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Characteristics of Cooperation in the Field of Innovation: Case Study Poland

Pierscieniak Agata¹ and Stelmaszczyk Monika²

¹ Jan Kochanowski University in Kielce, Poland
ORCID <https://orcid.org/0000-0002-1724-6766>

² Jan Kochanowski University in Kielce, Poland
ORCID <https://orcid.org/0000-0002-7055-0193>

Abstract

Innovation and collaboration are two key elements in the development of modern enterprises. The article aims to identify the nature of cooperation used to create innovation. Due to the origin and interests of the authors, the considerations were conducted for companies from Poland. The analysis was carried out using data from the report Monitoring Innovativeness of Polish Enterprises in 2018 (N = 497), 2019 (N = 560). It was found that Polish enterprises most often cooperate with stakeholders in the value chain, including customers and suppliers. The cooperation is supporting innovative activities and not initiating them. This may be the main reason shaping the attitude of Polish enterprises towards the adaptation of innovations rather than their creation.

Key words: cooperation, collaboration, innovation, EU, Poland, Europe 2020

Introduction

Cooperation and innovation are among the most important elements of modern economies (Siddiqui et al. 2018; Mejlgaard) i regionów (Ahmad & Anees 2016). Both of these activities create progress and are seen as elements of development on a macro (economic level) or micro (company level) scale. Innovation for modern companies is a must. This requires sharing knowledge (Stelmaszczyk 2017, Stelmaszczyk 2020), financial support and adequate human resources (Caputa 2010). The economies of countries compete in motivating and supporting economic entities in undertaking innovative activities. Innovations become elements of business models (Krawczyk-Sokołowska et al 2019). Policies are geared towards development and progress in the name of ensuring the well-being of its inhabitants.

Cooperation for the company is a desired activity, necessary to survive on the market. Implemented in various forms and structures, it allows you to use the potential of partners and achieve the intended goals. It is identified in many areas of economic activity, the basic ones, such as cooperation in the supply chain (Kozma, 2017, Li et al. 2019) and strategic ones, such as support for competitiveness (Singh, Joshi, 2017, Rana 2020, Tripathi et al. 2020). However, working in cooperation is not easy, it requires preparation and knowledge and, above all, appropriate potential (Pierscieniak, Grzebyk 2020), which can be used not only to establish a relationship but also to properly implement this process. In order to recognize how to support cooperation in the field of innovation, it is important to know its nature.

In light of the above considerations, the purpose of this article is to identify the nature of cooperation used to create innovation. Due to the origin and interests of the authors, the considerations were conducted for Europe, especially Poland, which is one of the member states of the European Union (EU). The analysis was based on data from the report Monitoring Innovativeness of Polish Enterprises, presented in two editions of 2018 and 2019, and the latest innovation ranking of member states of the EU European Innovation Scoreboard (EIS) from 2020.

Literature Review - Innovation and Cooperation

Innovation as an Element of Europe's Development Strategy

Increasing the innovativeness of enterprises is a priority for the EU, which for many years has been pursuing a policy of supporting the development of innovation in the Member States. In Europe, on March 3, 2010, the European Commission adopted a document called EUROPA 2020: A strategy for smart, sustainable and inclusive growth (Europe 2020, 2010) to stimulate the development of its economy in specific directions. The aim of the Europe 2020 strategy was to ensure the economic recovery of the European Union (EU) after the economic and financial crisis, supported by a series of reforms to create a solid foundation for growth and job creation by 2020. The strategy addressed the structural weaknesses of the European economy and economic and social issues, while at the same time addressing long-term problems such as globalization, increasing demand for scarce resources and an aging population (2019 Innovation Scoreboards¹). Europe 2020 was the EU's ten-year growth strategy puts forward three mutually reinforcing priorities (http://ec.europa.eu/europe2020/index_en.htm); Smart growth: developing an economy based on knowledge and innovation; Sustainable growth: promoting a more resource efficient, greener and more competitive economy; Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion. The strategy further identifies seven flagship initiatives the EU should take to boost growth and jobs (European Commission 2010). One on them is: Innovation Union: to improve framework conditions and access to finance for research and innovation that ensure innovative ideas can be turned into products and services, creating growth and jobs (Stec, Grzebyk 2016).

The Regions Innovation Ranking for 2020 published by the European Commission shows that the European Union's innovativeness has been growing for five years, and for the second time in history, European innovations have surpassed the achievements of the United States. However, the EU is still lagging behind Japan and South Korea in this regard, and China is catching up fast (European Innovation Scoreboards 2020¹).

Poland has been a member of the EU since 2004 and pursues a policy consistent with its assumptions. Polish challenges and development objectives, including those in the scope of increasing competitiveness and innovation of economy, were defined in national strategic documents and implementation programmes (Smart Growth Operational Programme 2014-2020 p.18). Poland is still at a very distant position in the rankings presenting innovation of the EU countries. The Summary Innovation Index (SII) score for Poland is below the EU average. In the innovation ranking, Global Innovation Index, which takes into account 7 components regarding both conditions for innovative activity and results of this activity. Poland in 2014 was in 45th place behind i.e. Czech Republic, Slovakia and Lithuania, recording increase from 49th place (in total 143 countries were classified in the ranking) (Smart Growth Operational Programme 2014-2020).

In Poland, many government institutions are involved in innovation support and promotion programs. One of the main institutions is The National Center of Research and Development (NCBIR), which for years has been coordinating the implementation of many stimulation and support programs for the innovativeness of the Polish economy, in particular support for the development of innovation in enterprises. NCBIR coordinated in the years 2007-2013 Innovative Economy Operational Programme (IEOP) with the key objective development of the Polish economy driven by innovation-seeking companies. The Innovative Economy Operational Programme offers comprehensive support for R & D-related ventures which provide businesses undertaking them with a competitive advantage in the Single European Market as well as in international markets (<https://www.ncbr.gov.pl/en/programmes/european-funds/>). In the years 2014-2020 in Poland, innovation was supported, among others, in the Smart Growth Operational Program, the aim of which is to support enterprises that implement innovative projects. Financial support in the form of grants for projects accepted for implementation is provided to consortia that form enterprises and research units. The result of the financed projects is, above all, innovative inventions, also promoted in world

scientific literature.

The development of innovation is monitored by various government agencies such as The Polish Agency for Enterprise Development (PARP) (<https://www.parp.gov.pl/en/>)¹ or local ones, e.g. Rzeszów Regional Development Agency (RARR), which prepare or commission research institutions to prepare reports. The result is a large collection of so-called Gray literature understood as available literature, both published and unpublished, but not indexed in scientific journals, available outside of scientific databases, which has not necessarily passed the process of academic review (Van Cauwenberghe et al., 2010).

Dimensions of Cooperation in Innovation - Theoretical Context

Cooperation is a phenomenon that is understood ambiguously in the literature. Many authors identify it with relations (Pierscieniak 2020), others present it as an ability, recognizing that it is a feature not only of employees who can create teams, but also of organizations that as entities form consortia or clusters. Another view on cooperation may be the process approach as a sequence of events that uses the necessary resources (Krawczyk-Sokołowska et al. 2016) to achieve the intended goal.

The feature that distinguishes cooperation from other activities of the organization is the need to have a partner. Partners can come directly from the value chain or from further the field. In Poland, the goal of cooperation is, for example, the implementation of projects, especially those financed by the EU. Then the partners come from the external environment, e.g. enterprises cooperate with research units or associations, etc. Cooperation takes various forms and is implemented in specific structures (partnerships, alliances, etc.). From the perspective of the analysis of the role of cooperation in innovation processes, two parameters seem important: the main objective and partner identity. The detailed concepts are presented in Figure 1.

Figure 1. Model of the Nature of Cooperation Between Enterprises

Partners identity	Partners from the environment	A. Collaboration focused on inventions	B. Cooperation as a challenge for the environment (clusters, producer groups, etc.)
	Value chain partners (Porter's concept)	C. Collaboration oriented to increase the company's competitiveness	D. Survival-oriented cooperation
		Individual (collaboration)	Common (cooperation)
The main objective			

Source: own study

The indicated original model of the types of cooperation allows to recognize its identity. Due to the indicated parameters, four types of cooperation have been distinguished:

A. Collaboration focused on inventions is an activity that results in creating innovation. The partners

¹The Polish Agency for Enterprise Development (PARP) is involved in the implementation of national and international programmes financed from the EU structural funds, state budget and multiannual programmes of the European Commission. As a key authority responsible for creating a business-friendly environment in Poland, PARP contributes to the creation and effective implementation of the state policy related to enterprise, innovation and staff adaptability. <https://www.parp.gov.pl/en/> (access 10.08.2020)

use their knowledge and share it in order to develop a new solution. The partners are most often institutions from the environment, e.g. scientific institutes and universities.

B. Collaboration as a challenge for the environment (clusters, producer groups, etc.) is used as a necessary form of cooperation in order to create a strong entity that allows for the development of the thematically leading field in which all members are involved. The partners are competitors and other companies, usually from the same field. In the literature on the subject in this area, the phenomenon of competition is most often identified (Dziurski 2020).

C. Cooperation oriented to increase the company's competitiveness is the operation of the unit aimed at achieving its goals related to improving the market position, with the support of partners from the supply chain, e.g. customers.

D. Survival-oriented cooperation it is a joint action of the entire supply chain, focusing on maintaining its position on the market as a group of entities pursuing their interests in relation to the interests of other partners from the supply chain, e.g. suppliers.

In the description, the words cooperation and collaboration were spread (Piersciniak 2015). The authors distinguish between these two terms, understanding that cooperation has a support character (based on the implementation of a common goal) and collaboration is realized where, next to the main (common) goal, it is characterized by individual goals of partners that motivate the enterprise to act.

Research Gap and Research Problem

By joining the discussions on the development of innovation in enterprises, several important issues can be diagnosed. One of the key ones is the role of cooperation in the development of innovation. Analyzes leading to the assessment of the level of innovativeness of economies, such as the European Innovation Scoreboard 2020. (2020) diagnose the elements influencing the innovativeness of enterprises. Rankings such as the Innovation Monitoring Report (2019, 2018) indicate components that are important for assessing the level of innovation. So the question is:

Q1: Is cooperation a key element in the development of innovation?

Assuming that cooperation is an important element of the company's activity in the development of innovation, it is worth considering with whom it is implemented, i.e. who is the partner of enterprises in the process of innovation implementation. Knowledge on this subject may be an important element identifying the identity of innovations implemented in the enterprise. It allows to determine the nature of innovation that prevails in the activities of a given enterprise and to assess their type.

Q2: What is the nature of cooperation undertaken by Polish enterprises in the development of innovation?

By compiling these analyzes on a macro scale, it may be the basis for formulating a thesis on the nature of the economy's innovation. The obtained results will be useful to confirm the direction of innovation development from a macro perspective.

The Objective of Study

The object of research is cooperation occurring in enterprises and implemented in order to create or develop innovation. This phenomenon is identified by many variables that describe this process, especially from the perspective of building relationships. Two types of reports, the European Innovation Scoreboard (EIS) and the Monitoring Innovation Polish Business (MIPB), are of key importance for the analysis.

The annual European Innovation Scoreboard (EIS) provides a comparative assessment of research and

innovation performance across the EU. The data helps Member States, regions and the EU to assess relative strengths and weaknesses of national research and innovation systems. The EIS provides an assessment of areas where Member States perform well and ones on which they need to focus their efforts to increase innovation performance. Based on their scores, EU countries fall into four performance groups: Innovation Leaders – perform 20% or more above the EU average; Strong Innovators –perform above or close to the EU average; Moderate Innovators – performance below the EU average; Modest Innovators – perform well below 50% of the EU average. EIS consist of with 10 components. One of them is Linkages. This category assesses the extent of innovative SMEs collaborating with others, public-private co-publications and private co-funding in public R&D activities (European Innovation Scoreboard 2020, 2019 Innovation Scoreboards).

The analysis of this category will allow to formulate the answer to the question Q1.

Monitoring Innovation Polish Business (Report 2018, Report 2019), the purpose of which is to diagnose the state of innovation of Polish enterprises and the factors shaping it - is a report prepared by the Polish government institution PARP. The survey consists in the annual measurement of the level of innovativeness of enterprises carried out using quantitative (CAPI) and qualitative (IDI) techniques. The target group are companies operating in Poland divided by size into micro (excluding the self-employed), small, medium and large. The analysis was carried out using data from the report Monitoring Innovativeness of Polish Enterprises in 2018 (N = 497), 2019 (N = 560).

Data Analysis

When collecting data to answer the question whether cooperation is a key element in the development of innovation (Q1), records of the role of cooperation in innovative activities were sought. For this, dimension Linkages from the EIS report (2020) was analyzed. Changes in two years' time in EU innovation performance in Linkages dimension increase. Innovative SMEs collaborating with others more than 10% increase. Public-private co-publications 1-5% increase (Linear regression) and for private co-funding of public R&D expenditures no reliable forecast (Linear regression) (European Innovation Scoreboard 2020, p. 36).

When analyzing the roles of individual cooperation activities selected for dimension Linkages, it was noticed that in countries with high innovation rates (Sweden, Netherlands)², the growth rate of these activities was greater than the growth rate of the summary innovation index (Table 1).

Table 1. Dynamics of Dimension Linkages Related to Cooperation for Selected EU Countries

		Dimension Linkages	Innovative SMEs collaborating with others	Public-private co-publications	Private co-funding of public R&D exp.	Summary innovation index	
Sweden	Relative to EU 2019	in 2019	150,5	147,8	298,5	82,3	140,7
	Performance relative to EU 2012	in 2012	162,9	199	297,2	85,7	146,2
		in 2019	154,9	146,8	337,5	83,3	153,1
Netherlands	Relative to EU 2019	in 2019	154,8	163,2	203,9	127	127,8
	Performance relative to EU 2012	in 2012	161,3	167,1	219,2	133,7	127,7
		in 2019	159,4	162,1	230,5	128,1	139,1
	Relative to EU 2019	in 2019	39,5	40,3	29,4	43,8	58,9

² As illustrations of the observed phenomenon, two countries from the area of Innovation Leaders (Sweden and Netherlands) and two countries achieving a lower level, Poland from the area of Moderate innovation and Romania from the area of Modest Innovation were selected.

Poland	Performance relative to EU 2012	in 2012	45,2	36,1	14,5	63,3	51,0
		in 2019	40,7	40,0	33,2	44,2	64,1
	Relative to EU 2019	in 2019	31,6	6,3	25,6	64,6	39,3
Romania	Performance relative to EU 2012	in 2012	42,2	21,2	19,9	98,7	59,7
		in 2019	34,4	6,3	28,9	65,1	40,5

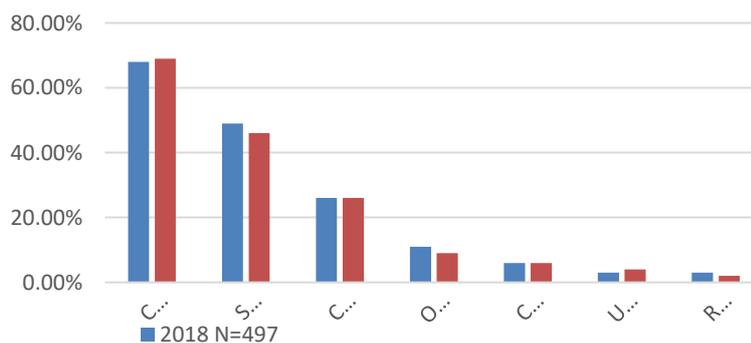
Source:European Innovation Scoreboard 2020. (2020) Luxembourg: Publications Office of the European Union, Part of the European Innovation Scoreboards (EIS) project for the European Commission, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs;https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en (available 16.08.2020)

The data of the European Innovation Scoreboard 2020 (2020 p. 62) show that, Poland is a Moderate Innovator. Over time, performance has increased relative to that of the EU in 2012. The strong increase in the last two years is mainly due to improved performance in Broadband penetration and Opportunity-driven entrepreneurship. Innovation-friendly environment and Employment impacts are the strongest innovation dimensions. Poland scores high on Opportunity driven entrepreneurship, Employment in fact-growing enterprises of innovative sectors, Population with tertiary education, and Design applications. Innovators, Attractive research systems and Linkages are the weakest innovation dimensions. Low-scoring indicators include SMEs with marketing or organizational innovations, Foreign doctorate students, New doctorate graduates, and SMEs innovating in-house.

Referring to the Monitoring Innovation Polish Business report (Report 2019), it can be noted that cooperation was included as an element of the so-called the innovation maturity index (WDI) in which the "relational capital" component was identified. Comparing the indicators of this component from the first and second editions, it can be noticed that in the second edition its value increased and amounts to 36.17 out of 100. In the first edition it was statistically significantly lower, amounting to 22.92. The indicator mainly concerns commitment and cooperation within innovation processes.

Searching for an answer to the question Q2 concerning the nature of cooperation in the dams of innovative activities of Polish enterprises, the data on who Polish enterprises cooperate with (Figure 2) was analyzed.

Figure 2. Partners of Polish Enterprises Participating in Cooperation in the Field of Innovation



Source:Raport 2018. Monitoring innowacyjności polskich przedsiębiorstw. Wyniki I edycji badania. 2018, Copyright by Polska Agencja Rozwoju Przedsiębiorczości, p.32 <https://www.parp.gov.pl/storage/publications/pdf/Raport-2018---I-edycja-Monitoring-innowacyjnossci-polskich-przedsiębiorstw.pdf> (access 16.08.2020);Raport 2019. Monitoring innowacyjności polskich przedsiębiorstw. Wyniki II edycji badania.2019. Copyright by Polska Agencja Rozwoju Przedsiębiorczości, p. 95 <https://www.parp.gov.pl/storage/publications/pdf/Raport-2019---II-edycja-Monitoring-innowacyjnoci-polskich-przedsiębiorstw.pdf> (access 16.08.2020)

The presented data shows that in 2018 and 2019 Polish companies most often cooperated with clients. This is confirmed by about 70% of the surveyed companies. Less than half of the respondents, i.e. 49% (2018) and 46% (2019), cooperate in the area of innovation with suppliers of equipment,

materials, components and software. A significantly smaller percentage of companies cooperated with other companies in the industry (with competitors) about 26% in each year. The cooperation of Polish innovatively active companies with other entities was negligible.

When analyzing detailed data depending on the size of the enterprise (Table 2), some trends can be noticed. Among the surveyed enterprises, the SME sector cooperates with clients more often than large enterprises. The situation regarding suppliers is different, the larger the company, the more often the cooperation declared. Regardless of the size, cooperation with competitive companies is at the level of 20-30%. Large companies are more willing to cooperate with external institutions such as consulting companies, consultants, universities or research institutes.

Table 2. Partners of Polish Enterprises Participating in Cooperation in the Area of Innovation (by enterprise size).

	Enterprise in 2018 (%)				Enterprise in 2019 (%)			
	micro	small	medium	large	micro	small	medium	large
Customers	70	60	62	58	68	70	73	61
Suppliers	47	55	64	44	44	57	53	55
Competitors	26	25	23	30	26	21	32	25
Other companies in the same group	12	3	14	17	9	10	17	30
Consulting companies, consultants	5	10	9	14	6	5	9	18
Universities	3	3	6	7	4	6	16	18
Research institutes	3	2	6	21	1	2	7	14

Source: Raport 2018. Monitoring innowacyjności polskich przedsiębiorstw. Wyniki I edycji badania. 2018, Copyright by Polska Agencja Rozwoju Przedsiębiorczości, p.32 <https://www.parp.gov.pl/storage/publications/pdf/Raport-2018---I-edycja-Monitoring-innowacyjnosci-polskich-przedsiębiorstw.pdf> (access 16.08.2020); Raport 2019. Monitoring innowacyjności polskich przedsiębiorstw. Wyniki II edycji badania. 2019. Copyright by Polska Agencja Rozwoju Przedsiębiorczości, p. 95 <https://www.parp.gov.pl/storage/publications/pdf/Raport-2019---II-edycja-Monitoring-innowacyjnoci-polskich-przedsiębiorstw.pdf> (access 16.08.2020)

Conclusions

For many years, the European Union has been implementing innovative economy strategies aimed at the development of innovation in enterprises in the member states. These activities are supported by funds and purposefully constructed programs at the national and Community level. Despite this, not all countries are equally innovative, but the presented data show that cooperation is a key element supporting the innovative activity of enterprises in Europe and constitutes an important element of relational capital.

When analyzing the case study Poland presented in the article, it can be noticed that the Polish economy is moderately innovative. Polish enterprises more often cooperate with customers and suppliers than with entities from the environment. In the light of the presented theoretical considerations (Model of the nature of cooperation between enterprises), it can be seen that cooperation in the area of innovation has a C collaboration oriented model to increase the company's competitiveness and D survival-oriented cooperation, where partners are entities from the value chain. Such cooperation allows for the acquisition of innovations that allow the Polish company to stay on the market.

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