

## FORESIGHT AS AN INNOVATION SHAPING INSTRUMENT

Marcin OLKIEWICZ

Koszalin University of Technology, Department of Management, Poland; marcin.olkiewicz@tu.koszalin.pl,  
ORCID: 0000-0001-6181-6829

**Abstract:** This article seeks to present possibilities for the development of a country with the use of modern research tools. The aim of this paper is to demonstrate the importance of foresight in guiding innovation, which fosters entrepreneurship as well as improves the quality of life of the society. Therefore, the study put forward the hypothesis that the use of foresight as an instrument creating strategic knowledge allows for a more effective identification of significant areas as potentials for the security of the country's development. The analysis presented in this article contains data from the last eight years. The results of the studies show that in Poland there is a significant potential, which, if managed appropriately, might influence the development of enterprises, municipalities and the macro-region.

**Keywords:** innovation, foresight, process, development.

### 1. Introduction

Ensure the development of a region is one of the major elements for both shaping the economy of the country as well as for entrepreneurship and the quality of life of the society. The development of the requirements, stakeholders' expectations, market presumptions and technology as well as the globalisation urge the researchers to conduct research "on the future". Particularly the authorities as well as entrepreneurs find it quite difficult to "build the future" due to the fact that in most cases it relies solely on forecasting, which is based on quantitative data. This indicates that poorly defined methodology of strategic research can result in not always accurately prepared decisions, strategies, directions of actions, for example, by not using the expert knowledge. Therefore, traditional management does not provide sufficient knowledge and the possibility to create knowledge necessary to ensure the security of development (sustainable development) in such a turbulent environment.

In this paper, an attempt was made to introduce certain aspects of strategic development of the region based on the review of the national and foreign literature as a research method. Particular attention was paid to the aspects of project tools, such as foresight, as an element that

determines the construction of long-term forecasts and scenarios, i.e. the innovative potential of the country (region of Europe). Therefore, the aim of this article is to indicate the significance of foresight in guiding innovation, which is important for the widely understood development.

## 2. The importance of strategic studies in creating the future

The appropriate development policy with such dynamic civilisational, political and legal changes require corresponding knowledge of strategic management. This is particularly evident when the focus is on the “activities that diagnose the subject and its environment, which makes it possible to generate and create an image of the future with a set of research tools that enable the analysis, evaluation and anticipation of future states of the chosen elements, areas, directions and the environment from the point of view of the development” (Gierszewska, and Romanowska, 2014) An example of the research structure of the environment is presented in Table 1. These areas of the environment are determined by different factors which, to a greater or lesser extent, determine the stability or development of the national economy. In strategic terms, developmental constraints can have very large negative effects although it is believed that this creates an opportunity to introduce new solutions and changes.

**Table 1.**

*Structure of the environment*

| Area of the environment                         | Sphere (nature) of the environment     | Factors characteristic to a specific sphere               |
|---|--|---|
| <b>Macro-environment</b>                        | <i>Demographic environment</i>         | Number and structure of the population                    |
|   |  | Birthrate   |
|   |  | Education   |
|   |  | Household model   |
|   | <i>Economic environment</i>            | Economic situation  |
|   |  | Inflation   |
|   |  | Exchange rates  |
|   |  | Incomes   |
|   |  | Availability of and interest rates on loans               |
|   | <i>Natural environment</i>             | Reserves of resources                                     |
|   |  | Environment pollution                                     |
|   |  | Source and cost of energy                                 |
|   | <i>Technological environment</i>       | New scientific discoveries                                |
|   |  | Implementation of new technologies                        |
|   |  | Expenditure on research and development                   |
|   | <i>Political and legal environment</i> | Government policy   |
|   |  | Legislation governing the activities of business entities |
|   |  | Tax and customs regulations                               |
|   |  | National and international economic groups                |
|   | <i>Socio-cultural environment</i>      | Population spending models                                |
| Value systems                                   |  |   |
| Standards of conduct                            |  |   |
| Subculture                                      |  |   |
| Perceiving oneself and the world through people |  |   |

cont. table 1.

|                          |                             |   |
|--------------------------|-----------------------------|---|
| <b>Micro-environment</b> | <i>Business environment</i> | Increasing competitiveness                            |
|                          |                             | Improvement of quality                                |
|                          |                             | Relations with market shareholders                    |
|                          |                             | Relationships with presumptions                       |
|                          |                             | Increase in added value                               |
|                          |                             | Development of organisational and regional potentials |

Adapted from: "Strategic analysis in the area of security" by Daniluk, P. 2014. M.R. Štefánik, and L. Mikulas (Eds.), *National and international security, 5th International Scientific Conference*. Slovaca: Pub. Akadémiaozbrojenýchsíl.

It is worth noting that having proper management qualifications does not always make it possible to conduct comprehensive, multi-level environmental studies that enable the creation of different visions of the future. Literature on the subject indicates that it is also essential to have appropriate skills, competencies, individual characteristics, luck and premonition (Hitt, Ireland, and Hoskisson, 2008; Olkiewicz, 2015).

A country which is managed in a modern way must treat management as an ongoing learning process aimed at making accurate and effective decisions to solve problems, create competitiveness, guarantee safety and development within the framework of the implemented changes. This is the result of changing the rules of the new economy determined by the following factors (Skrzypek, 2013):

- power of decentralisation – development of competitive advantage in decentralised areas by the centres of power,
- increase in profits – role of developing interpersonal interactions,
- universality and not rarity – mass development of copies or substitutes,
- not everything will be free – increase in the value of rare factors, i.e. people,
- first nourish the network – appropriate establishment of businesses with consumers and suppliers, as their insufficient number results in the liquidation of companies,
- space instead of place – development of globalisation along with the development of distribution,
- no harmony, everything is fluid – flexibility of actions through the promotion of the so-called innovation,
- technology of relationship – dominance of the intangible sphere over the material one, where the most valuable technologies are those that expand, strengthen, improve and develop all kinds of immaterial relationships,
- opportunity is more important than performance – generation of opportunities for new possibilities over innovation inefficiencies.

The conclusion is that the new economy based on the use of knowledge, interpersonal interactions and adaptation to the needs of the future (Radlińska, and Lisowska, 2008) forces managers to improve intellectual potential and skills, experiences and the ability to make right decisions, sometimes with the help of experts or consultants.

Therefore, foresight is the most appropriate research tool, which supports the decision-making process related to a change and which is part of the identification of development opportunities, the creation of a vision of the future, directions and priorities of actions within the new economy.

National and international literature on the subject does not precisely define the term “foresight”. The lack of an unambiguous equivalent in the Polish language allows for a variety of interpretations. The Ministry of Science and Higher Education, for example, defines foresight as “the process of creating a culture of thinking within a society concerning the future where scientists and representatives of businesses and public administration participate in defining strategic directions for research and technological development to bring maximum social and economic benefits” (nauka.gov).

The procedural approach is most frequently indicated by other authors (Borodako, 2011; Safin, 2010), although foresight is also interpreted as a prediction (Woźniak, 2009; PARP, 2012) of the future.

Foresight, as a study of the future, makes it possible to actively create the image of the future as it indicates investment priorities that create the economic and socio-economic development, defines changes in the outlook of science as far as innovation is concerned, promotes science and research cooperation as well as encourages various socio-economic and governmental environments to actively participate in initiating and generating common development scenarios. In other words, foresight “creates the language of social debate and the culture of building the social vision of thinking about the future” (Kuciński, 2010).

The existence of various factors identifying the “foresight phenomenon” means that this forward-looking research tool is most often considered in terms of the process. In the literature, the foresight process is characterized by “5Cs”, meaning (Wójcicki, and Ładyżyński, 2008):

- communication-a platform for the exchange of views between market shareholders,
- concentration on the distant future-visionary thinking systematized in a procedural way,
- coordination-established cooperation plans, actions, development of science and technology,
- consensus-an agreement concerning the vision, priorities of research and development of technology,
- cooperation-the development of cooperation in the scope of the implementation of the results in the economy.

It aims at creating a kind of philosophy of the “culture of cooperation” needed in the generation and acceptance of joint development activities in different areas.

In other words, foresight has become a tool which can be used to make an evaluation of both external and internal environment, generating the necessary knowledge (Piecuch, and Hewelt, 2013; Piecuch, and Piecuch, 2011), allowing for full integration, participation and commitment of market shareholders, creating a vision, strategy, development directions and

development activities in specific areas, with the use of appropriate quantitative and qualitative methods (Georghiou et al., 2008; Popper, 2008) (Table 2).

**Table 2.**  
*Foresight research instruments*

| Qualitative  | Quantitative  | Semi-quantitative   |
|--|---|---|
| Methods providing meaning to events and perceptions. Such interpretations tend to be based on subjectivity or creativity, which are often difficult to be corroborated (e.g. brainstorming, interviews)  | Methods measuring variables and applying statistical analyses, using or generating (hopefully) reliable and valid data (e.g. economic indicators)   | Methods which apply mathematical principles to quantify subjectivity, rational judgements and viewpoints of experts and commentators (i.e. weighting opinions)  |
| <ol style="list-style-type: none"> <li>1. Backcasting</li> <li>2. Brainstorming</li> <li>3. Panels of citizens</li> <li>4. Conferences/workshops</li> <li>5. Essays/Scenario writing</li> <li>6. Expert panels</li> <li>7. Genius forecasting</li> <li>8. Interviews</li> <li>9. Literature review</li> <li>10. Morphological analysis</li> <li>11. Relevance trees/logic charts</li> <li>12. Role playing/Acting</li> <li>13. Scanning</li> <li>14. Scenario/Scenario workshops</li> <li>15. Science fiction (SF)</li> <li>16. Simulation gaming</li> <li>17. Surveys</li> <li>18. SWOT analysis</li> <li>19. Weak signals/Wildcards</li> </ol> | <ol style="list-style-type: none"> <li>1. Benchmarking</li> <li>2. Bibliometrics</li> <li>3. Indicators/time series analysis</li> <li>4. Modelling</li> <li>5. Patent analysis</li> <li>6. Trend extrapolation/impact analysis</li> </ol> | <ol style="list-style-type: none"> <li>1. Cross-impact/structural analysis</li> <li>2. Delphi</li> <li>3. Key/Critical technologies</li> <li>4. Multi-criteria analysis</li> <li>5. Polling/Voting</li> <li>6. Quantitative scenarios/SMIC</li> <li>7. Road mapping</li> <li>8. Stakeholder analysis</li> </ol> |

Adapted from: "How are foresight methods selected?" by R. Popper. 2008. *Foresight*: 10(6).

One of such areas is innovativeness. In the foregoing considerations, it is assumed that the type of foresight research oriented towards innovative activities is based on multidimensionality by using: existing trends, market and market shareholder requirements (including legislation), knowledge, experience, qualifications and intuition of entrepreneurs (managers, policy makers, politicians, local governments etc.).

This means any changes that provide benefits to the country are dependent on the size, intensity, efficiency and effectiveness of the implemented investments, specifically – innovation.

### 3. The main feature of innovation in the development

The active participation of stakeholders and market prosumers in shaping and building the image of the future of the country indicates the potential directions for the development of

particular areas of the socio-economic life. According to *The Global Competitiveness Report*, Poland is a country with a high development potential, as presented in Table 3. The data indicate that in various periods Poland was among the group of countries with significant potential. In 2012-2014, Poland underwent significant reforms, which often resulted from the need to adapt to the requirements and expectations of the European Community (European Union). The changes were, to a large extent, aimed at adjusting individual economic and legal areas related to the EU development strategy and, above all, the possibilities of obtaining and spending funds from *the EU Common Budget and Development Agencies*.

**Table 3.**

*Polish development potential*

| Years | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 |
|-------|-----------|-----------|-----------|-----------|-----------|
| Rank  | 41/144    | 42/148    | 43/144    | 41/140    | 36/188    |

Adapted from: "The Global Competitiveness Report, 2018". World Economic Forum.

Visible changes in the ranking, covering the period 2014-2017, are the result of Poland being the largest recipient of the EU funds, i.e. in the 2000-2006 financial perspective – EUR 14 billion, in the 2007-2013 financial perspective – EUR 67.5 billion and in the 2014-2020 financial perspective – EUR85.5 billion.

The joint identification of key determinants of competitiveness, development of Poland and creation of plans and operational strategies, while taking into account the mega trends, will allow the society, governmental authorities and entrepreneurs to justify their decisions and to use the created development possibilities. Those actions or directions of change that result in innovation are particularly important.

The identification of the areas is a challenge for every governmental organisational unit; therefore, operators more and more often use tools such as foresight. The literature indicates that this tool has a broad scope of application because it is a process in which the values measured using various measuring scales result from the development of entities, facilities, phenomena and the maximisation of relationships and interactions with stakeholders, achieved through the pro-development and pro-quality aims and generated in the framework of expert group activities (Olkiewicz, 2017).

The extensive analysis of the economic and the social-environmental phenomena made it possible to adopt the following areas that influence the development from the point of view of a country (every national economy in the world): institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training efficiency, financial market development, technological readiness, market size, business sophistication and innovation (WEF, 2018).

Those actions or directions of change that result in innovation are particularly important.

Innovations include:

- the implementation of a new or significantly improved product (service) or a process, a new marketing method or a new organisational method in economic practice, workplace organisation or relations with the environment (Oslo Manual, 2005),
- any innovation implemented by organisations, i.e., new products or services, improved existing goods or services that lead to new added value of the market. Innovations can include the final product, the marketing operation as well as production and management processes, and other processes that shape the internal and external environments of the organisation (Dąbrowska, 2011),
- something new (Kmak, 2010),
- changes in activities that should improve the financial performance (Osładacz, 2012).

As pointed out by the quoted definitions, innovation is a change or changes aimed at the modernisation of manufacturing processes and the generation of new goods or services. Any modification implemented in terms of the functioning of an organisation will increase the competitiveness of the entity and promote both the location and the product, which may become a "local product or service". In addition, the increased activity of enterprises in innovation drives the development of a given economy and contributes to the growth of income of local governmental units and the GDP. In other words, any pro-innovation activities implemented in commercial enterprises indirectly affect the development of the region. It should be noted that territorial governmental units, through innovative actions, also increase the development potential of the region not only by improving the quality of life but also by creating a "favourable environment" and conditions for the development through innovations.

The literature indicates that innovations are generally classified into:

- the type of an activity: industries and services (Filipiak, and Panasiuk 2008, p. 232),
- the scale of changes: breakthroughs, significant and minor improvements (Tidd, Bessant, and Pavitt, 2005),
- the area of influence: product, process (Olkiewicz, 2017),
- the subject of a change: product, process, strategy (Pomykalski, 2001; Shilling, 2005; Tucker, 2002),
- the scope of a change: product, process, organisation, marketing (Bober, Olkiewicz, and Wolniak, 2017).

From the point of view of this case study, the following division of innovation can be assumed (Pander, 2012; Oslo Manual, 2005):

- product – implementation of new products/ services or improvement of the existing goods/services,
- process – implementation or improvement of production, supply or service processes,
- technology – implementation of experimental or innovative technological solutions,

- organisation – implementation, introduction or improvement of work organisation methods, quality of management, work and/or communication,
- marketing – implementation of branding changes, changes in the organisation image, product or service, and customer relationships (Olkiewicz, 2016),
- ecology – introduction of actions which affect the protection improvement and the state of the environment (Piecuch, and Piecuch, 2011, pp. 711-722; Olkiewicz, Bober, and Majchrzak-Lepczyk 2015, pp. 710-725).

The development of the country and, in particular, of individual regions, which allows a competitive advantage, most often depends on the innovative activity of local businesses, as well as infrastructure, governmental policy and knowledge.

#### **4. Innovation potential analysis**

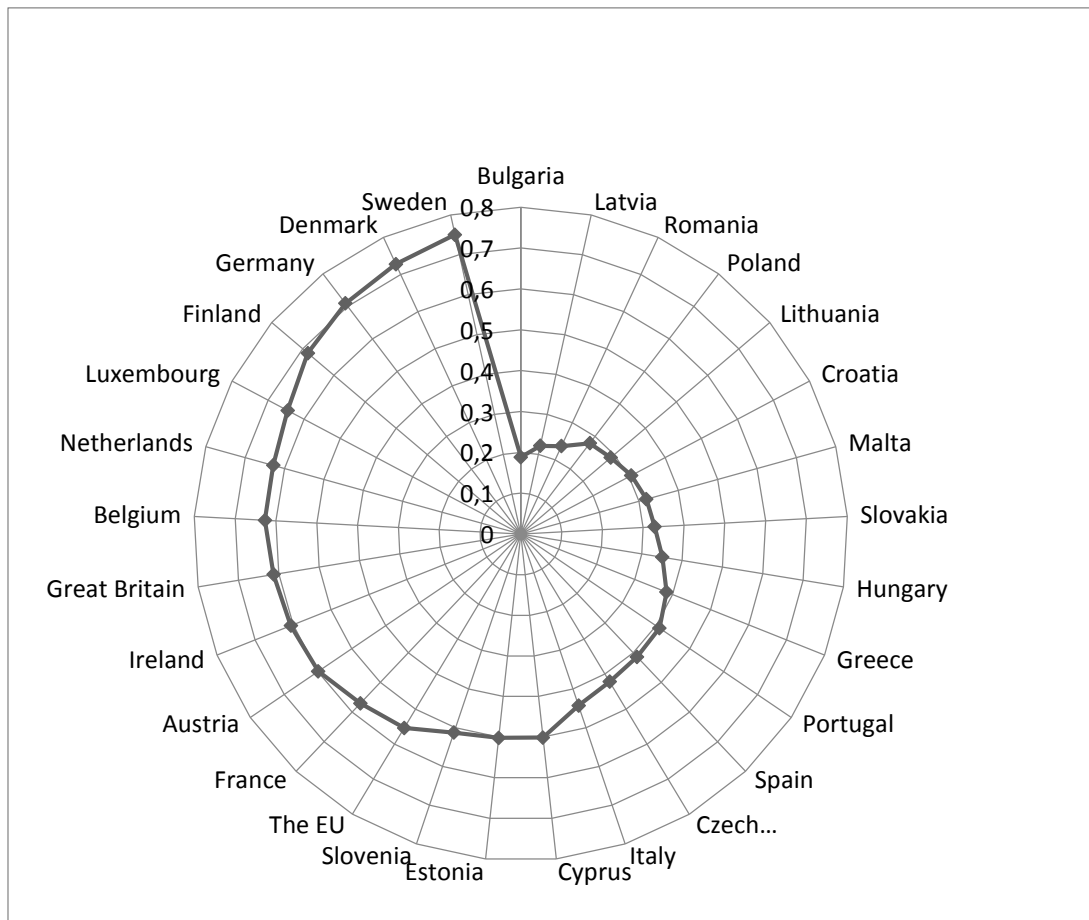
The importance of innovation in the development of specific regions of the country became particularly important after the accession of Poland to the European Union (as mentioned previously), as it indicated a great diversity of innovative potential in relation to the new member countries. The existing differences in investment potential were to be compensated or at least limited by the received financial means (grants), which, under various projects, were to stimulate pro-innovation activities.

Since 2003, foresight activities have been implemented in Poland: at the international level (4 projects), at the national level (3 projects), at the regional level (11 projects) and in the scope of the industry (24 projects). The growing interest in this type of activities is also visible among commercial entities because they make it possible to create the future in which innovative and pro-quality measures will be implemented and to increase the competitiveness and economic value of a company (Safin, 2010, pp. 43-52).

The European Innovation Scoreboard (2014) indicates that Poland was ranked 25th in the European Union in terms of innovative potential (Figure 1). With an index of 0.277, Poland was included in the 4th group of countries (modest investors) based on the innovative activity of enterprises. It should, however, be noted that this indicator (innovation), increases year by year although it is still so low. The low level of the indicator results from low investment activities mostly resulting from the lack of a specific vision of the future, limited financial resources (lack of financial policy) as well as human potential (possibilities of refinement). Introducing a change in the perception of the future as a result of the foresight process will make it possible to increase both positivist, economic and intellectual activities. It should be emphasized that the improvement (significant way) of one sector (industry) stimulates others to develop, and investments made bring real socio-economic benefits. Innovation leaders



belonging to the first group are: Sweden, Denmark, Germany, Finland, Luxembourg, the Netherlands and Belgium.



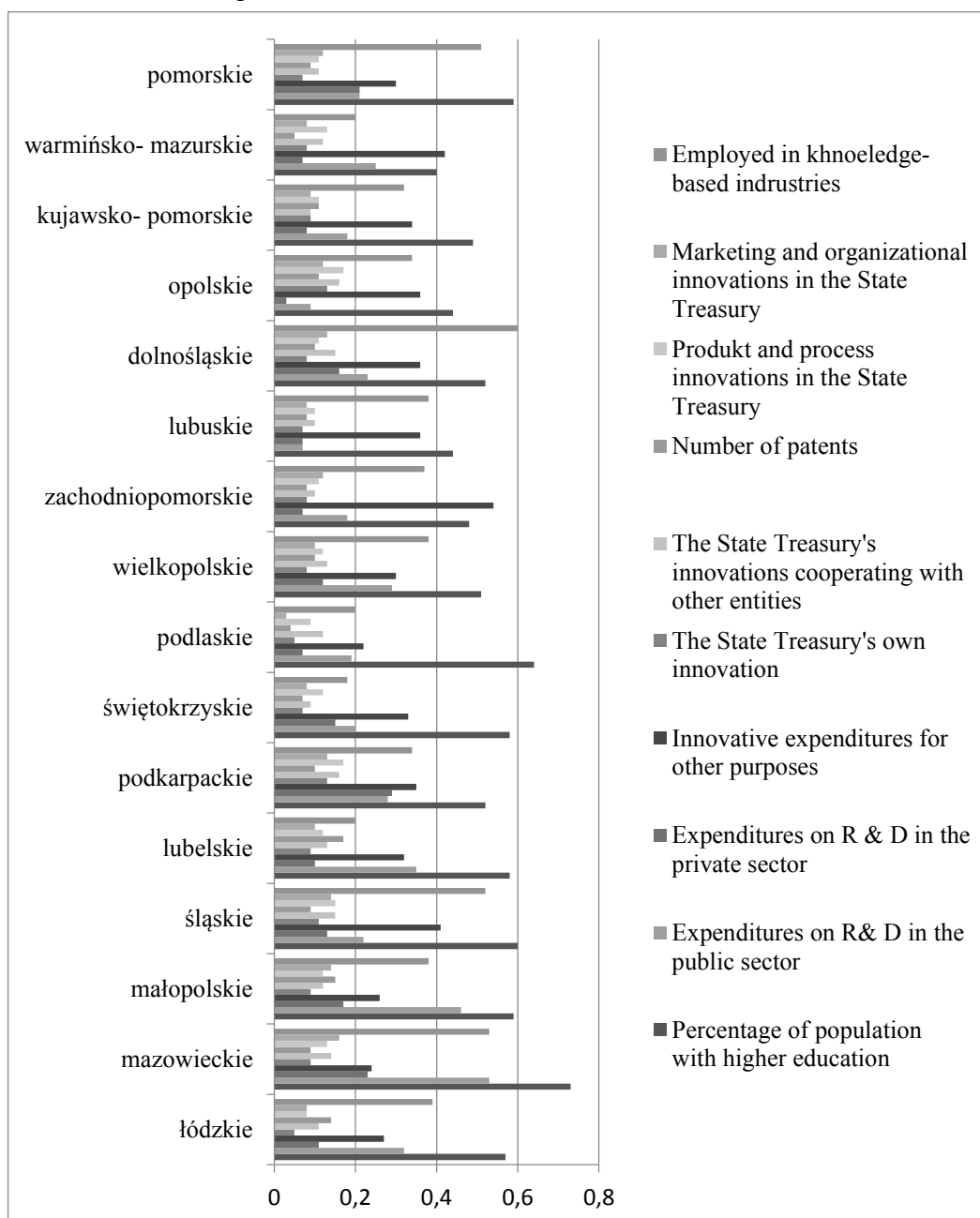
**Figure 1.** European innovation potential. Adapted from: “Innovation Union Scoreboard 2014”. [www.pi.gov.pl/PARP/chapter\\_86197asp?soid=8771DBB1291](http://www.pi.gov.pl/PARP/chapter_86197asp?soid=8771DBB1291).

The area of innovation is perceived as the sum of two key factors *Business sophistication* (50%) and *R&D Innovation* (50%). The Business sophistication assessment is performed within the following areas: local supplier quantity, local supplier quality, cluster development value, international distribution control, production process sophistication, extent of marketing, willingness to delegate authority, reliance on professional management. The *R&D Innovation* assessment is carried out in the areas of: capacity for innovation, R&D, university-industry collaboration in R&D, government procurement of advanced technology products, availability of scientists and engineers, PCT patent applications/million pop. (WEF, 2018, pp. 299-300).

Given the importance of the study, the innovation capability index (capacity for innovation), which increased in 2016-2017 (in Poland) from 60 pp to 68 pp, is the most important. However, it should be kept in mind that the innovation index depends on many factors – variables that interact with a variable degree of power, often being the basis of different areas of competitiveness, which is why the effective use of the foresight process in shaping the development of the country through "innovative economy" or "sustainable development" actions are an important element. Innovation indices in various voivodships are the proof of the

start of works in this regard, presented in Figure 2. They are not very satisfactory even though they remain optimistic.

The specificity and importance of innovation and the innovation potential have thus become an area of research for scientists and governmental institutions. When analysing the reflections on this issue, it can be stated that the innovation potential assessment indicators are gradually increasing. This means that the country innovativeness is growing, and the adopted policy of sustainable development of the country is properly managed. It is worth considering the introduction of cyclical foresight research, which could focus on the problems with the innovative potential growth in individual regions of the country along with the identification of key directions of its development.



**Figure 2.** Innovative potential by voivodships. Adapted from: "Innovation Union Scoreboard 2014". [www.pi.gov.pl/PARP/chapter\\_861\\_97.asp?soid=8771DBB1291](http://www.pi.gov.pl/PARP/chapter_861_97.asp?soid=8771DBB1291).

The specificity and importance of innovation and the innovation potential have thus become an area of research for scientists and governmental institutions. When analysing the reflections on this issue, it can be stated that the innovation potential assessment indicators are gradually increasing. This means that the country innovativeness is growing, and the adopted policy of sustainable development of the country is properly managed. It is worth considering the introduction of cyclical foresight research, which could focus on the problems with the innovative potential growth in individual regions of the country along with the identification of key directions of its development.

## 5. Summary

The process of improving the development of a country requires the introduction of new comprehensive management methods. Without changes in the social and cultural structures and without social acceptance of the planned changes, the actions taken may prove to be ineffective. Therefore, the proper strategic planning is a guarantee of the successful development, especially with the use of project tools such as foresight. This is important in the process of creating long-term forecasts and scenarios for the identification and use of the country innovation potential. Innovative potential is one of the most important determinants of regional development, which guarantees, inter alia, an increase in entrepreneurship, GDP and the quality of life of the society. It is worth emphasizing that the Polish innovation potential is constantly growing, which has a direct impact on the ongoing economic and socio-environmental changes.

The implementation of significant innovations in the country, constituting an element of creating the regional development, depends on the state policy, the vision of the future defined by the local governmental institutions and the innovative activity of local business entities.

An ideal solution supporting the sustainable management of the country would be to conduct a foresight study, which would set out a vision of the future as part of an active community involvement. The needs might probably be verified, and the developmental directions of the country would also be modified or updated, for example, through the identification of the technological development of a given area (determined by a given region), priority industries and megatrends.

This means that the adopted hypothesis: *the use of foresight as an instrument creating strategic knowledge, allows for a more effective indication of significant areas as the security potential of the country development* is confirmed, which also enables us to state that the goal of the study has been achieved.

## References

1. Bendy, E.K. (2013). *Foresight. Art and technology of future management*. Gdansk: The Gdansk Institute for Market Economics.
2. Borodako, K. (2011). *Foresight in tourism. Barriers of use and development*. Warsaw: C.H. Beck.
3. Dąbrowska, M. (2011). *Innovations in the service sector*. Warsaw: PARP.
4. Daniluk, P. (2014). Strategic analysis in the area of security. In M.R. Štefáňik, and L. Mikulas (Eds.), *National and international security, 5th International Scientific Conference*. Slovakia: Akadémia Ozbrojených Síl.
5. Filipiak, B., and Panasiuk, A. (2008). *Service provider*. Warsaw: PWN.
6. Georghiou, L., Cassingea Harper, J., Keenan, M., Miles, I., and Popper R. (2008). *The Handbook of Technology Foresight. Concepts and Practice. Prime Series on Research and Innovation Policy*. Northampton: Edward Elgar Publishing. Inc.
7. Gierszewska, G., and Romanowska, M. (2014). *Strategic analysis of a company*. Warsaw: PWE.
8. Hitt, M., Ireland, R., and Hoskisson, R. (2008). *Strategic Management. Concepts. Competitiveness and Globalization*. Mason, USA: South-Western Cengage Learning.
9. Innovation Union Scoreboard 2014. [http://www.pi.gov.pl/PARP/chapter\\_86197.asp?soid=8771DBB1291](http://www.pi.gov.pl/PARP/chapter_86197.asp?soid=8771DBB1291), access date 12.07.2016.
10. Kmak, M. (2010). Regional policy and innovations in the socio-economic development of the Małopolska voivodship. In D. Mikucka-Wójtowicz (Eds.), *Past - Present - Future. Research problems of young political scientists*. Krakow: Libron-Filip Lohner.
11. Kuciński, J. (2010). *Manual of the foresight methodology for experts of the regional Foresight project for universities in Warsaw and Mazovia, "Akademickie Mazowsze 2030"*. Warsaw: Warsaw University of Technology.
12. Olkiewicz, M (2017). *Model creation of quality in organizations within quality foresight*. Koszalin: Koszalin University of Technology.
13. Olkiewicz, M. (2015). The competencies of a manager as a determinant of the organisation's development. *Economics and Organisation of Enterprises*, 7(786), 63-72.
14. Olkiewicz, M., Bober, B., and Majchrzak-Lepczyk, J. (2015). Instruments of environmental protection management. *Annual Set the Environmental Protection*, 17, 710-725.
15. Olkiewicz, M., Bober, B., and Wolniak, R. (2017). Innovations in the pharmaceutical industry as a determinant of the process of shaping the quality of life. *Chemical industry*, 96(11), 2199-2201. doi: 10.15199/62.2017.9.2.
16. Osiadacz, J. (2012). *Innovations in the services sector – a systematic guide and examples of good practice*. Warsaw: PARP.
17. Oslo Manual (2005). *Guidelines for Collecting and Interpreting Innovation Data. Third Edition*. Organization for Economic Cooperation and Development. Paris: Statistical Office of the European Communities.

18. Pander, W. (2012). *Demand innovation or how to create contemporary innovations*. Warsaw: PARP.
19. PARP (2012). *Report on the state of the sector small and medium business in Poland in 2010-2011*. Warsaw: PARP.
20. Piecuch, I, and Piecuch, T. (2011). Teaching about the environment - it is never too early and it is never too late. *Annual Set the Environmental Protection*, vol 13, pp. 711-722.
21. Piecuch, I., and Hewelt, G. (2013). Environmental Education – First Knowledge and Then the Habit of Environment Protection. *Annual Set the Environment Protection*, 15, 36-150.
22. Plawgo, B., Klimczak, T., Czyż, P., Boguszewski, R., and Kowalczyk, A. (2013). *Regional innovation systems in Poland – test reports*. Warsaw: PARP.
23. Pomykalski, A. (2001). *Innovation management*. Warsaw: PWN.
24. Popper, R. (2008). How are foresight methods selected? *Foresight*, 10(6), 62-69. doi: 10.1108/14636680810918559.
25. Radlińska, K., and Lisowska, A. (2008). Knowledge management as an important element of competitive struggle of enterprises. In S. Piocha (Eds.), *Institutional and market conditions for the development of small and medium enterprises in Poland*. Koszalin: Koszalin University of Technology.
26. Sacio-Szymańska, A., Fantoni, G., and Daheim, C. (2016). Foresight as a key enabler of innovation in the economy. Introduction to the topical collection. *European Journal of Futures Research*, 4, 20. doi: 10.1007/s40309-015-0074-9.
27. Safin, K. (2010). *Foresight as a method of shaping the future, publication as part of the project “Identification of the potential and resources of Lower Silesia in the area of science and technology to improve the quality of life and to determine future directions of development”*. Wrocław: University of Economics in Wrocław.
28. Shilling, M. (2005). *Strategic Management of Technological Innovation*. New York: McGraw-Hill.
29. Skrzypek, A. (2013). Paradigm of a knowledge-based society in the conditions of the new economy. *Scientific Papers, UP-H in Siedlce Series: Administration and Management*, 98, 98.
30. Tidd, J., Bessant, J., and Pavitt, K. (2005). *Managing Innovation*. New Jersey: Wiley.
31. Tucker, R. (2002). *Driving Growth Through Innovation*. San Francisco: Beret-Kohler Publisher.
32. WEF (2018). *The Global Competitiveness Report, 2018*. World Economic Forum.
33. Wójcicki, J.M., and Ładyżyński, P. (2008). *Monitoring system and scenarios for the development of medical technologies in Poland*. Warsaw: ROTMED.
34. Zadura-Lichota, P. (ed.) (2015). *Innovative entrepreneurship in Poland. The discovered and hidden potential of Polish innovation*. Warsaw: PARP.