

INNOVATION RANKINGS - THE POSITION OF POLAND COMPARED WITH OTHER COUNTRIES UNDERGOING TRANSFORMATION

Anna Jańska

Maria Curie-Skłodowska University, Poland
anna.janska@poczta.umcs.lublin.pl

Teresa Bednarczyk

Maria Curie-Skłodowska University, Poland
teresa.bednarczyk@umcs.lublin.pl

Abstract:

The aim of the study is to assess the position of the Polish economy in the selected innovation rankings, which were prepared both for European countries and for some other countries in the world. The position of the Polish economy is evaluated in comparison with those of other European countries which are transforming their economies. The choice of the countries for the study was conducted in accordance with the classification of the European Bank for Reconstruction and Development. In a series of its reports - "Transition Report", it allocated the Polish economy to the group of the countries recognized as "Central Europe and the Baltic States", along with Estonia, Lithuania, Latvia, Slovakia and Slovenia. Our study consists in the review of literature as well as an analysis of secondary data, i.e. some selected innovation rankings. The research hypothesis goes as follows: despite the fact that Poland remains one of the fastest growing economies in the EU and it is doing very well when faced by the global financial crisis, it cannot rise to the modern challenges of improving the innovation in its own economy.

Keywords: innovation, rankings, Poland, transformation, economy, development

1. INTRODUCTION

Nowadays the issues of innovation are extremely important as they are essential for the growth of production and work efficiency. Innovative activities are fostered by such changes occurring in the world economy as globalization, fast flow of information, dynamic technological advances, relatively easy access to capital as well as ongoing changes in cultural values, the evolution in social standards, shortening the life cycle of products and services, and also international competition. The importance of innovation may be considered from the point of view of consumers, enterprises and states.

The subject of this study is innovation of economies. The aim of this paper is to assess the degree of innovation of the Polish economy compared to other transition countries in the light of the analysis of some selected innovation rankings. To this purpose, some transforming countries belonging to the European Union were used as a basic benchmark group for Poland. The selection was made on the basis of distinction proposed by the European Bank of Reconstruction and Development (EBRD).¹

The research was conducted drawing on the reviews of the subject literature as well as on a number of indicators presented in the summary indices used in some innovation rankings. The study discusses the selected rankings which consider the aspect of innovation of economies such as Innovation Union Scoreboard (IUS), Knowledge Economy Index (KEI), Global Innovation Index INSEAD and Global Creativity Index (GCI). Such a selection of indices attempted to assure timeliness and comparability of the data. Both ratings related to of the European Union countries and those beyond it were taken into consideration. Some reports focus on the aspect of innovation. In others, the issue of innovation is treated as one of many factors determining the level of economy of a given country and the prospects of its further development.

2. INNOVATIONS AND INNOVATIVENESS IN A THEORETICAL APPROACH

Until the mid-20th century, technology was much ahead of science. The theory lacked then adequate research methods and analytical tools for the rapid scientific and technical progress as well as the innovation process (Fiedor, 1979, pp. 18-21). The growth in the research on innovations began only in the middle of the 20th century, although the interest in the technological development appeared as early as in the 18th and the 19th centuries.² The concept of innovation was introduced to economic literature by the Austrian scientist J.A. Schumpeter in 1911, who was recognized as a pioneer of considerations on innovativeness and the creator of the theory of innovation based on observations of capitalistic economy at the beginning of the 20th century.

J. Schumpeter studied mainly technological innovations and their importance for economy, which may be viewed as a macroeconomic approach towards innovation. Schumpeter thought that technological changes in enterprises lead to the development of new clusters of means of production (work, capital, land). They, in turn, generate above average rates of returns, thanks to which a dynamic growth of the whole economy becomes possible. He claimed that economic growth is stimulated by innovations understood as market experiments and extensive far-reaching changes which affect the structure of markets and economic sectors in a fundamental way. The so-called creative destruction boosts economy by replacing old technologies with new ones (Schumpeter, 1960).

In the 20th century radical changes took place in the world of economy which consisted in reducing the significance of industry in favour of services. Such factors as knowledge and information started to play a key role. Consequently, Schumpeter's classical approach towards innovation gave way to new

¹In the report 'Transition Report' Poland was included into the group of countries transforming their economies: Central Europe and the Baltic states, along with Estonia, Lithuania, Latvia, Slovakia, Slovenia and Hungary. Since 2008 the Czech Republic has not been included in 'Transition Reports' being recognized as a state where the transformation has already been completed, cf. *Transition Report 2013* <http://www.ebrd.com/news/publications/transition-report/transition-report-2013.html> (Accessed 2015-01-03).

²Economists such as A. Smith, D. Ricardo, J.B. Say, J. S. Mill, K. Marx, A. Marshall, G. Tarde, T. Veblen, A.C. Pigou, M. Kalecki, showed their interest in technological progress, inventions and innovation. Classics of economics saw then benefits from using new machines making work more efficient, but at the same time they pointed at the negative impact of this progress crowding out workforce by new techniques, for more information see, inter alia in: N.I. Gust-Bardon, *Innowacja w myśli ekonomicznej od XVIII do XX wieku. Analiza wybranych zagadnień*, „ACTA UNIVERSITATIS NICOLAI COPERNICI” *Ekonomia* XLIII nr 1 (2012), pp. 105-109.

ideas. An economical aspect of innovation came in the fore and the subject scope of innovation significantly extended beyond the technical sphere (Janasz & Kozieł, 2007, p. 13.).

The representatives of a broadly understood concept of innovation and a new trend will include, among others, P.F. Drucker, Ph. Kotler, R.W. Griffin, M. E. Porter, S. Marciniak, I.K. Hejduk, W.M. Grudzewski, A. Pomykalski and S. Gomułka (Kasperkiewicz, 2008, pp. 16-18.). In the light of the theory of organization and management, the significance of innovation is emphasized while winning competitive advantages. Enterprises create innovations to defend their present competitive position or seek new competitive advantages.

Currently, for the purpose of research and comparative analyses, the definition and classification of innovation suggested in the Oslo Manual is recommended, as it provides commonly adopted, international methodological standard in conducting statistical research on innovation (*Podręcznik Oslo*, 2008.). OECD experts define innovation as implementing a new or significantly improved product (creation, service), or a process, a new marketing or organizational method in business practice, organization of workplace or relations with the environment (*Podręcznik Oslo*, 2008, p.48). According to the assumptions of the Oslo Manual innovations may be interpreted quite broadly, taking into account not only product and process innovations but also non-technological one, which bring a positive economic effect.

Innovation is also considered through the microeconomic approach. At the level of macroeconomics, innovation is understood as a certain attribute of a given enterprise, i.e. its ability to create something new or significantly improved, and when this ability can be measured and evaluated (Hilami, Ramayah et. al., 2010, p. 557). The economic effects of innovation processes have to be quantified at the microeconomic level.

The term 'innovativeness of economy' is closely related to the concept of 'innovation'. Innovativeness is this characteristic of economies which means ability to create and implement innovations as well as the ability to absorb them (Niedzielski, 2005, p.74.). Innovativeness of a given economy reflexes innovativeness of particular enterprises, i.e. their capacity and motivation to create and implement new projects and ideas for products, manufacturing, improving the enterprise's organization or marketing. Innovations enter into economy through entrepreneurs who translate the results of scientists' and inventor's works into business (market) reality. Seeking innovations, enterprises co-operate with universities or develop their own research departments. As a result, an enterprise is viewed to be innovative which implement new or improved technologies, products or production processes (*Raport o innowacyjności gospodarki Polski w 2010 roku*, 2011, p. 31.).

According to *Narodowy System Innowacji*, the development of modern technologies depends on many factors such as, among others, socio-cultural factors, economic, legal and technological ones. The main area of interest for NSI is a flow of knowledge and information between particular stakeholders who are active in the field of R&D (research and development) (Bukowski, Szpor & Śniegocki, Warszawa 2012, p. 12.) The level of expenditure on research and development is considered to be a primary barometer of financial engagement of economy into innovative activity. Research and development are of major importance particularly in high technology sectors (high-tech), e.g. IT industry. Other industries are more oriented towards acquiring knowledge and technology. Industries of medium and low technologies also influence the competitiveness of the Polish economy. For example, the Danish economy is highly innovative and competitive, despite the fact that in its structure dominant are small and medium enterprises of low technology sector, focusing on local activity and implementing incremental (gradual) innovations (Gmurczyk, 2011, pp. 82-89.).

3. PROBLEMS WITH MEASURING INNOVATIVENESS OF ECONOMY

The analysis of economy's innovativeness is carried out on a number of levels such as general conditions for innovativeness (e.g. for the business climate and human capital), financial investments in innovations or the results of investment activities aimed at innovations (Gmurczyk, 2014, p. 7). In the subject literature, there are a lot of scientific and technological indicators which are used for examining the level of innovativeness. Those most frequently used include expenditure on research and development as well as the number of patents per million population. Among other indicators are the following (Frankowski & Skubiak, 2012, p. 277):

- enterprises expenditure on R&D as a percentage of GDP Enterprises expenditure on innovations as a percentage of turnover,
- contribution of small and medium enterprises in the whole SME sector,
- employment in research and development,
- balance of payment in technology,
- activity in the sectors of high technologies (investments, employment, foreign trade),
- statistics of scientific publications,
- publications in brand and technical magazines.

In general, innovation and innovation potential of economies is difficult to measure. For diagnostic purposes and international comparisons of innovativeness of economies, a whole range of indicators are used and presented in the summary tables. On their basis innovation rankings are created which allow to identify and analyze causes and effects of phenomena affecting the innovation level of given political systems.

4. SELECTED INNOVATION RANKINGS AND THE POSITION OF THE POLISH ECONOMY

4.1. Innovation Union Scoreboard ranking

Innovation Union Scoreboard is the most popular ranking in the European Union. It was developed by the European Commission and the staff of the Maastricht University to realize the Lisbon Strategy. At present, it is based on 24 four indicators. The general index consists of 8 groups of indicators which fall into three large categories: (*Innovation Union Scoreboard 2014*)

1. favorable factors (enablers) – human capital, possibility of seeking financial sources from the market or the state support for innovators, but also quality, openness and attractiveness of the national research system,
2. enterprises' activity - investments of European enterprises in innovations, co-operation with other entities and developing intellectual capital,
3. outcome, i.e. benefits from innovation for the whole economy e.g. a number of innovators, economic effects of innovation.np. According to Innovation Union Scoreboard the EU countries were divided into four groups which vary in terms of the level of innovation:
 - "Innovation Leaders" understood as countries which achieve results much above the EU average – Sweden, Germany, Denmark and Finland;
 - "Innovation followers", countries which achieved the results above the EU average (but less than 20% above the average); these are Netherlands, Luxemburg, Belgium, the UK, Austria, Ireland, France, Slovenia, Cyprus and Estonia ,
 - "Moderate innovators" – countries rated below the average of the EU -, Italy, Spain, Portugal, Czech Republic, Greece, Slovakia, Hungary, Malta, Lithuania and Poland.
 - "Modest innovators" – those whose scores proved to be much lower than the EU average; these are Lithuania, Romania and Bulgaria.

Poland belongs to the third, last but one, group of moderate innovators and it is close to the bottom line, being ranked twenty- third among 27 countries of the EU (*Innovation Union Scoreboard 2014*). Compared to the ranking from 2013, Poland advanced from the group of weak innovators and entered the group of moderate innovators. Among the transforming EU countries, the Polish economy was ranked the 6th, i.e. in the penultimate place (see Table1). Only Latvia was rated worse.

Taking into account the structure of indicators, it is worth noting that in Poland such indicators as the number of Community trade mark registrations and enterprise expenditure on innovations showed some improvements. However, such indicators as, among others, a number of doctoral students-graduates as well as co-operation of small and medium enterprises with other entities running activities in favour of innovation, have deteriorated.³

³ Poland in the last but one group of the EU countries in terms of innovation, cf. <http://www.naukawpolsce.pap.pl/aktualnosci/news,399463,polska-w-przedostatniej-grupie-panstw-w-ue-pod-wzgledem-innowacyjnosci.html> (Accessed 2015-01-03).

Table 1: Transforming countries in the EU by Innovation Union Scoreboard 2014

Country	Innovation Union Scoreboard 2014	
	performance	rate
Estonia	0,502	2
Lithuania	0,289	5
Latvia	0,221	7
Poland	0,279	6
Slovakia	0,328	4
Slovenia	0,513	1
Hungary	0,351	3

Source: the author's own study based on Innovation Union Scoreboard 2014

4.2. Knowledge Economy Index

The World Bank makes use of Knowledge Economy Index (KEI) to measure the level of growth of economy based on knowledge. This indicator is the arithmetic mean of the four sub-indexes presenting four categories of economy based on knowledge (Dworak, 2009, p. 61.):

1. economic and institutional regime (tariff and non-tariff barriers, quality of regulations , compliance with law);
2. education and human resources (the level of reading and writing skills - *literacy rate*, persons receiving education at the secondary school level and persons receiving education at the university level, compared to the general population),
3. innovation system (royalties and patent fees, patent applications granted by the United States Patent and Trademark Office - USPTO, a number of scientific articles in scientific and technical magazines,)
4. IT infrastructure (a number of phones per 1000 persons, a number of computers per 1000 persons and a number of the Internet users per 10 000).

According to Knowledge Economy Index, Poland is ranked third from the bottom in the EU and a very distant place in the world. Over the last years the Poland's position has got deteriorated which might only prove difficulties in fast and efficient implementation of knowledge and its application in the economy. Among the examined countries -members of the EU- and transforming their economies, Poland together with Slovakia are ranked the lowest (see Table 2) Taking into account the sub-indices, it would be worth noting that Poland is ranked the highest in the area of education. Worse rates in the area of IT infrastructure had a significant effect on the lower general position of Poland in the KEI ranking.

Table 2: Transforming countries in the EU by Knowledge Economy Index 2012

Country	Knowledge Economy Index 2012	
	performance	rate
Estonia	8,40	1
Lithuania	7,80	4
Latvia	7,41	6
Poland	7,41	6
Slovakia	7,64	5
Slovenia	8,01	3
Hungary	8,02	2

Source: the author's own study based on Knowledge Economy Index 2012

4.3. Global Innovation Index (INSEAD)

The Global Innovation Index 2014, in its 7th edition, is co-published by Cornell University, INSEAD, and the World Intellectual Property Organization (an agency of the United Nations). The ranking takes into account 143 countries from all over the world and is created on the basis of 81 criteria such as innovation potential, the ease to gain capital to develop innovative projects or the quality of education.

In 2014 the main subject of the 7th edition of the report is *The Human Factor in Innovation* (The Global Innovation Index, 2014, p. 6).

The main indices (pillars) used in the ranking are as follows: institutions (political, regulatory, business environment), human and research capital,(education, higher education, research and development) infrastructure (ICT, energy, infrastructure), market sophistication, (credits, investments, trade and competition) and business sophistication (research workers, innovative clusters, knowledge absorption). Sub-pillars include knowledge outputs (knowledge creation, knowledge impact, knowledge dissemination) and creative outputs (creative processes as well as goods and services).

In the general ranking of Global Innovation Index (INSEAD), the Polish economy is placed in the 45th position, while among the EU countries which are transforming their economies, it is placed in the last 7th position (see Table 3). However, some attention should be given to quite varied sub-indices. A high rating was given to Poland for Political environment (political stability). Slightly worse in this group of indices was scored Business environment and Regulatory environment. Also Human capital & research category puts Poland in a more favourable position due to the high rates for education and R& D. Of all the areas considered in the ranking, Market sophistication was ranked the lowest, mainly because of less attractive investment conditions and not very good credit facilities. Equally poor rates were also given to Business sophistication. Low ranks for Business sophistication were affected by low ranks for Innovation linkages. The low 103rd position reflects difficulties in developing co-operation between science and industry or in the development of clusters. The three remaining categories of the ranking- Infrastructure, Knowledge & technology outputs, Creative outputs were ranked at the comparable levels (positions 49,53 and 51 relatively) (The Global Innovation Index, 2014, p. 243).

Table 3: Transforming countries in the EU by Global Innovation Index INSEAD 2014

Country	Global Innovation Index INSEAD 2014	
	performance	rate
Estonia	0,84	1
Lithuania	0,73	6
Latvia	0,77	3
Poland	0,69	7
Slovakia	0,75	5
Slovenia	0,81	2
Hungary	0,76	4

Source: the author's own study based on *Global Innovation Index INSEAD 2014*

4.4. Global Creativity Index

Another discussed ranking has been created since 2004 by Martin Prosperity Institute, and its idea is to monitor and to observe the development of creative economy of dozens (82) of world countries.

The methodological core of the Global Creativity Index was based on the concept of 3T: "technology, talent, tolerance", whose main assumption is to treat human creativity as the main source of the social and economic development. The main result in the GCI ranking consists of three variables, which at the same time are used for building three indexes:

1. technology index,
2. talent index,
3. tolerance index.

On the general list of the Global Creativity Index, Poland is currently ranked 41st, and among countries transforming their economies- along with Slovakia - it takes the last sixth place (see. Table 4). Similarly, as in the case of GCI INSEAD, more specifically, Poland's performance in different sectors varies significantly. There are areas where Poland is ranked relatively high. It refers, among others, to the talent, education and human capital indexes. In general, the result is lowered by a relatively poor rate of so called The Creative Class (32,2%).

Within the study of factors connected with technology, Poland's biggest strength appears to be scientific staff, and the weakest – the performance in the area of investment on research and

development as well as the number of registered patents, which considerably affected the overall assessment of Poland in Global Creativity Index (Creativeindustries 2011).

According to GCI, the weakest results for Poland are observed in terms of tolerance which is mainly due to the low level of openness to religious and ethnic minorities as well as nearly low acceptance of sexual minorities.

Table 3: Transforming countries in the EU by Global Creativity Index 2011

Country	Global Creativity Index 2011	
	performance	rate
Estonia	0,528	3
Lithuania	0,484	5
Latvia	0,520	4
Poland	0,476	6
Slovakia	0,476	6
Slovenia	0,638	1
Hungary	0,606	2

Source: the author's own study based on *Global Creativity Index 2011*

5. CONCLUSIONS AND RECOMMENDATIONS

To conclude, one should note that one of the main reasons for Poland's low position (rank) in the examined innovation rankings is a modest share of expenditure on research and development in terms of GDP. According to the latest Eurostat data, in recent years these expenditure in Poland have risen and in 2013 they reached 0,87% of GDP compared to 0,56% of DGP in 2004. However, they are still below the EU average, which was 2,02% of GDP (compared to 1,76% in 2004). Nominally, in 2013 Poland's expenditure on R&D amounted to €3.436 m compared to €139m in 2004. In the whole EU it was 273.464m in 2013 compared to €194.341m in 2004.

The structure of expenditure on R&D follows closely the innovative rankings for particular countries. For example, the highest level of expenditure among the EU countries was recorded in Finland -3,32% and Sweden - 3,21%, while the lowest one was in Romania - 0,60% and Cyprus - 0,48% (Eurostat 2013).

As the discussed above rankings show, not only expenditure on research and development determine whether a given country is successful in the area of innovation or not. Countries with comparable expenditure are frequently assessed differently in the rankings. It is worth noting that innovation of economies of particular countries is heavily, impacted by such factors as conditions of running business activity, a system of education, trust, co-operation between business and science as well as active involvement of private companies in innovative activity. The first indicator – the conditions for running business in Poland is ranked rather high. However, it is recommended small entrepreneurs have more flexibility and facilities while starting their businesses and seeking to realize innovation investments, which is always burdened with some risk. As for the system of education, from the quantitative point of view, it does not raise more serious objections. Yet, some dilemmas arises whether the system develops and promotes critical thinking, creativity, brevity, leadership skills, etc. to a sufficient extent. At present, education for children and young people in Poland is rather connected with linear thinking and memorizing. Meanwhile, following the words by K. Robinson *'We are not able to foresee what the world is going to look like (...) even in 20 years. We don't know which skills will be valued, what will be worth studying, but we certainly know what is going to matter is innovation, creativity, flexibility of thinking, and this is what artistic education develops'*(Robinson, 2013.).

On the basis of the analysis of selected rankings it can be concluded that the Polish economy does not fully exploit its innovative potential and loses many options due to the modest social capital.

Particularly low were ranked the issues related to the level of trust of citizens, which is reflected in low rates given in such areas as: co-operation of small and medium enterprises with other entities, innovative business connections, co-operation between science and industry enterprises or in clusters, issues of tolerance, the low level of openness to minorities. The evolution of social standards, overcoming stereotypes and internal prejudices is increasingly becoming even more challenging than

infrastructure or regulatory and administrative issues. The improvement of innovativeness of the Polish economy will depend not only on recapitalization of the research and development sector but also on the change of the Polish mentality, which might prove a more difficult task.

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