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INNOVATIVENESS OF ENTERPRISES IN THE EUROPEAN UNION IN THE CONTEXT OF THE APPROACH TO INNOVATION PROCESSES

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Purpose: This article is a continuation of a series of publications on enterprise innovations and the benefits they bring. It serves as a foundation for further research among companies, the results of which will be presented in a subsequent publication. The primary goal was to identify the basic innovation profiles of European enterprises and the use of the main sources of information on innovation by companies, which may be important in the context of further identification of the models of innovation processes used.
Design/methodology/approach: The study is based on a review of the literature on innovation models and the reasons for their implementation and uses statistical data on the innovativeness of enterprises in the European Union countries provided by Eurostat. The research results on the profiles of innovative enterprises in the European Union were analysed, with particular emphasis on Polish companies due to the planned further research.
Findings: The study made it possible to determine the differences occurring in the European countries covered by Eurostat research in terms of the innovation profiles of enterprises and revealed relatively low innovation activity among Polish companies. It was also found that enterprises use various sources of information in their innovation processes. Differences in the approach of companies from different European countries were also identified in this area. It is particularly apparent that innovative entities from Poland relatively rarely use external sources of information for their innovation activities.
Originality/value: The results highlight different approaches to innovation in the surveyed countries and will enable better planning of further research aimed at determining the impact of numerous factors on the innovation activity of Polish enterprises, with particular emphasis on subsidies from EU and national public funds.
Keywords: innovativeness of enterprises, innovation profiles of enterprises, innovative activity of an enterprise.
Category of the paper: analytical research paper.

1. Introduction

The development of innovations and their impact on the level of competitiveness of enterprises and economies is significant, as evidenced by the results of numerous studies and the positions of academics. The European Union has been trying for decades to stimulate innovation processes in the private and public sectors, and its innovation policy is constantly evolving (Gajewski, 2017). Research confirms the correlation between economic development and innovation, although its connection with the development of entrepreneurship is less clear-cut. The complexity of the EU innovation policy management processes, the imperfection of financing instruments and too many decision-makers involved in the innovation-stimulating processes lead to results that are below EU expectations (Crudu, 2019). According to the European Innovation Scoreboard 2024 report, South Korea remains the most innovative country surveyed. The other three competitors – Canada, the United States and Australia – still have an advantage over the European Union. Noteworthy, however, is that since 2021, the EU's average innovation performance has been higher than that of Japan. Nonetheless, it is necessary to further strengthen the innovative capacity of individual countries. This means that further improvement of innovation policy is required, and for this purpose research should be conducted to identify key factors that have a positive impact on the innovative attitudes of enterprises.

The aim of the research conducted for the purposes of this article is to gather the knowledge necessary for further planning of the research process for the next publication in the series. It was important to determine the basic innovation profiles of European enterprises and the basic sources of information used by companies in the context of the applied innovation process models, which will be examined further.

When it comes to innovation, one of the key issues to consider is how decisions are made to invest in it. It is also important to focus on the determining factors in order to understand why enterprises undertake or abandon innovative activities. Additionally, it is crucial to identify the sources of information that innovators use in the process of creating innovations.

The obtained results will constitute the basis for detailed preparation of further research procedures for the next part of this publication series.

2. Models of innovation processes

When it comes to the determinants of decisions on implementing innovations, it can be crucial to identify the model of innovation processes that dominates in enterprises. The first to be described was the model of innovation “pushed” by science (supply-side), which was

characteristic of economic activity in the mid-20th century. This is one of the linear models that assumed a dominant role of science and basic research, which in turn drove applied research, eventually leading to the introduction of innovations to the market. In this approach, customers had little influence on creating the directions of innovation development; the role of the market was to receive new products and accept them or not. By the mid-1960s, the role of customer needs began to be emphasised in innovation processes. It was noted that a considerable proportion of successful innovations resulted from companies responding to identified market needs. This led to the description of another linear model of market-pull (demand-driven) innovation, in which entrepreneurs often introduced small, incremental innovations that were a response to rapidly changing market needs (Repetowski, 2008).

Roy Rothwell wrote about five generations of innovation process models, among which the described supply and demand models are classified as the first and second phases.

In the 1970s, the interactive model (known as the coupling model) became widespread, which combined the two linear models described above. While still sequential, it represented a move away from a linear approach to a parallel one, which was expected to be more efficient (Rothwell, 1994).

Gabor Keresztes and Marcell György Endresz also discuss the simultaneous-coupling model, in which innovations arise from the simultaneous combination of knowledge from three functions: marketing, production and research and development. Its characteristic feature is that the point at which the innovation process will begin is not known in advance. They mention this model before the interactive model (Keresztes, Endresz, 2020).

The fourth generation includes parallel models focusing on internal enterprise integration and building relationships with key suppliers and active customers through various relationships and alliances. The fifth phase, however, is based on continuous innovation using networks, which has been common since the late 1980s. These models leverage the possibilities for intensive information exchange thanks to developing information and communication technologies (Rothwell, 1994).

Paul Trott presents a somewhat different chronological perspective on the development of innovation process models due to their characteristics, identifying a total of eight phases. The final phase, according to him, is based on open innovation (Trott, 2017). This has emerged in response to the growing risk to innovation because of shortening product life cycles, increasing global competition, very rapid technological progress and the rising costs of implementing innovations. Companies aim to mitigate this risk by using open innovation and deepening collaboration within networks (Kozioł-Nadolna, Świadek, 2010).

3. Innovation profiles of enterprises in the European Union

The innovativeness of the European Union economy is one of the fundamental conditions for maintaining and increasing its competitiveness on international markets. For years, the community has been making efforts to effectively compete with the USA and Japan, which have historically been the leaders in innovation rankings. Other global economies also recognise the importance of innovation in creating the foundations for building competitive advantage. Notably, countries like South Korea or the USA spend a higher percentage of GDP on research and development than the European Union. One recent initiative is the development of the European Innovation Plan, which aims to help Europe become a leader in high-tech innovation, which requires significant financial investment (Polluveer, 2024).

To support the development of the EU's innovation policy, Eurostat is introducing new reporting tools to facilitate the study of business innovation. The Community Innovation Survey (CIS) provides data on the innovation activities of enterprises, but the mere number of implemented innovative solutions does not significantly contribute to assessing the effectiveness of innovation activities. Moreover, it is difficult to provide information on the success of individual solutions in each country due to practical limitations. As a result, a tool was created to determine the innovation profiles of enterprises based on data related to their capacity for innovation, actions taken and business innovation outcomes. As a result, seven profiles were developed, distinguishing between companies that engage in innovative activities and those that do not. Profiling takes into account basic information about the innovative behaviour of enterprises, first identifying whether an entity conducts any innovative activities. A distinction is then made between innovators who implement innovations and those who do not. Next, the innovation capabilities of enterprises are considered, and whether they develop them either independently or in cooperation with other entities. The fourth level assesses whether enterprises have developed significant innovation capabilities that result in the implementation of product or process innovations, which allows them to be distinguished from those that, lacking such capabilities, are forced to acquire fresh solutions (Eurostat, 2023).

The enterprise innovation profiles are as follows:

Profile I: Product innovators introducing new products to the market – entities that have developed and implemented products that are new to the market, i.e. those that were not previously offered by competitors.

Profile II: Product innovators without market novelties – entities introducing a product innovation that is identical or remarkably similar to products already offered by competitors.

Profile III: Business process innovators – implementing innovations in a business process that has been developed by the enterprise.

Profile IV: Innovators without significant innovation capabilities of their own – enterprises that, when introducing product or process innovations, do not develop them themselves, but purchase them from others.

Profile V: Entities that are not innovators, which have worked on innovations but have not implemented them – that is, those that have conducted innovation activities in the last three years but have not implemented them because they have not completed them or have abandoned them during that time.

Profile VI: Non-innovators that have attempted to innovate – enterprises that have only considered innovating but have not had any ongoing or discontinued innovation activity in the last three years.

Profile VII: Non-innovative entities that have not attempted to innovate – enterprises that have no tendency to engage in innovation activities.

They provide better information to analysts and policy-makers than one-dimensional standard indicators. "Innovation profiles" is a new tool that will capture better the complete picture of innovation in European enterprises.

This approach is intended to provide answers to the questions: What do companies do to be innovative? What limitations do they face? What promotes innovation? What can be done to create favourable conditions for the development of innovation in enterprises and thus increase the competitiveness of the economy?

The approach of European Union enterprises to innovation in the light of Eurostat data.

To identify approaches to implementing innovation processes, the innovation profiles of enterprises were primarily examined. The findings from Eurostat's research indicate that enterprises capable of independently developing and implementing innovations are more likely to be found in the category of medium and large enterprises. Companies purchasing innovative solutions are small, but the average number of employees is the upper limit of this category of companies and is 49 people. Companies that do not undertake any innovative activities are most often small enterprises employing fewer than 40 people. The results obtained in the 2020 Eurostat study based on data from selected European Union countries confirm the thesis that the size of an enterprise may affect its innovation potential.

The analysis of data related to the innovation profiles of companies in the European Union countries covered by the study indicates that there is a strong positive correlation between GDP per capita and the percentage of innovative companies that independently introduce product innovations that are new to the market because they have not been offered before by competitors (Profile I). The Pearson correlation coefficient in this case is 0.67. The relationship between the percentage of companies with a profile I and the level of GDP is shown in Figure 1.

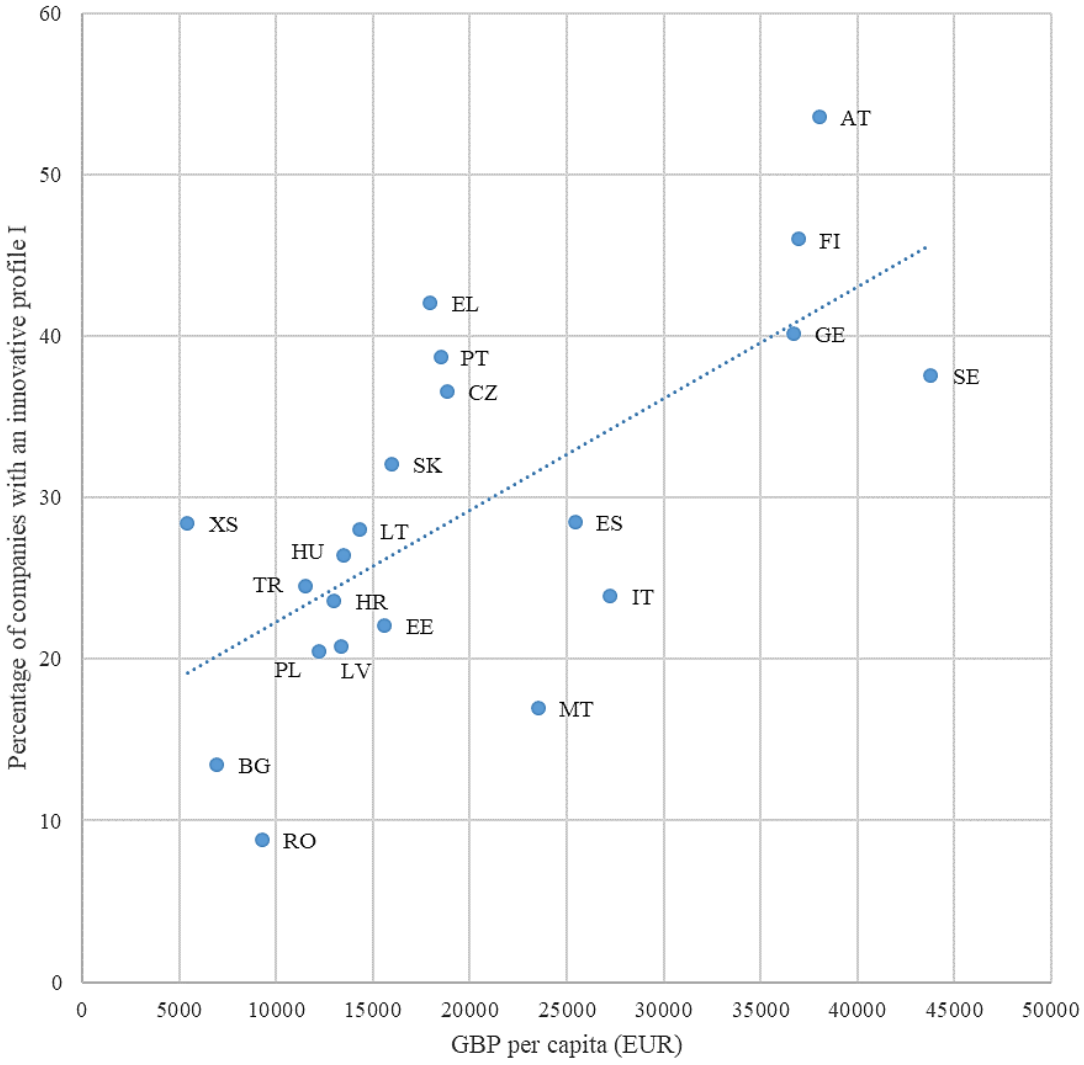

Figure 1. Correlation of the percentage of profile I companies with GDP.

Source: Own elaboration based on Eurostat data.

No significant correlation was found for profiles II to IV. A weak correlation (Pearson coefficient 0.37) occurs between GDP and the percentage of companies with innovation profile V. A moderate negative correlation, but with a higher coefficient (-0.44), occurs in the case of companies with profiles VI and VII. This means that as GDP grows, the percentage of enterprises with the lowest innovation activity or those that do not demonstrate it should decrease.

The relationship between the aggregated percentage of companies with a profile VI and profile VII and the level of GDP is shown in Figure 2.

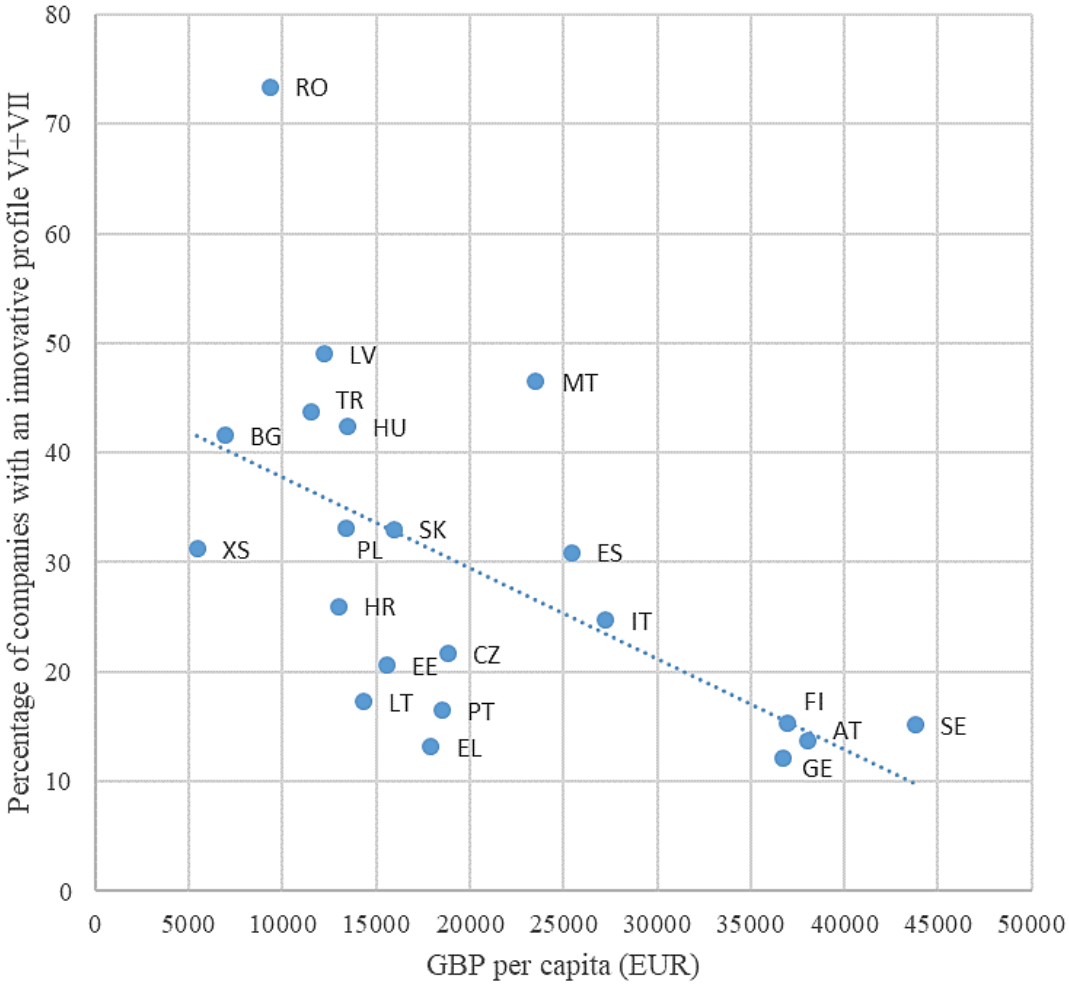

Figure 2. Correlation of the percentage of profile VI and VII companies with GDP.
Source: Own elaboration based on Eurostat data.

Compared to enterprises from other countries covered by the study, the innovativeness of Polish enterprises is unfavourable. The percentage of enterprises that do not undertake any innovative activity is significantly higher only in Romania (almost 55%). The situation is also slightly worse in Bulgaria (33.5% of non-innovative companies, but with almost twice lower GDP per capita). A specific situation also occurs in the case of Malta, where 31% of companies represent profile VII and 15.5% have profile VI. Malta is therefore characterised by a low share of enterprises implementing product innovations. A strong negative correlation can be obtained by adding up the percentage of enterprises with innovation profiles VI and VII. The correlation coefficient in this case is -0.58.

In terms of the percentage of entities that do not implement any innovations, regardless of whether they only considered innovation activity or did not even undertake it, the situation in Poland is better. Innovation activity in Romania, as well as Bulgaria, Turkey, Latvia, Hungary and Malta is significantly lower, while Slovakia and Spain have similar indicators.

Details of the profiles can be found in the Table 1.

Table 1.
Innovation profiles of enterprises

Country	GBP per capita 2019 (EUR)	Innovative profile (percentage of companies)						
		I	II	III	IV	V	VI	VII
Bulgaria (BG)	6960	13,5	11,3	24,6	6,5	2,5	8,1	33,5
Czechia (CZ)	18820	36,6	20,0	17,7	3,4	0,7	8,4	13,3
Germany (GE)	36720	40,2	24,6	15,5	4,3	3,3	8,6	3,5
Estonia (EE)	15570	22,1	21,6	33,4	0,3	1,9	4,2	16,4
Greece (EL)	17 930	42,1	24,1	16,1	3,2	1,3	5,9	7,3
Spain (ES)	25 420	28,5	22,0	8,1	5,9	4,6	16,1	14,8
Croatia (HR)	12 980	23,6	26,6	15,8	7,2	0,8	11,2	14,8
Italy (IT)	27 260	23,9	21,8	21,9	2,6	5,2	3,7	21,0
Latvia (LV)	12 230	20,5	6,9	18,6	3,8	1,2	27,6	21,4
Lithuania (LT)	14 300	28,0	19,2	24,3	8,8	2,4	4,6	12,7
Hungary (HU)	13 490	26,4	12,9	7,4	6,9	4,0	32,4	10,0
Malta (MT)	23 520	17,0	14,0	18,2	2,8	1,4	15,5	31,0
Austria (AT)	38 040	53,6	10,3	16,3	3,4	2,6	3,1	10,6
Poland (PL)	13 370	20,8	16,8	21,1	3,7	4,5	3,8	29,3
Portugal (PT)	18 500	38,7	17,5	15,6	5,0	6,7	11,0	5,5
Romania (RO)	9 310	8,8	7,1	6,9	1,5	2,3	18,5	54,9
Slovakia (SK)	15 940	32,1	7,7	14,7	5,8	6,8	21,1	11,9
Finland (FI)	36 970	46,0	16,4	11,8	2,4	8,1	0,0	15,3
Sweden (SE)	43 790	37,6	17,8	19,7	5,3	4,4	4,2	11,0
Serbia (XS)	5 440	28,4	18,7	9,7	11,6	0,3	10,6	20,6
Türkiye (TR)	11 500	24,5	12,7	13,0	0,9	5,1	21,6	22,2

Source: Eurostat.

In terms of sources of information on innovation, the European enterprises surveyed are less likely to use private sector clients and even less likely to seek information from public sector clients. Polish companies are characterised by some of the lowest indicators. They are most likely to use group companies as a source of information about innovations. In this respect, companies from Estonia are interesting, as they most willingly use information from suppliers and customers from the public sector, and from Italy, where suppliers have the greatest influence and companies from the corporate group the least.

The distribution of responses from the surveyed enterprises may indicate that there may be non-linear models of innovation processes, which may be suggested by various sources of information on innovation indicated as important, but this requires verification during further surveys among entrepreneurs.

4. Summary and conclusions

Innovations are an important pillar in the development of the European Union's economy, which tries to encourage enterprises to develop them. At the same time, it is improving the tools for collecting data that allow for assessing the effectiveness of innovation policy. However, these tools are still not perfect, and the results of research conducted by Eurostat need to be

supplemented to find answers to the question of how various instruments, especially financial ones, stimulate innovation activity.

The correlation between GDP per capita and the percentage of enterprises implementing independently developed product innovations and those that do not conduct innovation activities or are only considering them indicates a strong connection between these values. Of course, it is possible to discuss whether the level of economic development promotes innovation or the other way around. It is most likely that there is bidirectional stimulation in these areas. The cases of European countries with higher business innovation activity than indicated by GDP suggest that it is possible to stimulate it through appropriately designed innovation policy instruments, which need to be continuously researched and developed.

A factor that certainly promotes the development of innovation is the size of the enterprise, but in all European Union countries the economy is dominated by medium-sized and small entities, so we should look for other stimulants to enhance innovation.

The available data do not clearly indicate whether the applied models of innovation processes or the willingness to use particular sources of information on innovations influence the overall level of innovation in enterprises. This is particularly visible in the case of Estonia, where enterprises are less willing to use various sources of information on innovations apart from public sector clients, which is the source they use most often among entities from all countries covered by the survey. Meanwhile, Estonia has been steadily progressing in its position in the European Innovation Scoreboard reports, and in the latest one it is rated as a strong innovator, recording a significant increase in its innovation score, changing its position by as much as two groups from 2021. Meanwhile, Poland remains in the group of emerging innovators, despite the progress that is being observed. This confirms the need to seek new opportunities to increase innovation. This is very difficult, because there are no conclusive research results to develop an effective support system. It is necessary to use new tools, such as the described innovation profiles, and to continuously carry out research on the attitudes of enterprises towards innovation and on the internal and external determinants that can stimulate their innovation activity.

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