

# Barriers to Innovation Activity. The Macro-, Mezo- and Microeconomic Approach on the Example of Poland

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## Abstract

*Innovations are gaining more and more attention in studies and research mainly due to their role in the socio-economic development of countries. However, many countries and regions face real problems in creation, diffusion and absorption of innovation. The aim of the paper is to explore the barriers and bottlenecks which may influence and limit innovative activity across the country, regions and companies. The level of innovation in an economy is the result of many factors. For this reason, the article indicates not only the economic barriers which may appear at various stages of the innovation process, but also includes the cultural, behavioral, sociological and anthropological background. As a result, the various taxonomies of barriers are presented and evaluated. Particular attention is paid to the comprehensive interactions between various actors and institutions in the innovation process. Thus, the article focuses on and highlights the regional aspect which encourages the need of cooperation between businesses and institutions in order to understand the negative determinants blocking innovation.*

**Keywords:** innovation, innovation barriers, economic and noneconomic conditions

**JEL:** O3

## Innovation as a determinant of the modern economy

Observing the diversity and number of factors that make up the economic reality of the modern, knowledge-based economy—it is not difficult to notice that the present rate of socio-economic development is being enhanced and at the same time, it forces enterprises, individual industries or regions to undertake innovations. Factors of a legal, economic, social, cultural and political nature define and determine the level of innovativeness of the economy. The ability to absorb innovations, as well as the ability to independently invent and implement innovations was previously basic and fundamental criterion for building and maintaining the competitive advantage of an enterprise on the international market.

At present, however, due to the increasing degree and speed of technological development and wide access to information, the success of a particular enterprise is increasingly dependent on the skills and the effectiveness of cooperation with other participants in the innovation process, with a special ability to use and absorb the knowledge generated by them. And although the main creators of innovation are still enterprises, an increasing number of them are created in connection with many market players. For this reason, the concept of innovation goes beyond the scope of micro-

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economics itself, entering the economics of regions and even the entire economy, in which entities create regional and then national innovation strategies. Innovation of the region itself is determined by processes and phenomena of a geographical, economic and spatial nature. It is derived, among other things, from the innovation of business entities, the research and development sector, and human capital (Nowakowska 2009, 11–12).

Particular emphasis is placed on the inclusion of innovation within a certain innovation system, which by focusing on cooperation with institutions and organizations involved in creating and supplying knowledge, becomes a challenge for every national economy. It is mainly about universities, research and development institutes, technology parks, technology transfer centers, clusters, etc. However, it should be noted that not every innovation arises as a result of research and development carried out with other entities. It is often the result of systematic activity of the company—in particular, it concerns the incremental innovations that improve already existing processes and products. Similarly—due to the diffusion process—part of an innovation can be implemented and developed by the company based on external solutions, including those coming from abroad (Bukowski, Szpor, and Śniegocki 2012, 7).

McAdam, Reid, Harris and Mitchell have noticed that innovative companies are a precondition for the dynamic and competitive economy (Nassar and Faloye 2015, 197). According to them, the importance of innovation grows as a result of increasing global competitiveness, shortened product life cycle, increasing technological capabilities of enterprises as well as rapidly changing consumer needs. For this reason, innovation is not only seen from the micro-, but also the meso- and macro-economic level (Jasińska-Biliczak and Sitkowska 2014, 58). Referring to the global approach in the interpretation of the concept of innovation, it is important to consider the barriers to innovative activity. Analyzing this issue, it turns out that this phenomenon is not previously unknown. However, the more dynamic business activity, connected with the need to function in new and rapidly changing economic conditions, growing and aggressive competition, as well as expanding the scope of conceptual innovation, strengthens and exposes a wide range of emerging barriers.

## 1 Level of innovation of the Polish economy

Although the 21st century is called the “century of innovation” (Fryca-Knop 2015), there is still a huge gap between individual countries in the area of creation and transfer of modern technologies and innovations. When analyzing international innovation reports on Poland, it can be stated that we are still in remote places and our possibilities are still limited. The low level of innovative and technological development of the Polish economy is discussed by Firlej and Firlej (2015, 204), who stated that in order to ensure the achievement of economic and social cohesion, a competitive economy based on knowledge and cooperation of enterprises, administration and science should be created.

The assessment of the innovativeness of the Polish economy can be made by analyzing the detailed results of the report “The Global Innovation Index 2017. Innovation Feeding the World,”<sup>1</sup> which is the result of cooperation between Cornell University, INSEAD and the World Intellectual Property Organization (WIPO). The global innovation index provides detailed data on the innovativeness of 127 countries and economies around the world. It is based on the analysis of 81 indicators. In this ranking Poland in 2017 took the 38th position (39th position in 2016). The next report on a European scale prepared by the European Commission is the “European Innovation Scoreboard 2017.”<sup>2</sup> In the year 2017 this report was methodologically changed, which resulted in preparing four main types of indicators and ten dimensions of innovation, which together translate into 27 different indicators. Based on the total innovation indicator, the member states were divided into four groups: innovation leaders, strong innovators, moderate innovators and modest innovators.

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1. See: The Global Innovation Index 2017. Innovation Feeding the World. 10th Edition. Report by Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent, Cornell University, INSEAD, and the World Intellectual Property Organization, 2017, [a:] [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_gii\\_2017.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf).

2. See: European Innovation Scoreboard 2017. Report by Hugo Hollanders and Nordine Es-Sadki, European Union, 2017, [a:] <http://ec.europa.eu/DocsRoom/documents/24829>.

Poland was still ranked among moderate innovators and by taking the 25th place out of the 28 EU countries, it fell by two positions compared to the ranking from 2016.

The European Commission, as in previous years, published in 2017 the “Regional Innovation Scoreboard.”<sup>3</sup> It contains data from 220 regions from 22 countries of the European Union, as well as from Norway, Serbia and Switzerland (smaller EU countries like Cyprus, Estonia, Latvia, Lithuania, Luxembourg and Malta are included as one country). Analyzing the report, we have the opportunity to compare the level of innovation on a regional scale. In comparison to the European Innovation Scoreboard, the regional one is less detailed and focuses more on the sector of small and medium-sized enterprises. Regions are classified within four groups: innovation leaders, strong innovators, moderate innovators and modest innovators. Poland on the European level was classified in the group of countries with a moderate degree of innovation, with seven voivodships being classified as moderate innovators, and nine as modest innovators. Among the national reports, reference can be made to the “Millennium Index—Innovation potential of regions,”<sup>4</sup> which indicates the “inequalities and challenges in the development potential of different regions.” Voivodship innovation assessment is based on six factors: labor productivity, value added rate, R&D expenditure, post-secondary education, the number of employees in the R&D area and the number of patents. According to the report, innovative activity is spread out in Poland unevenly and concentrates in the largest urban/academic centers (Mazowieckie and Małopolskie voivodships), although the difference of the rate of development of individual voivodships become smaller over time.

Observing the still unsatisfactory results of Poland in the area of innovation, it seems essential to identify obstacles that slow and hamper the innovation process or prevent innovative activities from taking place, and thus affect the development of innovation in individual regions and the Polish economy.

**Tab. 1.** Innovation Index based on Regional Innovation Scoreboard and Millennium Index

Regional Innovation Scoreboard 2017 (European Commission)				Index Millennium 2018 (Poland)		
Voivodship	Index	Rank <sup>a</sup>	Group	Voivodship	Index	Rank
Mazowieckie . . . . .	63,6	159	Moderate	Mazowieckie . . . . .	94,0	1
Małopolskie . . . . .	57,2	178	Moderate –	Małopolskie . . . . .	86,0	2
Dolnośląskie . . . . .	56,9	179	Moderate –	Pomorskie . . . . .	71,0	3
Pomorskie . . . . .	55,0	181	Moderate –	Dolnośląskie . . . . .	66,0	4
Podkarpackie . . . . .	51,8	192	Moderate –	Lubelskie . . . . .	60,0	5
Łódzkie . . . . .	50,4	197	Moderate –	Łódzkie . . . . .	59,0	6
Śląskie . . . . .	50,3	198	Moderate –	Wielkopolskie . . . . .	58,0	7
Wielkopolskie . . . . .	49,3	199	Modest +	Śląskie . . . . .	56,0	8
Lubelskie . . . . .	47,4	201	Modest +	Podkarpackie . . . . .	55,0	9
Zachodniopomorskie . .	47,0	204	Modest +	Opolskie . . . . .	47,0	10
Kujawsko-Pomorskie .	46,3	206	Modest	Kujawsko-Pomorskie .	46,0	11
Podlaskie . . . . .	45,5	207	Modest	Zachodniopomorskie .	46,0	12
Opolskie . . . . .	43,7	208	Modest	Podlaskie . . . . .	45,0	13
Lubuskie . . . . .	41,1	210	Modest	Warmińsko-Mazurskie	40,0	14
Warmińsko-Mazurskie	38,9	212	Modest	Świętokrzyskie . . . . .	39,0	15
Świętokrzyskie . . . . .	36,8	213	Modest –	Lubuskie . . . . .	36,0	16

<sup>a</sup>From 220 regions in 22 countries of EU, Norway, Serbia and Switzerland.

Data source: “Regional Innovation Scoreboard...”, op. cit. and “Indeks Millennium 2018...”, op. cit.

Note: [In the journal European practice of number notation is followed—for example, 36 333,33 (European style) = 36 333.33 (Canadian style) = 36,333.33 (US and British style).—Ed.]

3. See: Regional Innovation Scoreboard 2017. Report by Hugo Hollanders and Nordine Es-Sadki, European Union, 2017, [@:] <https://ec.europa.eu/docsroom/documents/31491/attachments/1/translations/en/renditions/native>.

4. See: Indeks Millennium 2018. Potencjał Innowacyjności Regionów. Bank Millennium, [@:] [https://www.bankmillennium.pl/documents/10184/26648072/Indeks\\_Millennium\\_2018-Potencjal\\_Innowacyjnosci\\_Regionow.pdf](https://www.bankmillennium.pl/documents/10184/26648072/Indeks_Millennium_2018-Potencjal_Innowacyjnosci_Regionow.pdf).

## 2 The essence and typology of barriers to innovation activity

The barriers apply to the whole innovation process. Recognizing it in 5 stages: (1) knowledge, (2) invention (related to the development of innovation), (3) implementation (in the enterprise, market), (4) diffusion (dissemination), and (5) adaptation—at each of these stages it is possible to identify barriers preventing the implementation of the assumed changes (fig. 1). The impact of barriers will also vary depending on the stage. For example, the financial barrier will probably have more impact at the implementation stage than at others. It is therefore important to identify inhibitors of innovations in order to be able to take action to eliminate them. The growing number of players, the growing pressure of the need to dominate the market, and the increasingly widespread effects of globalization, cause the presence of an increasing number of barriers. Literature distinguishes the hampering barriers and the deterring barriers. The first are barriers hindering the achievement of innovative activities by companies at all stages of the innovation process, and the second—the barriers that prevent companies from engaging in innovative activities.

This article aims to show the barriers appearing at the three levels of innovation: microeconomic, macroeconomic and mezo-economic, although the division does not exist strictly, as these barriers overlap and in specific cases can be classified in two and even three groups. A wide range of possible “brakes” and “locks” are microeconomic barriers. These are barriers appearing already at the enterprise level. Recognizing them and awareness of their strong impact should help the business and innovation processes affecting at the same time the competitiveness and sustainable development at the company level as well as national policies. Nowadays, innovations also increase uncertainty and market pressure. It should be emphasized that the diversity of barriers will affect different levels and types of innovation. And the more radical the innovation, the wider the range of possible barriers. The impact of individual barriers can include the “new” or “existing” used technology, or processes together with the market on which it appears: new versus existing (fig. 2).

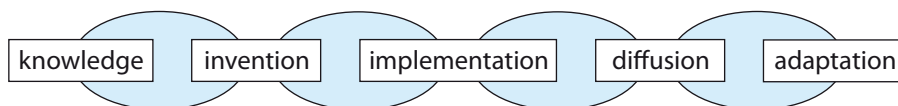


Fig. 1. Stages of the innovation process

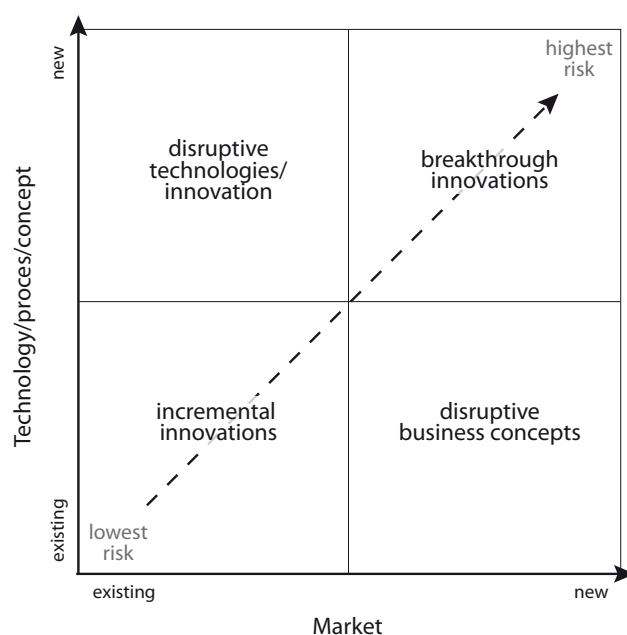


Fig. 2. Innovation application space

Source: Own elaboration based on Assink (2006)

In the literature we can find many typologies of barriers. The most common divisions include barriers related to: (1) costs, (2) knowledge, (3) market environment, (4) institutional/organizational environment, and (5) other reasons for not undertaking innovative activity. A multitude of barriers results from the essence of innovation, which is a result of a multi-step process and the end result should finish with adaptation. A deeper analysis of barriers on the enterprise level was made by Assink (2006, 217–226), who studied the destimulants of disruptive innovations in large corporations, which were systematized in 5 groups:

- Adoption barriers—they limit the ability to search for new destructive innovations. Existing successful products, projects or technologies limit the willingness to take the initiative risk and increase the risk of falling into the familiarity trap. Many companies are “prisoners” of their own successful business model. This type of barrier is often marked by excessive bureaucracy in large enterprises, which require allegiance to rules and procedures that in reality impede creativity, and consequently cause individual units to be less responsive and less prone to take risks.
- Mindset barriers—are associated with the inability to unlearn the old logic of products and markets operate both at the level of the individual and the entire organization.
- Risk barriers—concern the learning trap. Internal concentration, which often strengthens the syndrome “not invented here” is one of the traditional barriers to innovation. Most companies looking for a stable environment fall into the trap of learning—the tendency to do the same even in situations where it is no longer effective. There is also a reluctance to cannibalize their own product markets.
- Nascent barriers—related to the lack of creativity, the lack of “feeling” the market and predicting it. Large corporations do not have the motivational skills of small businesses to “nurture” or motivate innovative people who have new, creative and “breaking rules” ideas.
- Infrastructure barriers—related to the lack of necessary infrastructure.

Bright (1964) lists twelve reasons causing reluctance of industrial enterprises to implement innovations that are becoming inhibitors of innovation. These are both **financial factors** such as: (1) protection against the loss of value of capital that has been invested in an existing manufacturing apparatus and products, (2) prevention of declining income resulting from devaluation by innovations of currently required knowledge and skills, (3) avoiding the costs associated with the renewal and modification of existing processes and production apparatus, which would be necessary due to innovation and adjustment to the competition; and **personal and organizational factors**: (4) maintaining the status and privileges associated with the hierarchical position in a given structure, (5) preventing the loss of a position by a person or professional group, (6) tendency of organized groups to conformism, (7) reluctance of an individual or group to disturb the balance and climate in the enterprise, (8) “ossification” and bureaucracy being a frequent feature of large organizations, (9) personal considerations resulting from individual fears and habits; as well as **socio-cultural factors**: (10) maintaining a present lifestyle, (11) breaking the social patterns, trends, habits, behaviors related with everyday activity; and **legal factors** (12) which conflict with regulations.

Hölzl and Janger (2012) among the main barriers to innovation include: (1) financial barriers (lack of external financing), (2) skill barriers (lack of qualified staff), (3) lack of information on technology, (4) lack of knowledge of the market, and (5) lack of partners and co-operators to create innovations.

Lewandowski, Skołud and Plinta (2014) present the types of barriers at the implementation stage, which is often the last stage, ending in failure to implement changes or innovations. As a barrier they indicate: (1) barriers to vision, that is misunderstanding of strategies by employees, (2) barriers to management (no strategy review by management), (3) the human barrier (no incentive system related to strategy and innovation implementation), and (4) the resource barrier (inappropriate budget preparation in relation to the strategy).

The classification of barriers at the diffusion stage (in the case of geographic diffusion) was carried out by Gould (1969), who divided the barriers according to the effect that can be caused by them. Diffusion barriers can have three basic effects. He listed: (1) absorption barriers—the diffusion wave is stopped, and (2) reflecting barriers—the wave of diffusion is reflected. Sometimes the wave of innovation wants to hit the barrier and then bounce back from it. However, clean forms of absorbing



and reflecting barriers are rare. In most cases, we deal with permeable barriers—which allow the passage of a part of the diffusion impulse, but generally slow down the intensity of the whole process.

Gould classified barriers into: (1) physical—barriers that only a few years ago were completely absorbing (refers to mountains, deserts, swamps, oceans), but today their “permeability” is growing rapidly, and in some cases they do not exist anymore; (2) cultural—often the diffusion barrier can be much more subtle than the physical barriers that are so easily seen in the landscape; (3) linguistic barriers, which similar to physical barriers, become permeable barriers; (4) religious and political barriers that can also stop or slow down the diffusion of innovation, and (5) psychological—where the course of diffusion depends on individual decisions, barriers can accelerate or delay the course of innovation. These barriers sometimes seem to be completely absorbing or completely permeable.

Although the existing innovation processes were mainly based on undertaking innovations by enterprises, the modern knowledge base shall aim to implement the so-called open innovation model based on the cooperation of the enterprise with its environment. Creation of the innovation process no longer depends only on the economic entity, but to a greater extent on network cooperative relations, which take the form of more regional and industry-based systems (Gust-Bardon 2011, 50–51). For this reason, the barriers can be divided into: barriers related to individuals within the organization (routine, perceptual obstacles—i.e., closure of employees and managers for the need of change, various interests and needs of collaborators), barriers to organization (motivation combined with the state of technological, organizational and social uncertainty, barriers related to the environment). Looking for further reasons for Poland’s low innovativeness, they should be found in external sources (at the meso and macro levels).

Matusiak and Guliński (2010) describe four types of barriers being limitations in the innovation process. They mention: (1) structural barriers—in the science and economic sector (including low absorption of the Polish market for innovation or the imitative (arbitrary) character of Polish entrepreneurship related to poor development of regional innovation systems; (2) systemic barriers—related to an excess of regulations, legal acts and regulations adversely affecting the undertaking of research and innovation activities, (3) awareness and cultural barriers—characterized by low acceptance of pro-innovative attitudes and mutual disagreement and unwillingness to cooperate on the business-science line; and (4) competence barriers—in the area of public administration, universities, entrepreneurs etc.

In many companies, there are no departments responsible for research and development which is caused by a lack of professionals/specialists. Unfortunately, there is a lack of appropriate staff dealing with the development of innovative products, processes or the transfer of modern technology in research institutes as well as insufficient readiness and sometimes even unwillingness of universities to build cooperation with entrepreneurs or other players in the regional system. However, many authors present divergent positions stating that expectations as to the administration or universities that they will stimulate and create innovative companies are unreasonable. The company’s environment should only create appropriate conditions or provide tools, but the initiative itself should be on the entrepreneur’s side.

One of the barriers in Poland is still the imperfect Regional System of Innovation, which by definition: (1) should be a social system, and innovation is to be the result of social interaction between business entities; and (2) emphasizes not only the innovative capacity of actors, but also draws more attention to interactions between different actors while institutional factors are placed in a visible place and taken into account; an excellent innovation system can maximize the efficiency of innovation, reduce innovation costs, stimulate effective integration and use of resources needed for innovation, and make various services more comprehensive and delivered in a more timely manner.

Barriers to innovation in the region from Isaksen’s research, who identified three types of barriers to innovative activities in RIS are: organizational thinness, fragmentation and lock-in (Isaksen 2001) (tab. 2). It can therefore be concluded that, on the one hand, the excess of market players and extended competition on the markets may inhibit the development of innovation, on the other hand, the deficiency adversely affects the undertaking of innovative activity.

Also, Nowak (2015, 90) emphasizes that “innovations are created with the participation of a larger number of participants than before and at the same time require combining and diffusion

**Fig. 2.** Classification of barriers to the regional innovation system

Barriers to RIS	Main problem	A typical problem region
Organizational thinness	Lack of relevant local actors	Peripheral regions
Fragmentation	Lack of regional cooperation and mutual trust	Metropolitan regions, some regional clusters
Lock-in	Regional industry specializes in obsolete technologies	Old industrial regions and peripheral areas built on the acquisition of raw materials

Source: Isaksen (2001)

of more knowledge fields than ever before, more innovation arises under increasingly differentiated mechanisms and a more diverse environment, that at the same time may become a factor hampering the innovation activity.” Jasiński (2014, 18) relates the situation of Poland to the works and studies of De Beule and Nauwelaerts (2013), who at the country and the company level studied the different relationships between innovation and creativity. According to the researchers, the two pillars of the international economy and at the same time the driving force is innovation due to creativity in multinational enterprises. Innovative activities, in particular concerning the implementation of innovations, require large financial expenses. Native companies, with less capital involved and reluctance to investment risk, often look short-term, do not include the capital-intensive R&D works and building own intellectual background in their plans. On the other hand, there is a risk that big corporations, although they often have good research and development facilities, are the creators of many patents, have a higher level and the diversity of collected competences, often stop by lobbying the implementation of new technologies or keep new technologies in secret, to beat if necessary the competition or let the already implemented technology get the investors’ money back (Frankowski and Skubiak 2012, 128).

At the macroeconomic level, the most common are:

- financial barriers related to starting a business activity, which concern: limited possibility of obtaining funds for new projects, lack of financing of research at the national and regional level, or an unfavorable tax system;
- market barriers related to trends in the international economy, increased competitiveness and strong competition on the market within the regions and market sectors, changing business cycles with the particular risk of crises;
- organizational barriers that refer to specific segments of the economy, and in particular the R&D sector, and the lack of adequate access to information at the local level;
- institutional barriers—referring to the relationship between active market entities, institutions, local government and government administration bodies; and
- legal barriers—related to the implementation of legal acts, imprecision of economic law provisions.

However, we should not focus on excessive exposure of organizational and economic factors but take into account the broad sociological and cultural aspect from which many barriers emerge. Often these are historically and mentally rooted principles, characterized by a lack of social trust, or cooperation in a closed environment.

Although intensive studies on economic barriers in the area of innovation (Jasińska-Biliczak, Kowal, and Hafner 2016, 9) have been conducted, the area of culture and society is increasingly recognized as an area of innovation, but at the same time an emerging barrier. A lot of research work is being done in relation to the organizational culture of enterprises and their openness to innovations. But there are still few studies on the implications in the sphere of innovation resulting from the features of national culture and consumer behavior, in particular related to the demand and reaction to innovative products.

Hofstede, Hofstede and Minkov (2011, 412) assumed that taking a particular position on a scale of five dimensions of national culture constitutes a potential advantage or weakness in competing on the market. In the case of innovation, the cultural determinant is the dimension of avoiding uncertainty. Thurow (1992) continues the thesis claiming that the nation’s adoption of a culturally

defined version of capitalism: individualistic or communal defines the ability to compete globally. The issue of the efficiency of the innovation's diffusion, that creates the mechanism of growth in the endogenous model of Romer (1990), gives an advantage to communities with a collective culture in which they are more widely disseminated and diffused (Trompenaars and Hampden-Turner 2002, 77). The acceptance of innovation by the market depends on the innovativeness of customers, their openness to what is new. Innovativeness, as Gutkowska (Gutkowska 2011, 108) points out, is a feature of the human personality, which prompts the individual to accept novelties earlier, to direct his behavior towards innovations.

The diagnosis of the Polish situation was conducted by Bukowski, Rudnicki and Strycharz (2012, 13), who noticed the barriers to innovation, defining them as the “leaching” of the social sense of innovation. It is primarily an excessive tendency to technological innovation, while neglecting other areas. The second aspect that hampers the innovation is focusing on “institutionalized and formalized sources of knowledge and innovation,” while not paying attention to knowledge in the less formal form (so-called hidden knowledge) (e.g., know-how). The authors also emphasize the selection of a push strategy (supply) strategy with less preference for a pull (demand) strategy. The last element is “lack of recognition of knowledge in the field of social sciences as an important stimulator of innovation in society.”

An interesting approach to the innovation process is presented by Bal-Woźniak (2011, 99), who lists four types of innovative competencies which should be considered in the sequence of interdependencies, that is competences in the form of awareness (know), readiness (want), skills (know how) and opportunities (be able to). In the area of these competences one can look for factors (barriers) that hamper and interrupt the whole process. They can correspond to the typology of Haustein (1994), who took into account all levels on which barriers may appear. He pointed out:

- non-knowledge barriers—deficits of knowledge, insufficient effects and learning, unawareness of activities occurring within the organization and in the environment, lack of awareness of the need to take up innovation
- inability barriers—failure to react quickly in the environment and not implementing the innovative solutions, lack of capital, performance deficit, lack of technical and organizational conditions, lack of access to research and development institutes, inflexibility of employees in creativity and responsiveness
- lack of a permit barriers—legal and administrative barriers
- lack of will barriers—lack of readiness and motivation to undertake innovative activities as a result of contradictory economic interests, social and cultural preferences, ideological objections, lack of an innovative organizational culture stimulating the “creative climate”

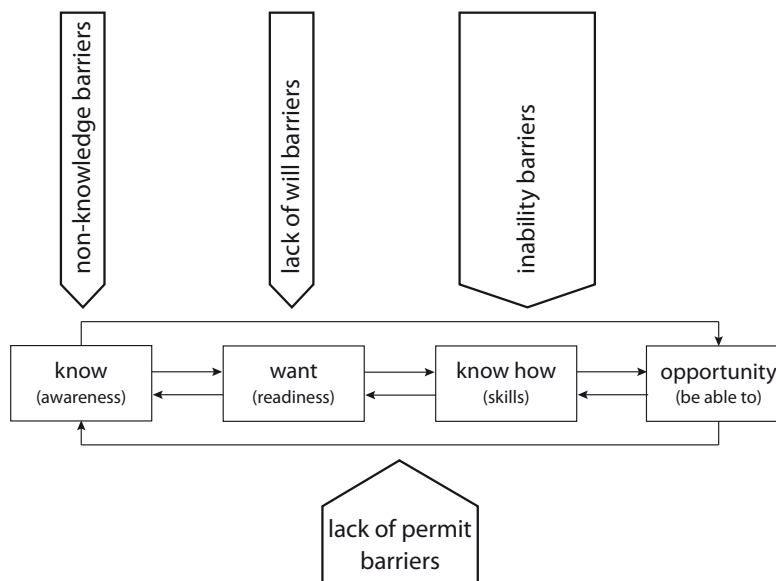


Fig. 3. Innovative competences vs. barriers to innovation



### 3 Barriers to innovation activity in Poland

Analyzing the current situation of Poland in terms of its innovativeness, at the microeconomic, regional or national level, unfortunately it must be stated that there appear to be too many barriers hampering the development of the economy. The available reports (European, national, and regional) clearly point out low involvement of Polish enterprises or regions in the development of innovation. The “richest” picture of the barriers is presented in the European Innovation Scoreboard, which is based on four main indicators:

- Framework conditions—capture the main drivers of innovation performance external to the firm and cover three innovation dimensions: human resources, attractive research systems, as well as innovation-friendly environment.
- Investments—public and private investment in research and innovation—cover two dimensions: finance and support and firm investments.
- Innovation activities that capture the innovation efforts at the level of the firm, grouped in three innovation dimensions: innovators, linkages, and intellectual assets.
- Impacts that cover the effects of firms’ innovation activities in two innovation dimensions: employment impacts and sales effects.

Unfortunately, in Poland in recent years there has been a negative trend of a low index with simultaneous decrease of SME innovations in the scope of both product/process as well as marketing/organizational innovations. Other positive and negative trends are presented in table 3.

The studies carried out by Keralla Research<sup>5</sup> show that the main barrier is the structural and awareness-cultural barrier (lack of knowledge and not opening up to innovations) explained by the specificity of the industry. The surveyed companies subsequently indicated the following barriers: financial (lack of financial resources to introduce innovations), too small scale of company’s activity on innovations, decision barriers (decision/strategy of the company’s management—do not invest in innovations), mental barriers (no need to invest in innovation), economic barriers (there is no economic climate, no economic incentives to innovate).

In recent years, we can read about many products “innovative content” or “made in innovative technology,” in plants and service offices “innovative process,” “new improved...”. Unfortunately, as Grajkowski also emphasizes,<sup>6</sup> there has occurred a devaluation of the meaning of innovation—the actual concept of innovation goes beyond its definition, which means that many projects are funded unduly, and where financial resources could actually be used, there is a financial barrier. Grajkowski notes the wrong direction of supporting the whole process. According to the author, the entity which requires financial support should be changed. So far, these are universities, scientific research units. However, attention should be focused on the inventor and the process of commercialization of his innovations, which should result not only in financing, but also in building an appropriate environment.

If higher-level barriers, such as financial barriers, seem to be overcome, the emerging lower-level barriers prevent the implementation of innovative projects. Many programmes have been implemented to stimulate innovative in enterprises, but this has not led to a major breakthrough in an increase of innovation activity. Such examples have been presented in a report prepared by ECORYS, which presents the participation of Polish beneficiaries in the “Horizon 2020” programme.<sup>7</sup> The Framework Programme “Horizon 2020” is the biggest Research and Innovation programme in the EU. Individual scientists, scientific and industrial institutions, enterprises—especially from the SME sector can apply for funding from this programme. The goal is to ensure the individual countries implement world-class science and technology, remove barriers to innovation and make

5. See: Innowacje w MŚP. Pod lupą. EFL SA, [@:] [https://efl.pl/wp-content/uploads/2016/08/raport\\_layout\\_podgl\\_05.10.15r..pdf](https://efl.pl/wp-content/uploads/2016/08/raport_layout_podgl_05.10.15r..pdf).

6. See: Bariery rozwoju innowacji w Polsce. Wybrane uwagi i postulaty. Analysis by Zygmunt Grajkowski, Giza Polish Ventures, Warszawa, 15 August 2012, [@:] [http://gpventures.pl/repository/files/Bariery\\_rozwoju\\_innowacji\\_Zygmunt\\_Grajkowski\\_GPVI.pdf](http://gpventures.pl/repository/files/Bariery_rozwoju_innowacji_Zygmunt_Grajkowski_GPVI.pdf).

7. See: Analiza wykorzystania przez polskich beneficjentów środków w ramach programów zarządzanych centralnie przez Komisję Europejską: Horyzont 2020. Raport końcowy. ECORYS, [@:] [https://www.ewaluacja.gov.pl/media/54959/RK\\_H2020\\_FIN.pdf](https://www.ewaluacja.gov.pl/media/54959/RK_H2020_FIN.pdf)

**Tab. 3.** European Innovation Scoreboard (result in relation to the EU, where EU = 100)

Poland	2010	2016	Change 2010/2016
Summary Innovation Index . . . . .	52,8	54,8	2,0
Human resources . . . . .	69,4	77,4	8,0
New doctorate graduates . . . . .	46,2	32,9	-13,2
Population with tertiary education . . . . .	125,0	167,1	42,1
Lifelong learning . . . . .	32,6	26,3	-6,3
Attractive research systems . . . . .	22,7	33,0	10,3
International scientific co-publications . . . . .	44,5	79,8	35,3
Most cited publications . . . . .	26,5	39,2	12,6
Foreign doctorate students . . . . .	9,4	7,4	-2,0
Innovation-friendly environment . . . . .	44,8	83,7	38,9
Broadband penetration . . . . .	77,8	122,2	44,4
Opportunity-driven entrepreneurship . . . . .	21,5	56,5	35,0
Finance and support . . . . .	46,0	51,2	5,3
R&D expenditure in the public sector . . . . .	57,4	68,0	10,7
Venture capital expenditures . . . . .	31,6	30,1	-1,5
Firm investments . . . . .	71,8	85,1	13,3
R&D expenditure in the business sector . . . . .	14,1	38,2	24,0
Non-R&D innovation expenditures . . . . .	190,7	188,8	-1,8
Enterprises providing ICT training . . . . .	35,7	50,0	14,3
Innovators . . . . .	25,0	2,2	-22,8
SMEs product/process innovations . . . . .	24,3	5,9	-18,4
SMEs marketing/organizational innovations . . . . .	25,9	0,6	-25,3
SMEs innovating in-house . . . . .	24,8	0,0	-24,8
Linkages . . . . .	37,4	26,8	-10,6
Innovative SMEs collaborating with others . . . . .	52,1	23,0	-29,1
Public-private co-publications . . . . .	19,2	22,7	3,5
Private co-funding of public R&D expenditures . . . . .	40,9	33,3	-7,6
Intellectual assets . . . . .	56,0	77,9	21,9
PCT patent applications . . . . .	31,3	39,6	8,3
Trademark applications . . . . .	51,8	79,7	27,9
Design applications . . . . .	92,5	128,1	35,6
Employment impacts . . . . .	92,2	88,0	-4,2
Employment in knowledge-intensive activities . . . . .	42,3	55,1	12,8
Employment fast-growing enterprises . . . . .	128,6	111,9	-16,7
Sales impacts . . . . .	68,5	55,2	-13,4
Medium and high tech product exports . . . . .	93,3	84,2	-9,1
Knowledge-intensive services exports . . . . .	45,0	44,4	-0,7
Sales of new-to-market/firm innovations . . . . .	66,2	32,7	-33,5

it easier for the public and private sectors to work together in innovation activities. The projects are selected by means of calls announced by the European Commission. According to the authors of the report, the main barriers to applying for money from “Horizon 2020” by Polish beneficiaries are: relatively low innovation of Polish entities, poor knowledge of English, lack of experience in applying funds from Horizon, low innovation of companies, lack of consortia and foreign cooperation.

A serious barrier still present in Poland is the lack of or insufficient cooperation between the business and scientific environment. In the report prepared by the Warsaw Enterprise Institute, it was noticed that “entrepreneurs recognize the need to introduce changes and innovations to business and keep up with the discoveries of science . . . However, too few entrepreneurs decide to cooperate, and if it is already undertaken, it is a negative experience for many companies that

does not confer an advantage.”<sup>8</sup> The entrepreneurs point out as reasons: lack of understanding of business goals and strategies by scientists, lack of conclusions from the researches, too slow a pace of work. On the other hand, enterprises, especially industrial ones, do not want to incur expenditures on their own research and development activities, or, as in the case of companies with foreign capital, the research is performed in centers located in the parent company. It is the low level of expenditure on research and development that is one of the most serious barriers to the development of a knowledge-based economy. In this field, insufficient intellectual capital is a serious barrier, causing difficulties in accessing specialized knowledge, and thus specialists responsible for establishing an innovation strategy.

The essence of bottlenecks is presented by the Joint Research Center — Research Center of the European Commission in “Research and Innovation Observatory country report 2017: Poland.”<sup>9</sup> The authors pay attention to the Polish innovation system, which includes many intermediaries in the field of knowledge transfer, such as business incubators, technology transfer offices and innovation brokers. Studies and innovation activities in scientific and industrial networks are unfortunately still limited.

An important problem in the Polish economy with a cultural and sociological background is the lack of flexibility. The innovative system must be a flexible system and open at the individual, enterprise and state economy level. This flexibility applies to (1) the employee — his openness to changes/innovations, of both product and process, and (2) enterprises, reorganizing workplaces inside the company and aims to facilitate employees performing various tasks and roles. It can be achieved, for example, by the rotation of employees between positions, changing tasks at a given workplace, performing tasks from different positions at the same time, or introducing flexible work time. In the meantime, we can often meet with resistance of employees but also of the management staff to the introduction of changes. There is fear of risk. Regional innovation barriers in Poland were presented in the latest report “Millennium Index 2018 — Regional Innovation Potential.” Ranking components are 6 criteria. The first two — i.e., labor productivity (in PLN million per number of employees) and the value-added rate (in %) present the actual situation and performance of enterprises. Expenditures on research and development (in relation to GDP) reflects the innovative activity of companies. Higher education (the number of students per 10 000 inhabitants) presents the scientific potential of the workforce employed in R&D (per 1000 active employees) — stand for intellectual background, while the last indicator — number of patents (per 1 000 000 inhabitants) — reflects the effectiveness of the created innovations. Analyzing the results of individual regions, it can be concluded that the largest barriers (voivodships with the lowest index and level of indicators) occur in regions with few scientific and research facilities, small industry, mainly from the so-called “Poland B.”

Innovation barriers in each region are reflected in their attractiveness for potential foreign investors. In the context of the activity of foreign investors and the innovative potential of the location of their investments, we are dealing with the effect of a feedback loop. Foreign direct investments (FDIs) on the one hand stimulate innovation in the region or sector, on the other hand, new investors locate their entities in attractive areas due to the innovative potential there.

Analyzing the location of entities with foreign capital (fig. 4), it can be noted that almost 38% of entities are registered in the Mazowieckie Voivodship, almost 10% in the Śląskie Voivodship, 9% in Wielkopolskie and Dolnośląskie voivodships. The increased activity of foreign investors in these regions clearly corresponds to their high index presented in “Millennium Index 2018 — Regional Innovation Potential” (tab. 4).

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8. See: *Przyszłość polskiej nauki — potencjał i bariery współpracy biznesu z nauką*. Report by Dominika Maison et al., Warsaw Enterprise Institute, Warszawa, czerwiec 2016, page 21, [@:] <http://wei.org.pl/wp-content/uploads/2017/12/old/images/file-6fb1d9a829f1d6c9863dedf31382e308.pdf>.

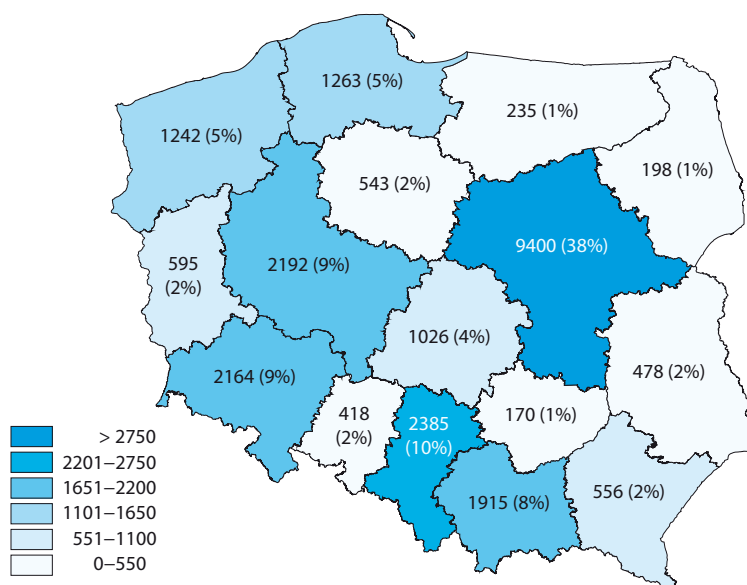
9. See: *RIO Country Report 2017: Poland*. JRC Science for Policy Report by Krzysztof Klineciewicz, Magdalena Marczevska and Katarzyna Szkuta, Luxembourg: Publications Office of the European Union, 2018, [@:] <https://rio.jrc.ec.europa.eu/en/file/12168/download?token=fhCw0Rjy>.

**Tab. 4.** “Millennium Index — Regional Innovation Potential” — regional results

Voivodship	Index	Labor productivity	Value added rate	R&D expenditures	Higher education	Employed in R&D	Number of patents
Mazowieckie	94	100	87	77	100	100	100
Malopolskie	86	79	93	100	100	74	69
Pomorskie	71	99	95	53	80	50	49
Dolnośląskie	66	69	78	32	89	50	79
Lubelskie	60	58	100	41	70	33	59
Łódzkie	59	68	100	29	64	38	58
Wielkopolskie	58	92	76	27	73	34	48
Śląskie	56	75	81	24	53	34	69
Podkarpackie	55	78	82	49	49	45	29
Opolskie	47	76	76	17	46	20	50
Kujawsko-pomorskie	46	72	73	16	57	26	33
Zachodniopomorskie	46	64	83	13	53	21	40
Podlaskie	45	72	68	20	57	25	29
Warmińsko-mazurskie	40	58	79	15	42	20	25
Świętokrzyskie	39	67	71	14	39	16	26
Lubuskie	36	67	78	9	29	15	16

Note: All the analyzed criteria have equal weight; the voivodships could score max. 100 points

Data source: “Indeks Millennium 2018...”, op. cit.



**Fig. 4.** Number of entities with foreign capital by voivodships in 2016 (share in % in the brackets)

Source: Own study based on (*Działalność gospodarcza podmiotów...* 2017)

## Conclusions

Summing up, it should be stated that the problem of barriers to innovative activity is widely discussed in the literature. This topic is given more and more attention in research and global reports, mainly due to the role of innovation in socio-economic development. Innovation is associated with the opening up to seeking new ideas, solutions and effective implementation. At the same time, sensitizing enterprises to the possible existence of barriers is a difficult task. Barriers often occur contrary to expectations, they are not caused by one reason, but a complex of various events. Unfortunately, Poland is still struggling with barriers appearing at all stages of the innovation chain.

In addition to the typical economic barriers, the specificity of Poland is a strong cultural, behavioral and historical impact (Bernat, Bruska, and Jasinska-Biliczak 2017) and these are barriers that are often more difficult to overcome than, for example, a financial barrier. International experience shows the possibility of eliminating barriers and at the same time supporting innovation through the implementation of a model of cooperation between industrial centers and research centers, as this is the main area in which Poland differs from innovative countries.

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