any discussion of competitiveness attributes of regions, it is important to bear in mind that these factors change with time (Czyżewska, 2012, p. 217).

Research Methodology

In the following analysis, the authors included the division into competitive potential and competitive performance. Competitive performance shows the effects of competition, while competitive potential is determined by all broadly understood resources a given country possesses. These resources create the economy's competitive capacity and determine its ability to compete (Grynia, 2018, p. 33, 34). Competitive performance was assessed according to the GDP per capita while competitive potential was evaluated with the use of Porter's Diamond Model. The latter led to a distinction of four groups of determinants of regional competitiveness. Due to the high degree of inertia in regional processes, identifying the factors that may influence regional competitiveness at a given moment or over a specific period is complex and depends on the availability of statistical data necessary for conducting an appropriate analysis (Kot & Kraska, 2018, p. 152). Considering the data resources provided by Statistics Poland, Porter's Diamond Model has been adapted to Polish conditions using the modifications proposed by Strahl (2006, p. 102-104) and Kot & Kraska (2018, p. 153, 154). The final set of variables selected for the analysis is shown in Table 1. All the determinants set in observation matrices were characterised by the variability exceeding 10%.

For the determination of the level of competitiveness of the warmińsko-mazurskie voivodeship, one of the most commonly used linear ordering methods was employed, namely the method proposed by Hellwig (1968), called the economic development metric. This procedure enables the user to order a set a variables according to a synthetic index[1], which is created by the aggregation of normalised[2] input variables. Among others, a detailed discussion of the calculation procedure can be found in the publication by Roszko-Wójtowicz & Grzelak (2019, p. 17, 18).

[1] The aggregate metric was determined from the formula: $CI_i = 1-[c_{i0}/(\bar{c}_0 +2S_0)]$, where: CI_i – Competitiveness Index, c_{i0} – distance of a voivodeship from the model, $\bar{c}_0$ – average distance of voivodeships from the model, S_0 – standard deviation of the distance of voivodeships from the model.

[2] Normalisation of data was achieved through standardisation described with the formula: $z_{ik} = (x_{ik} - \bar{x}_k)/S_k$, where: z_{ik} – standardised value of k-th variable in i-th unit, x_{ik} – value of k-th variable in i-th unit, $\bar{x}_k$ – arithmetic mean of k-th variable, S_k – standard deviation of k-th variable.

Table 1

A set of variables used in the analysis

Competitiveness sub-area	Symbol of the variable	Name of the variable
Innovativeness in production processes	X_1	share of inputs into innovative activity in companies in total national inputs
	X_2	average share of innovative companies in total number of companies
	X_3	inputs into innovative activity in companies relative to the GDP
	X_4	inputs into innovative activity in companies per 1 working person
	X_5	internal inputs into R&D activity in the region
	X_6	higher education graduates and students per 10,000 population in the region
	X_7	share of companies which have collaborated in the field of innovative activity in % of total industrial companies
	X_8	share of sold production of new/improved products in industrial companies in value of total sale of all products
	X_9	investment inputs in the public sector per 1 inhabitant
	X_{10}	investment inputs in the private sector per 1 inhabitant
Demand conditions	X_{11}	average monthly expenses per 1 person in a household (in PLN)
	X_{12}	average monthly spending on education per 1 person in a household (in PLN)
	X_{13}	beneficiary of community social assistance per 10,000 population
	X_{14}	registered unemployment rate
	X_{15}	share of net revenues from sales of innovative products in total net sale revenues (in %)
	X_{16}	gross added value per 1 working person in the region (in PLN)
Supporting and related branches	X_{17}	contribution of the voivodeship in creating the country's gross added value (in %)
	X_{18}	share of net revenues from exporting innovative products in the net revenues from total sale of products (in %)
	X_{19}	number of business entities registsred in the REGON system per 10,000 population
	X_{20}	business environment institutions per 10,000 business entities
	X_{21}	natural persons conducting business activity per 10,000 population
Business environment	X_{22}	share of the national economy entities with the contribution of foreign capital in the total number of business entities registsred in the REGON system
	X_{23}	total length of active sewerage network in km per 100 km^2
	X_{24}	total length of active gas network in km per 100 km^2
	X_{25}	total length of active water supply distribution network in km per 100 km^2
	X_{26}	hard-surfaced roads per 100 km^2
	X_{27}	share of foreign capital located in business entities seated in the voivodeship in the total value of foreign capital located in Poland

Source: developed by the authors, based on Statistics Poland (GUS), https://stat.gov.pl/ (28.02.2024).

In order to make the analytical results more detailed, a multiple regression method was employed, with the aim to determine which group of variables had the strongest impact on the position of the Warmińsko-Mazurskie voivodeship in the competitiveness ranking. First, the variables within the particular areas (*A*-*D*) were submitted to an assessment of mutual correlations using the Pearson's coefficient. Lack of correlation allowed us to proceed to the subsequent step of the analysis. Regression coefficients were estimated with the help of the least squares method.

Having estimated the model, it was then subjected to an evaluation with respect to fit. To this aim, we employed a corrected R^2 coefficient, which unlike R^2 takes into account the degree of complexity of the model and is more often used in multiple regression analysis. The significance of variables was also evaluated, using the *F* statistics and the related *p* values. The explanatory variables were considered statistically significant at $p<0.05$ (Osojca-Kozłowska 2021, s. 125-127). The analysis was made on the basis of averaged values of the variables from years 2014-2022.

Results

Comparison of the values of the Competitiveness Index (CI) obtained in the particular areas shows that the Warmińsko-Mazurskie voivodeship occupied the penultimate place in the area of innovativeness in production processes, while the Świętokrzyskie voivodeship fell to the last place. In two other areas, demand conditions and business environment, the Warmińsko-Mazurskie voivdeship scored the lowest among all Polish voivodeships. Its position was somewhat better in the area of business support and related branches. There, the Warmińsko-Mazurskie had the third lowest position. In each of these four areas, the highest CI value was scored by the Mazowieckie voivodeship (Tab. 2). The research results reflect the characteristics of the voivodeship. Warmia and Masuria is one of the most agricultural voivodeships in Poland, with a large area of agricultural land and forests. For this reason, there are few large industrial enterprises that focus on innovation.

The data collated in Table 2 served to determine the linear regression model from the following formula:

$$y = -0.037 + 0.325A + 0.199B + 0.205C + 0.285D$$

The parameter related to the business environment area achieved the highest value (0.325). This means that the strongest impact on regional competitiveness was exerted by this area. On the other hand, the lowest value was achieved in the area of demand conditions (0.199), which confirms its smallest impact on the final

Table 2

Values of the Competitive Index (CI) of Polish voivodeships in the distinguished areas

Voivodeship	Overall	Innovativeness in production processes	Demand conditions	Support and related branches	Business environment
	Y	*A*	*B*	*C*	*D*
Dolnośląskie	0.43	0.50	0.63	0.53	0.23
Kujawsko-Pomorskie	0.20	0.26	0.27	0.22	0.16
Lubelskie	0.20	0.27	0.20	0.12	0.34
Lubuskie	0.20	0.17	0.45	0.38	0.10
Łódzkie	0.26	0.31	0.44	0.28	0.18
Małopolskie	0.41	0.53	0.39	0.39	0.36
Mazowieckie	0.61	0.87	0.75	0.64	0.34
Opolskie	0.24	0.27	0.45	0.31	0.15
Podkarpackie	0.22	0.41	0.15	0.17	0.20
Podlaskie	0.14	0.28	0.18	0.11	0.05
Pomorskie	0.38	0.46	0.60	0.44	0.19
Śląskie	0.43	0.46	0.55	0.44	0.39
Świętokrzyskie	0.10	0.13	0.14	0.09	0.19
Warmińsko-Mazurskie	0.08	0.17	0.09	0.15	0.05
Wielkopolskie	0.34	0.39	0.46	0.42	0.25
Zachodniopomorskie	0.21	0.24	0.30	0.33	0.13

Source: developed by the authors, based on the Local Data Bank.

level of competitiveness. The problem of low innovation in the voivodeship has been noticed, and its improvement has become one of the four goals of the Strategy for the socio-economic development of the Warmińsko-Mazurskie voivodeship until 2030. The essence of the strategic goal 'Smart productivity' is actions aimed at strengthening enterprises' competitiveness by developing their innovation. The goal also focuses on intensively engaging high-quality human resources in response to technological changes (robotization) and population ageing. A similar analysis was carried out in each of the four areas. Within the group of indicators comprised in the production innovativeness areas, the regression model looked as follows:

$$A = -0.3034 + 0.014X_1 + 0.005X_2 + 0.029X_3 + 0.000002X_4 - 0.009X_5$$
$$+0.001X_6 + 0.015X_7 + 0.006X_8 + 0.000038X_9 + 0.000017X_{10}$$

The indicators X_1, X_3 and X_7 had the strongest whereas the indicator X_4 had the weakest impact on the CI values. However, indicator X_3, same as X_2, X_4, X_5,

was not statistically significant, which was evidenced by the *p*-value. For this reason, the indicator that had the strongest impact on the area of innovation was the Share of enterprises that cooperated in the field of innovative activity in % of all industrial enterprises, This means that an increase in the share of enterprises that cooperated in the field of innovative activity in % of all industrial enterprises by one percentage point will contribute to an increase in the indicator in the area of innovation by 0.015.

The fact that the warmińsko-mazurskie voivodeship scored higher than the Świętokrzyskie voivodeship position in this competitiveness ranking was a consequence of its higher scores in nearly all indicators. It was only the percentage of companies collaborating in the field of innovation in the total number of industrial companies and the share of sold production of new/improved in the total sale of products that the scores obtained by the Warmińsko-Mazurskie voivodeship were the lowest among all Polish voivodeships (both 4.83%).

Another area submitted to a regression analysis covered the demand conditions, and the model constructed on the basis of collected data looked as follows:

$$B = -0.42 + 0.0005X_{11} + 0.007X_{12} - 0.0001X_{13} - 0.02X_{14} + 0.02X_{15} + 0.000002X_{16}$$

According to this model, the strongest effect on the CI value in the demand conditions area was produced by indicator X_{15}, i.e. share of net revenue from the sale of innovative products in net revenue from total sale (in %), which in the Warmińsko-Mazurskie voivodeship was the lowest in Poland and amounted to 4.31%. The highest value of this indicator was achieved in the Pomorskie voivodeship (13.02%).

The high negative effect was exerted by indicator X_{14}, i.e. the registered unemployment rate. Its value in the Warmińsko-Mazurskie voivodeship was the highest among all voivodeships – the average of the years examined (2014-2022) was 12.02%. The average unemployment rate in the country was 7.92%. The values of these two indicators were mostly responsible for the low level of CI in this area in the Warmińsko-Mazurskie voivodeship.

The next area submitted to our analysis was the one of supporting and related branches. In this case, the model looked as follows:

$$C = -0.35 + 0.011X_{17} + 0.019X_{18} + 0.00026X_{19} + 0.00014X_{20} + 0.098X_{21}$$

The CI value in this area was most strongly affected by indicator X_{21} (number of natural persons conducting economic activity), while it was least impacted by indicator X_{20} (business environment institutions per 10,000 business entities).

These indicators in the Warmińsko-Mazurskie voivodeship were 0.17 and 1,185.83 respectively. For this reason, this voivodeship, despite one of the highest values of indicator X_{20} in Poland, was found on a low place in the ranking as regards the CI value in this area.

The last area that underwent a regression analysis was the business environment area. Competitiveness in this area was determined by six indicators. The strongest effect on the CI value in this area was produced by indicators X_{22} and X_{25}, which is demonstrated by the equation below:

$$D = -0.21 + 0.001X_{22} + 0.00014X_{23} - 0.00003X_{24} + 0.001X_{25}$$
$$+0.0002X_{26} + 0.0028X_{27}$$

The indicators mentioned above are the percentage of the national economy entities with foreign capital share in the total number of companies registered in the REGON system, and the total length of water distribution systems in km per 100 km^2.

Both these indicators in the Warmińsko-Mazurskie voivodeship scored the lowest in the whole country and they amounted to sequentially 30.22% and 57.31 km. On the other hand, the indicator X_{24}, which according to the model had the lowest impact on the final value of the CI, achieved a relatively high value in the Warmińsko-Mazurskie voivodeship (67.61 km). This resulted in a very low CI value in this area achieved by the Warmia and Mazury region. Not only was it the lowest in the country, but also it was twice as low as in the voivodeship that was on the penultimate place in the ranking (the Świętokrzyskie voivodeship).

The five regression models enabled us to identify the factors with the strongest impact on competitiveness. They were the indicators from the areas of business environment and innovativeness in production processes. In these areas, the following had the greatest importance: X_1 (percentage of inputs into innovative activity in companies in total national inputs), X_3 (inputs into innovative activity in companies relative to the GDP), X_7 (share of companies which have collaborated with others in the field of innovative activity in % of the total number of industrial companies), and X_{21} (natural persons conducting business activity per 10,000 inhabitants). Their low values in the Warmińsko-Mazurskie voivodeship had the largest contribution to the overall low values of the competitiveness index in this region in years 2014-2022.

Summary and Conclusions

Competitiveness as a research question is now gaining importance. Articles dedicated to this problem are increasingly often referred to not just by economists but also by government and local government officials, politicians, and entrepreneurs. Interest in all kinds of reports dealing with competitiveness has been growing. Many of them address the topic of competitiveness, looking at examples of rich, competitive regions. This article, using the example of the Warmińsko-Mazurskie voivodeship, presents the most important factors shaping the level of regional competitiveness and focuses attention on an underdeveloped and uncompetitive region. A direction for further research may be to re-examine the situation after the next EU programming period (2021-2027). By comparing these two periods, it would be possible to examine changes in individual areas and the impact of EU funds on these changes.

Regional competitiveness has a considerable impact on the state's economic condition. For this reason, balanced development of all voivodeships should be in the interest of local, regional and central governments. The state's regional policy should envisage such actions that would level off the emerging discrepancies among the country's regions. To this aim, it is necessary to develop a comprehensive approach and a long-term action plan. Unique values of regions should be taken into consideration, and rare resources ought to be used while building a region's competitive advantage. In the case of the Warmińsko-Mazurskie voivodeship, important factors are its peripheral location, the ongoing war in Ukraine, and new aspects of specialization.

Investments into infrastructure, the R&D sector and business environment should also be included in efforts aiming to improve competitiveness. Competitiveness is increasingly often equated with innovativeness. Hence, it is also important to purchase and employ cutting edge technologies in companies operating in a given region. The key aspect in the development of regional competitiveness is the access to qualified human resources. In the knowledge-based economy, it is essential to invest in education, higher education, and in upgrading courses for employees.

The analysis presented in this paper shows that the Warmińsko-Mazurskie voivodeship consistently scored the worst in competitiveness rankings among all Polish voivodeships. This was observed in terms of both competitiveness performance and potential. When analysing the GDP per capita in years 2014-2021, the said region had one of the lowest growths of this parameter in whole Poland, which equalled just 53.6%. The GDP per capita in the Warmińsko-Mazurskie voivodeship increased from PLN 31,973 in 2014 to 49,098 in 2021. The observations appeared the same when considering competitiveness potential. Although values of most indicators increased over the years, and the dynamics of the competitiveness index (CI) was the highest in Poland (63.72%), this did not affect significantly the competitive position of the region. In the area

of innovativeness in production processes, the Warmińsko-Mazurskie voivodeship had the penultimate place among all voivodeships in Poland, while being the last in the areas defining demand conditions and business environment, and being the third from the bottom for the area of support and related branches. It can be assumed that the gap between the Warmińsko-Mazurskie voivodeship and the other Polish voivodeships was so large in many of the studied areas because of historical circumstances. Hence, despite efforts to improve the region's competitiveness, such discrepancies have not been levelled off.

Moreover, using the regression model, it has been determined that the level of innovativeness has a strong impact on the competitive position of any voivodeship. Another important area was the business environment. These results are reflected in reports dealing with this research subject, where innovativeness is nowadays identified as a crucial factor in the development of competitiveness. An example is *Innovation and Entrepreneurship: Practice and Principles* by Peter F. Drucker (1992), in which the author often emphasizes that innovation is a fundamental element of entrepreneurship and a key factor in gaining a competitive advantage. In *The Geography of Innovation: Regional Innovation Systems*' by Asheim & Gertler (2005) the authors present the concept of regional innovation systems (RIS), which emphasize the importance of innovation as a key factor in the competitiveness of regions.

It is important to regularly examine the competitiveness of regions to see where development funds should be allocated and to counteract disproportions. Similar research in the coming years will allow us to see the direction of changes taking place in individual voivodeships as well as changes in the values of individual indicators.

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