
Innovativeness of Regions in Poland

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Abstract:

Purpose: The purpose of this article is to highlight the increasing importance of innovation in regional economic development, quantify the research area, and present the current ranking of innovativeness among voivodships in Poland.

Design/Methodology/Approach: To conduct our research, we employed an aggregate measure in the form of a synthetic indicator of development commonly used in EU nomenclature to assess innovation. The regional level used as the basis for EU regional policy is NUTS 2. Therefore, for this study, each of the sixteen existing voivodships in Poland is considered as a separate region.

Findings: The multidimensional and ambiguous nature of measuring regional innovativeness poses significant challenges in its identification. Following the EU guidelines, we selected a set of diagnostic variables that fairly comprehensively describe the innovativeness of regions in Poland, although with certain limitations. By employing an appropriate synthetic measure of development, we were able to rank the voivodships in Poland based on their level of innovation, providing a statistical overview of this complex phenomenon.

Practical Implications: The presented considerations and research results offer a more comprehensive understanding of the economic category in question and provide an insight into its current state in Poland. While some problems have been addressed, others are merely indicated and can contribute to scientific discussions. Policymakers and decision-makers may find this information valuable in formulating development strategies for the upcoming years.

Originality/Value: This article emphasizes that there exist theoretical foundations for studying regional innovativeness, although quantifying the research area remains a significant challenge. Nevertheless, a description is feasible, and empirical research can effectively employ methods of multivariate statistical analysis.

Keywords: Innovativeness of regions, quantification, multivariate statistical analysis.

JEL codes: O18, C19, R59.

Paper type: Research article.

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1. Introduction

In the contemporary economy, knowledge and innovation are widely utilized, and their importance will continue to increase as driving forces for smart and sustainable development in the future (Janasz, 2011, p. 21). The region plays a crucial role as the primary source and transfer hub for innovations into economic life (Sekuła, 2008, p. 94). This is because it offers the most favorable factors and conditions for innovation creation (Stawasz, 2009, pp. 269-270). The source literature highlights the significance of innovation in the territorial context (Kudłacz and Reichel, 2003).

Nowacki (2009) defines regional innovativeness as the region's inclination and ability to implement innovations, with its components encompassing available resources and the methods employed to utilize them (Nowacki, 2009, p. 64). Markowska adopts a broader perspective, considering it as the capacity and motivation of the regional economy and enterprises to continuously seek and practically apply the outcomes of scientific research, new concepts, ideas, and inventions (Strahl (ed.), 2010, p. 16).

Brol clarifies that regional entities can operate in both the economic and social spheres, as well as the regional ecosystem, and regional innovativeness can result from the behavior of these entities and the regional or local policies implemented by competent self-government bodies with the means to influence the region's space, society, and economy (Strahl (ed.), 2010, p. 36).

Therefore, it can be assumed that regional innovativeness refers to the ability and willingness of entities operating within and for the benefit of a particular region, encompassing both the social and economic spheres, as well as regional policy, to generate and adopt innovations.

This involves a continuous pursuit and practical application of the outcomes of scientific research, research and development endeavors, new ideas, concepts, inventions, and solutions that aim to bring about positive changes in quantitative growth and qualitative progress within the region. It also aims to better meet the needs of its residents and make more effective use of available resources.

2. Innovativeness of Regions as a Factor Stimulating the Economy

Innovation is an inherent feature of the modern world (Górecka and Muszyńska, 2011, p. 55). Innovation begets innovation (Castells, 1998, p. 32). In today's economy, there is a constant need for new solutions in various aspects of socio-economic life, and innovation arises from anything that inspires people to engage in the process of change (Pomykalski, 2001, p. 25).

The experience of highly developed countries demonstrates that innovation is the driving force behind every economy, as it determines long-term growth potential.

There exists a positive relationship between investment intensity in research and development and the development and competitiveness of an economy (Janasz, 2010, p. 103). The capacity for increased spending on research and development enables leading countries in innovation development to excel in economic growth (Nowicka, 2008, p. 70). Innovation stands as one of the main factors contributing to the economic prosperity of countries and regions (Filipiak and Kogut-Jaworska, 2008, p. 36).

In light of the aforementioned viewpoints, the growing importance of innovation in regions as a factor stimulating the economy becomes apparent. The innovativeness of regions determines their development and becomes a driving force behind regional development (Klóska, 2015). Brol (2009) regards innovation as the initial, causative stage of the triad in the region's economic development cycle, comprising regional innovation, regional competitiveness, and regional development (Brol, 2009, p. 60).

Fully endorsing this approach, it should be noted that the innovativeness of a region is a key factor significantly influencing changes within the region, as it plays a pivotal role in improving the existing state. Therefore, the innovativeness of a region serves as a means to enhance the competitiveness of its economy, ultimately fostering regional development.

Factors associated with the knowledge-based economy are perceived as opportunities to enhance the innovativeness of regions and lay the foundations for socio-economic development. It is recognized that regions capable of generating and absorbing knowledge and innovation are better equipped to achieve higher and more sustainable economic growth (Bagińska, 2010, p. 66).

Innovations, as the fundamental factor stimulating socio-economic development, are responsible for spreading the development process to other areas through spatial diffusion (Korenik, 2012, p. 144). Innovation stands as one of the key factors influencing the competitiveness of regions (Winarski, 1999, p. 51).

Consequently, the innovative potential of regions presents opportunities that should be seized to enhance competitiveness and foster socio-economic development (Kharchenko, Alpeeva, and Ovcharova, 2014, p. 313). The innovative capacity determines whether a given region falls into the following categories (Boguski, 2007, pp. 78-79):

- innovative - characterized by a high concentration of modern industries in the economy, utilization of advanced technologies by companies, and thriving research and development centers;
- adaptive - primarily characterized by the ability to absorb and disseminate innovations generated in innovative regions;

- conservative - exhibits low entrepreneurial potential, with late arrival and infrequent adoption of innovations;
- open-air museum - remains on the periphery of major innovation trends, lacking structural and modernization changes.

It appears that the latter type can still be viewed as a traditional region, while the first three, to varying degrees, represent a higher stage of development due to the characteristics of a learning region (Table 1).

Table 1. *Characteristics of a learning and traditional region*

Criterion	Learning region	Traditional region
Competitive base	Self-sustaining benefits (based on the creation of knowledge and its improvement)	Comparative benefits (based on natural resources and labour)
Production system	Knowledge-based production. The source of value is knowledge. Innovation plays a major role. Continuous creation process.	Mass production. The source of value is physical work. Innovation is not part of production.
Industrial infrastructure	It adopts a network structure	Classic supply relationships. Linear links between producers and suppliers.
Human resources	Qualified workers. Continuous improvement of the value of human resources. Continuing education.	Poorly qualified and cheap workforce. Taylor's concept of work and the education system
Communication infrastructure	Oriented to global needs. Electronic exchange and acquisition of data.	Oriented to own needs, on a national scale.
Industrial regulation system	Relationships based on mutual dependencies. The organization is a network. Flexible adjustment.	Regulations based on pure competition. The basis of organization is hierarchy and control.

Source: Korenik, 2006, p. 119.

3. Data and Methods

When exploring the characteristics of innovativeness in Polish regions, the study began by identifying specific indicators in three aspects: potential, company activity, and results. The European Union's guidelines for measuring innovation, specifically the *Innovation Union Scoreboard (IUS)* and the *Regional Innovation Scoreboard (RIS)*, were used as the reference framework and considered an international standard.

The selection of indicators was based on their substantive relevance, and the main challenge in selecting diagnostic variables to describe the innovativeness of Polish

voivodeships in the analyzed period was the limited availability of specific numerical data. As a result, a set of eight diagnostic variables for the innovativeness of regions in Poland in 2021 was finally adopted (Table 2).

Table 2. Innovation indicators of regions in Poland in 2021

Indicator symbol	Generic Block / Regional Innovation Index	Convergent pointer number in EU research (IUS and RIS)
I. Potential		
I ₁	Expenditure on innovative activity in enterprises as a percentage of GDP (%)	1.3.1
I ₂	Percentage of people aged 15-89 with higher education (%)	1.1.2
II. Business activity		
I ₃	Internal expenditures on R&D activity as a percentage of GDP (%)	2.1.1
I ₄	Percentage of industrial enterprises that cooperated in innovative activities (%)	2.2.2
III. Results		
I ₅	Share of innovative enterprises in total industrial enterprises (%)	3.1.1
I ₆	Share of innovative enterprises in total enterprises in the service sector (%)	3.1.2
I ₇	Share of people working in R&D in the economically active population (%)	3.2.1
I ₈	Share of net revenues from the sale of products of entities classified as high and medium-high technology (enterprises employing more than 9 persons) (%)	3.2.2

Source: Own study based on GUS, IUS and RIS data.

In order to build a ranking of voivodeships in Poland in terms of innovativeness characterized by the variables listed in Table 2 as a synthetic measure of development (SMD), a well-known and methodically consistent with the Summary Index of Innovation (SII) commonly used in the EU nomenclature (IUS) was used, the arithmetic mean (multiplied by 100) of diagnostic variables brought to comparability through zero unitarization (after its application, the value of each variable will be included in the closed interval from zero to one).

All diagnostic variables adopted for the study were treated as stimulants and given equal weight to each (as most researchers do in practice).

4. Results

The initial values of the adopted SMD enabled the ranking of Polish voivodeships in terms of innovation in 2021 (Table 3).

Table 3. Results of own research on the innovativeness of regions in Poland in 2021

Voivodeship	SMD value	Ranking place
DOLNOŚLĄSKIE	64,24	3
KUJAWSKO-POMORSKIE	29,13	12
LUBELSKIE	40,32	7
LUBUSKIE	14,31	15
ŁÓDZKIE	31,61	9
MAŁOPOLSKIE	77,52	2
MAZOWIECKIE	85,08	1
OPOLSKIE	30,05	11
PODKARPACKIE	63,63	4
PODLASKIE	37,81	8
POMORSKIE	52,98	5
ŚLĄSKIE	45,59	6
ŚWIĘTOKRZYSKIE	15,84	14
WARMIŃSKO-MAZURSKIE	24,74	13
WIELKOPOLSKIE	30,41	10
ZACHODNIOPOMORSKIE	13,04	16

Source: Calculations and own study based on Central Statistical Office data (www.strateg.stat.gov.pl; 06.06.2023).

The voivodeship of Mazowieckie occupies the position of innovation leader among the regions in Poland, based on the considered features in Table 2. Małopolskie and Dolnośląskie also rank highly, securing positions on the podium. On the other hand, Zachodniopomorskie, Lubuskie, and Świętokrzyskie receive the lowest ratings in the survey.

5. Conclusions

Changes within regions exhibit diverse characteristics, and the search for determinants of regional development, the key driving forces, is an important and frequently discussed topic. The concept of regional innovativeness is highly complex and challenging to quantify precisely. However, measurement is possible, albeit encountering methodological difficulties (Hollanders and Esser, 2007) and the lack or incomplete availability of homogeneous and comparable data.

It is worth noting that the latest available data for this study refers to the end of 2021, resulting in a time delay of several months. Despite these limitations, the substantive discussion and the employed measures have allowed for presenting a comprehensive statistical overview of regional innovativeness in Poland. The presented study and its results have achieved the objective set forth at the beginning.

Furthermore, multivariate statistical analysis methods can be effectively utilized in future research on regional innovativeness. It is evident that there is an uneven

development among the different voivodeships in Poland in terms of innovation. The synthetic measure of development adopted for the innovation leader is more than six times higher than that of the weakest region in the ranking..

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