

CHANGES IN THE INNOVATIVE ACTIVITY OF POLISH ENTERPRISES IN THE YEARS 2019-2021

ZMIANY W DZIAŁALNOŚCI INNOWACYJNEJ POLSKICH PRZEDSIĘBIORSTW
W LATACH 2019-2021

<https://doi.org/10.34739/zn.2023.61.04>

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JEL Classification Codes: O31

Abstract: The underlying objective of this paper is to identify the condition of and specify the changes in the innovative activity of Polish enterprises in the years 2019–2021. The first part of the article constitutes an overview of the definitions and types of innovation presented in the subject literature. The empirical part involves an analysis of the results of GUS (Statistics Poland) studies conducted for three periods of innovative activity of enterprises (2017-2019, 2018-2020, 2019-2021). The results of the carried-out analyses indicate an increase in the share of innovative enterprises in the total number of enterprises in Poland. In each size class of industrial and service enterprises, the implementation of process innovations dominated. In the analysed period, an increasing expenditure on innovative activities was observed, and the expenditure dynamics indicators were significantly higher in the entities conducting service activities. In the structure of financing innovative activities own funds played the most important role, regardless of the size of the enterprise and the type of the activity.

Keywords: innovative activity of enterprises, product innovations, business process innovations, investment in innovation, innovation funding sources

Abstrakt: Zasadniczym celem opracowania jest identyfikacja stanu oraz określenie zmian w działalności innowacyjnej polskich przedsiębiorstw w latach 2019–2021. Jego pierwsza część stanowi przegląd prezentowanych w literaturze przedmiotu definicji i rodzajów innowacji. W części empirycznej dokonano analizy wyników badań GUS przeprowadzonych dla trzech okresów działalności innowacyjnej przedsiębiorstw (2017-2019, 2018-2020, 2019-2021). Wyniki przeprowadzonych analiz wskazują na wzrost udziału przedsiębiorstw innowacyjnych w ogólnej liczbie przedsiębiorstw w Polsce. W każdej klasie wielkości przedsiębiorstw przemysłowych i usługowych dominowało wdrażanie innowacji o charakterze procesowym. W analizowanym okresie zaobserwowano rosnące nakłady na działalność innowacyjną, przy czym wskaźniki dynamiki nakładów były znacząco wyższe w podmiotach prowadzących działalność usługową. W strukturze finansowania działalności innowacyjnej, bez względu na wielkość przedsiębiorstwa i rodzaj działalności, najważniejszą rolę odgrywały środki własne.

Słowa kluczowe: działalność innowacyjna przedsiębiorstwa, innowacje produktowe, innowacje procesu biznesowego, nakłady na innowacje, źródła finansowania innowacji

Introduction

One of the major reasons for the growing interest in the issue of innovation has been the continuous evolution of the conditions in which contemporary enterprises operate. Rapid and unforeseen changes in the environment along with increasing competitor pressure have made innovation a necessary part of the fight to allow the company to continue in business (Sobolewski, Wściubiak, 2017, p. 446). From the point of view of the enterprise, innovation may encompass market offer extension, quality and functionality improvements to the products on

offer, cost reduction, reaction-time reduction, increase in customer needs' satisfaction, or the facilitation of business's adaptation to new legal regulations.

Innovation is one of the fundamental determinants conditioning the development of economies of individual countries, regions and enterprises. Innovations set the pace and directions of economic development and the forms of international cooperation (Mazur-Wierzbicka, 2015, p. 97). Innovation of the economy is the ability and motivation of entrepreneurs to continuously seek and implement research and development findings,

new ideas, concepts and inventions. It further comprises the refinement and development of existing production technologies and service processes, the implementation of new organization and management solutions, the improvement and development of infrastructure, above all, with respect to the collection, processing and circulating information, following the idea of the information society (Pomykalski, 2000, pp. 18-19). The condition for boosting the level of economy innovation is the development of the innovative operations of individual enterprises.

The underlying objective of this article is to identify the changes in the innovative activity of Polish enterprises in the years 2019-2021.

Literature review

Even though the term innovation was coined at the beginning of the 20th century, there has been no one homogenous, universal definition of the concept until today. The diversity of the available definitions implies the complex character of the phenomenon, its multifaceted nature and the continuous evolution of the way it has been perceived. When defining innovation, one may apply one of two approaches: result-based and process-based. The definitions of the former type identify innovation with a change which leads to the introduction of a new or an improved product, process or organizational solution. The process approach emphasizes creative thinking and a sequence of actions aimed at the application and use of new or improved solutions.

The result-based approach is presented in the definition by J.A. Schumpeter, considered the precursor of innovation, who described innovation as (Schumpeter, 1960, p. 322):

- introducing new products into production or improving existing ones,
- introducing a new or an improved method of production,
- opening a new market,
- using new raw materials, new sources of raw material acquisition or new organization of production,
- using a new sales or purchase solution.

The scope of innovation understood in the above manner should be deemed very broad, for it comprises all technical and organizational changes that may take place in the enterprise.

The result-based understanding of innovation is presented also by Ch. Freeman, Ph. Kotler and M.E. Porter. For Freeman, innovation is the first commercial application of an invention (Freeman, 1982, p. 7), whereas Kotler likens innovation to any good, service or idea, which will be perceived

as new by the producer or the recipient (Kotler, 1994, p. 322). Porter, in turn, views innovation as the exploitation of new ideas, which is to bring about economic benefits, technological improvements, and refined methods or ways of use of a given thing (Porter, 1990, p. 51-52). This approach to innovation encompasses both the simple modifications of existing processes, products, and practices, which may be new to the enterprise but not to the industry, and entirely new products and processes, which are novel both to the industry and to the enterprise.

The result-based approach in the Polish literature is presented, amongst others, by J. Baruk. He describes innovation as a purposefully human-designed change regarding a product, methods of production, work organization, or methods of management, applied for the first time in a given enterprise in order to achieve socio-economic benefits (Baruk, 2006, p. 102; Baruk, 2014, p. 234-235). Similarly, M. Dolińska defines innovation in a result-based manner, by referring to tangible and intangible novelties introduced into an economic unit and/or on the market (Dolińska, 2010, p. 22-23).

The process-based understanding of innovation shows the process of creating innovation composed of several stages: design, realization, adaptation and implementation of a new product or a new method of production. In such a context. R. Simonetti, D. Archibugi, and R. Evangelista discuss innovation and define it as a creative and interactional process engaging the market and off-market institutions, aimed at a creative use of various forms of knowledge, responding to market demand and the requirements set by the innovative society (Simonetti, Archibugi, Evangelista, 1995, p. 79). Amongst the Polish researchers, it is F. Budziński who suggests the process-based approach, emphasizing that innovations are a cumulative process, for the majority of them substitute the already existing techniques and contribute to the effectiveness of old techniques and improvements to their quality, whereas the creation of a novelty is conditioned by access to pre-existing knowledge (Budziński, 1996, p. 15).

Upon an analysis of the methods of defining innovation, we may identify their common features, which are underlined by researchers irrespective of their adopted research approach. One of the joint features of innovation is its bearing the stamp of newness. It is about unprecedented solutions which are applied by the enterprise to gain an advantage. In addition, innovation is characterized by some elements of dynamics, for it is a tool for modifying organizations or responding to the changes in the environment or an anticipative action having an impact on the environment. Innovation is also

indicative of success. Innovations are actions the effect of which should be the attainment of goals set by the enterprise. Another significant point is that innovations are not a value on their own but they have an effect on the process of delivering a new value to the enterprise. Innovation is a tool for the achievement of a more advantageous competitive position by enterprises and for the outperforming of competitors. Innovations are also associated with risk, i.e. one may say with only some degree

of probability that the objects of innovation will turn out beneficial and guarantee desired outcomes.

The multidimensionality of the term is reflected in its various types (Tab. 1). Dividing innovation into different types, one may note the role it plays in the process of market development of enterprises. The individual types of innovation determine in a significant way the company's competitive position. What is more, certain types of innovation have various implications for entrepreneurs.

Table 1. Classifying innovation

Criterion of classification	Type of innovation
Material scope	<ul style="list-style-type: none"> • product – concerning the introduction of new products of higher functionality levels on the market; products which deliver their customers objectively new or greater advantages; • process – an effect of introducing new or markedly improved methods of production or development of a service, including those in the field of finances, distribution or research and development; they may have the nature of changes involving equipment, human resources, methods of work, customer service, or a combination of those changes; • organizational – involves the introduction of a new organizational method into the current company business practices; they may concern a change of procedures and methods of performing work; • marketing – refers to the implementation of new or improved marketing systems, which result in modifications in the construction and appearance of a product, its distribution, methods of promotion, or its marketing strategy;
Causes	<ul style="list-style-type: none"> • demand-based – revealed as a consequence of the needs communicated by the market; • supply-based – generated as a consequence of discoveries and inventions of explorers or inventors as a consequence of their inquisitiveness, creative predispositions or the need of personal fulfilment;
Method of development and implementation	<ul style="list-style-type: none"> • systemic (planned) – developed and implemented by specialists as part of a process repeatable and improved within a given organization, more and more often – network-based; • unit – developed and implemented by a single employee, whose creative mind and seeking new, more effective solutions lead to innovation;
Place of application of innovation	<ul style="list-style-type: none"> • within the enterprise – created by the company and used solely for its purposes; • in the market environment of the enterprise – pursuing goals of the environment, in which the company responsible for innovation operates;
Originality of applied changes	<ul style="list-style-type: none"> • pioneer (radical, original) – an effect of creative solutions based on new knowledge, applied in the economy for the first time and playing a significant role in its development; • imitative (adaptative, derivative) – involving the application by the enterprise of imitation of original solutions pre-applied in the economy;
Source of origin	<ul style="list-style-type: none"> • created independently by the enterprise; • created by the enterprise in cooperation with other business entities; • purchased by the enterprise;
Time horizon of the effects	<ul style="list-style-type: none"> • strategic – aimed at assuring the enterprise a competitive position it requires in the future; • tactical – a tool of realization of current needs of the enterprise and a response to current market demands;
Impact on competitive position	<ul style="list-style-type: none"> • distorting – they have a nature of groundbreaking technological discoveries/inventions, the initial value of which was difficult to estimate and, therefore, they do not generate concerns amongst the competition; with time, competitors become aware of the developmental potential of the discovery/invention, but the significant market advantage will be with the enterprise which has introduced this type of innovation; • supporting – innovations introduced by the enterprise to maintain its current competitive position.

Source: own study compiled on the basis of: Dolińska, M. (2010), *Innowacje w gospodarce opartej na wiedzy* [Innovations in the knowledge-based economy]. Warszawa: PWE, pp. 17-21; Mazur-Wierzbińska, E. (2015), *Działalność innowacyjna przedsiębiorstw w Polsce* [The innovative activity of enterprises in Poland]. Zeszyty Naukowe Wyższej Szkoły Ekonomicznej w Tarnowie, vol. 26, no. 1, pp. 98-101; Styś, A., Dejnaka, A. (2018), *Innowacje w biznesie* [Innovations in business]. Warszawa: Difin, pp. 21-22.

The term innovation is strictly related to the term enterprise innovativeness, which describes its tendency and ability to develop and acquire new and improved products, services or technologies (Janasz, Koziół, 2007, p. 57). An innovative company is an intelligent organization permanently generating innovations and accomplishing innovative projects for the needs of manufactured products and provided services broadly accepted by recipients due to their state-of-the-art quality and competitiveness (Sosnowska, 2000, p. 25).

Innovativeness means the possession and development of competencies and skills to apply innovative solutions to internal operations and on the served markets, and flexible adjustment of operations to changes occurring in the environment. It is preconditioned by the ability to manage knowledge effectively and to use it in practice in the processes of innovation oriented at an increase of values created for customers. Another important element here is the well-developed relation with the environment. Knowledge at an enterprise's disposal, combined with a knowledge of its partners, become a source of creating values oriented not at the owner or customers, but rather at all of the interacting subjects (employees, society, partner organizations, including academic centers and R&D facilities) (Mikuła, 2008, p. 82).

Methodology

This paper involves an analysis of the results of GUS (Statistics Poland) studies conducted for three periods of innovative activity of Polish enterprises (2017-2019, 2018-2020, 2019-2021). The studies are founded on the methodological standard set out in the Oslo Manual drafted by OECD and Eurostat. The specified methodology defines an enterprise conducting innovative activity as an entity which has introduced at least one innovation over a period of three years (a new or improved product or a new or improved business process), a novelty from the point of view of the said entity (Oslo Manual 2018, 2020, p. 36). This means that only undertakings which have been implemented are considered innovative.

The analysis comprises the share of innovative enterprises in the total number of industrial and service enterprises, the share of innovative enterprises in the general number of industrial and services enterprises by the type of innovation, the share of industrial and service enterprises that introduced business process innovations, and investment in innovative activity and its funding sources.

Results and Discussion

In the period 2019-2021, the participation of innovative industrial and services enterprises in the total number of those enterprises was 22.5% and 19.7%, respectively (Działalność innowacyjna polskich przedsiębiorstw w latach 2019-2021 [The innovative activity of enterprises in the years 2019-2021], 2022, p. 27). Their share compared to the period 2017-2019 increased by 3.6 p.p. in the industry and by 7.8 p.p. in services (Działalność innowacyjna polskich przedsiębiorstw w latach 2017-2019 [The innovative activity of enterprises in the years 2017-2019], 2020, p. 31). In each of the analysed periods, product or process innovations were most often introduced by entities with 250 employees or more (Figure 1). Large enterprises, typically oriented at constant growth, are more capable of undertaking cooperation with domestic and foreign research centers and, above all, have more financial resources. Innovation by small and medium enterprises, in turn, depends on the conditions created by the state's economic policy.

In the analysed periods, industrial enterprises dominated innovation. One exception from this rule concerned the operations of entities employing 10 to 49 people in the periods 2018-2020 and 2019-2021. However, the disparities between the industry and services are not vast, which gives grounds for the conclusion that the size of the company rather than the type of conducted business activity determines to the greatest extent the ability to implement innovative solutions.

The findings of GUS's analysis of innovative activities of Polish enterprises suggest that there are more process innovations implemented than the product ones in industrial and services enterprises alike (Table 2). In the analysed years, the participation of the entities which introduced process innovations increased by 2.7 p.p. in the industry and by 7.8 p.p. in services. The growth of the share of enterprises which implemented product innovations was lower and amounted to 0.5 p.p. both in industry and services enterprises. The revival in the introduction of process innovations was caused, among others, by the COVID-19 pandemic and the need for many entities to adapt to the restrictions related to the lockdown. Those projects that were postponed in the past, in particular IT projects, then became a priority and necessary for conducting business in the conditions of numerous restrictions.

Business process innovations involved, most of all, the application of a new or a significantly improved production method or an introduction of systems supporting provided services. The objective of

the implementation of that type of innovations was, above all, to cut administrative and transaction costs, to increase employee satisfaction with their workplace, to gain access to intangible resources (e.g. knowledge), and to reduce delivery costs.

Product innovations typically comprised the implementation of a new product or a product substantially improved when compared to its original version. The improvements concerned not only

product's features (technical specification, used components and materials, software, easy operation, or other functional characteristics), but also its new applications and methods of use. In the case of services, improvements included changes in service provision (e.g. swiftness and effectiveness), additions of new functions or features to existing services, or introducing novel services.

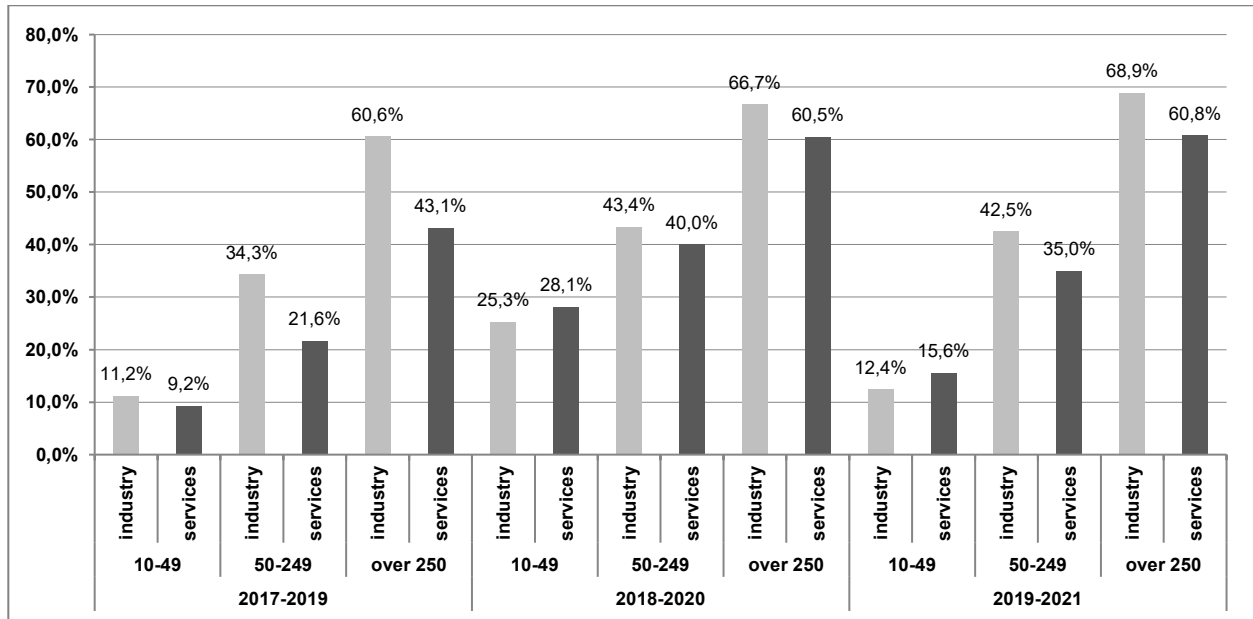


Figure 1. Share of innovative enterprises in the total number of industrial and services enterprises

Source: compiled on the basis of Działalność innowacyjna przedsiębiorstw w latach 2017-2019 [The innovative activity of enterprises in the years 2017-2019] (2020). Warszawa-Szczecin: Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie; Działalność innowacyjna przedsiębiorstw w latach 2018-2020 [The innovative activity of enterprises in the years 2018-2020]. (2021). Warszawa-Szczecin: Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie; Działalność innowacyjna przedsiębiorstw w latach 2019-2021 [The innovative activity of enterprises in the years 2019-2021]. (2022). Warszawa-Szczecin: Główny Urząd Statystyczny, Urząd Statystyczny w Szczecinie.

Table 2. Share of innovative enterprises in the total number of industrial and services enterprises (in %) by the type of innovation

Specification	Type of innovation		
	product	business process	product and business process
Period 2017-2019			
- industry	13.6	15.3	10.0
- services	6.3	10.3	4.7
Period 2018-2020			
- industry	18.4	26.3	13.3
- services	12.1	27.6	8.9
Period 2019-2021			
- industry	13.1	18.0	9.1
- services	6.8	18.1	5.2

Source: as per Figure 1.

In the period 2019-2021, 18.0% of industrial enterprises and 18.1% of services enterprises introduced business process innovations, i.e. 2.7 p.p.

more industrial entities and 7.8 p.p. more services entities than in the years 2017-2019 (Działalność innowacyjna polskich przedsiębiorstw w latach

2017-2019 [The innovative activity of enterprises in the years 2017-2019], 2020, p. 45; Działalność innowacyjna polskich przedsiębiorstw w latach 2019-2021 [The innovative activity of enterprises in the years 2019-2021], 2022, p. 40). In the period under review, the highest percentage of industrial and services entities who implemented new organizational methods were reported in the entities employing 250 people and more (Table 3).

Business process innovations involved the introduction of new organizational methods into current company business practices, into the workplace or into external relations of a given enterprise. With respect to business practice, innovations comprised new methods of organizing procedures and ways of performing work. As far as the workplace is concerned, innovations mostly

included the shifting of responsibilities and changing the methods of employee decision-taking. Organizational innovations in company external relations were new methods of organization of relations with other market entities.

A particular form of innovation were undertakings associated with the application of a new marketing method, which comprised changes in product or packaging design, the placement method, the form of promotion, or the price setting. Their superior goal was to meet the needs of customers, explore new markets, or create a novel method of product or service placement, which would allow an increase in company sales. Those were the changes related to marketing strategy elements significantly different from the ones previously applied by companies.

Table 3. Industrial and services enterprises which innovated the business process, with the number of employees (in %)

Specification	Number of employees		
	10-49 people	50-249 people	over 250 people
Period 2017-2019			
– industry	8.3	28.7	55.5
– services	7.8	18.8	41.2
Period 2018-2020			
– industry	27.0	36.5	61.1
– services	24.8	37.0	58.1
Period 2019-2021			
– industry	9.4	36.0	62.1
– services	14.1	33.1	58.4

Source: as per Tab 2.

In the years 2019-2021, 52.7% of the total investment in innovative activity was done by industrial companies. The dynamics indices, however, are markedly higher for entities conducting services activities (Table 4). In the year 2021, investment in innovative operations in the group of industrial enterprises was slightly above PLN 19.0 billion, and was lower by 6.6% compared to the preceding year, and by 17.8% compared to 2019. In the year 2021, investment in services enterprises reached PLN 22.3 billion, which means that it was higher by 21.5% compared to the year 2020, and by 45.1% compared to the year 2019.

Until relatively recently, the service sector was considered less innovative than the industry, and innovations in services were treated as secondary to the solutions created and implemented in the production sphere. The high rate of dynamics of expenditure on innovative activities in service entities, higher than in industry (145.1% in the period

2019-2021), allows us to assume that the growing competition on the services market means that service companies are forced to look for more and more effective tools to gain the market advantage, whereas the need to distance competitors and achieve success results in the search for what is new, better, more effective and more difficult to imitate. The innovativeness of service enterprises is supported by the dynamic processes of development and the dissemination of information and communication technologies, as well as the growing and diversifying demands of consumers.

Throughout the discussed period, the largest investment in innovative activities among industrial enterprises was reported by enterprises employing 250 or more people. Their participation in investment in innovations in total, both in industrial and services entities, was very high and in the year 2021 amounted to 69.9%.

Table 4. Expenditures on innovation activities in enterprises (current prices) by number of persons employed (in PLN million)

Specification	Number of employees			Total
	10-49 people	50-249 people	over 250 people	
2019				
– industry	1 655,3	3 945,1	17 578,5	23 178,9
– services	2 761,0	2 937,7	9 702,1	15 400,8
2020				
– industry	1 803,2	3 852,5	14 722,5	20 378,2
– services	2 501,3	2 926,8	12 971,1	18 399,2
2021				
– industry	1 662,9	4 060,3	13 318,3	19 041,5
– services	3 043,1	3 677,9	15 627,7	22 348,7
Dynamics 2019-2021 (2019 = 100%)				
– industry	99,9	102,9	75,8	82,2
– services	110,2	125,2	161,1	145,1

Source: as per Tab 2.

With respect to product and business process innovations, financial expenditure covered, above all (Działalność innowacyjna... [The innovative activity...], 2022, p. 58):

- research and development works (R&D) conducted by own or purchased development facilities;
- own staff working on innovations (gross remuneration and surcharges on remuneration) irrespective of the type of contract (full-time employment, civil-law contracts);
- third-party materials and services purchased to pursue innovative activities;
- investment in tangible fixed assets in use and intangible assets to carry out innovative activities;
- remaining activities in new or improved products or business process, i.e. designing the product, defining the service provision

method, preparing production/distribution for innovation;

- staff training and professional development;
- marketing (including market research) and costs of registering and monitoring intellectual property developed by the enterprise, directly related to the introduction of product or business process innovations.

GUS's research findings demonstrate that the funding of investment activity in Polish enterprises is dominated by internal resources (Table 5). Their participation in the structure of financing of industrial entities fluctuated between 75.0% in 2019 and 76.3% in 2021. In each of the analysed years, this was somewhat higher in services enterprises. Own resources used in the funding of innovative activity comprise, above all, funds from the division of retained profit, which depend on the developmental strategy adopted by the owners of a given entity.

Table 5. Share of investment in innovative activities of enterprises, by the funding source (in %)

Specification	Source of funding				
	own	state budget	acquired from abroad	bank loans	other
2019					
– industry	75.0	2.9	5.4	6.6	10.1
– services	82.8	2.3	7.6	3.7	3.6
2020					
– industry	75.6	3.2	8.1	6.1	7.0
– services	85.3	1,9	6.9	3.8	2.1
2021					
– industry	76.3	3.8	9.7	6,0	4.2
– services	87.9	2.5	5.6	2.1	1,9

Source: as per Tab. 2.

In Polish enterprises, second place in terms of participation in the structure of funding investment was taken by bank loans, typically investment loans. Their percentage in the funding structure was higher in industrial entities, although, in the period 2019-2021, it decreased from 6.6% to 6.0%. The decreasing trend was also reported in services enterprises (3.7% in 2019 and 2.1% in 2021).

The lower level of financing innovations with funds from investment loans was related to the ongoing COVID-19 pandemic in the period 2020-2022. The weaker corporate lending performance observed during the pandemic resulted from a sense of business uncertainty and difficulty predicting the future economic and regulatory environment. Interest in taking out loans will certainly remain at a similarly low level in the near future due to the limited investment opportunities caused by high inflation, high investment costs and the uncertain macroeconomic situation.

Foreign resources had a smaller role in investment funding than bank loans. Foreign funds mainly included those originating from the EU structural funds provided for business innovative activities as part of operational programs.

The least resources for innovation in Polish enterprises originated from the state budget. Their share in the financing of both industrial and services entities had the lowest variability level of all the sources. The funds from the state budget were derived mainly from the subsidies of the Polish Agency for Enterprise Development (PARP) and,

to a lesser extent, from the National Center for Research and Development (NCBiR) and the Ministry of Science and Higher Education.

Conclusions

Innovations in enterprises have had a significant impact on their developmental potential. They are an effective tool for improving or maintaining a competitive edge. Most entities treat innovativeness as a special operational imperative and it becomes permanently embedded in their system of management and organizational culture.

The findings of the research in innovative activity conducted by GUS in the years 2019-2021 confirm that Polish enterprises show a significant innovative potential, which is reflected by the growing number of innovative businesses and the scope of innovations, to include the process innovations.

The level of innovative activity and investment expenditure vary depending on the size of the business entity. Innovations of all types are most often introduced by enterprises employing 250 or more people. Large entities have a markedly higher level of investment when compared to small and medium-sized companies. What is worrying is that there has been a drop in investment in innovations in large production entities. An increase in investment was reported across all classes of sizes of entities conducting service activities. The funding of investment activity in Polish enterprises is clearly dominated by internal resources.

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