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FINANCIAL ASPECTS OF INNOVATION ACTIVITY OF ENTERPRISES

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Purpose: The purpose of the paper is to assess the innovative activity of enterprises in Poland with a particular focus on the sources of funding of projects implemented by industrial and service enterprises, as well as to examine the relationship between the respective forms of funding and the level of innovative activity of small, medium and large business units.
Design/methodology/approach: The first part of the article includes a critical analysis of the literature on the financial determinants of the innovative activity of business units. The empirical analysis was based on statistics published by the Central Statistical Office of Poland (CSO), which were used to assess the level and structure and dynamic of the respective sources of funding for innovative activities of enterprises in Poland in 2013-2022. The Pearson correlation coefficient was used for examining the relationship between the scale of innovative activity of enterprises and the sources of their funding.
Findings: The primary source of funding for the innovative activities of enterprises in Poland was their own funds, the level of which had the greatest impact on undertaking activity in this area. In SMEs, especially small enterprises, funds obtained from abroad were also important, and the shortage of own financial resources necessary to cover expenses later reimbursed by EU grants was supplemented by bank loans, access to which made it possible to increase the scale of ongoing projects. Large companies with financial credibility and assets to secure loan repayment, made their innovation activity highly dependent on the ability to raise capital from financial institutions, and in addition they were willing to use alternative forms of funding.
Originality/value: The analysis includes not only the scale and sources of funding of innovative activity of enterprises in Poland, but also the relationship between the level of expenditure on innovations and the use of various forms of funding.
Keywords: innovations, innovative activity, sources of financing.
Category of the paper: Research paper.

1. Introduction

Constant changes in the environment, as well as increasing competition, force companies to constantly develop, a key element of which is innovation. In modern economy, innovation, encompassing a set of organized activities indispensable for the growth of a company's

efficiency and competitive position, is seen as a tool and also a function of entrepreneurship, whose task is to transform an idea into a specific product or service that meets specific needs, with the ability to generate profit, multiply capital and create the conditions for the continued operation and development of the enterprise (Duraj, Papiernik-Wojdera, 2010). Investing in novelties, accompanied by an increased demand for capital and a higher level of risk, is one of the most important challenges currently facing companies aware that modern solutions enable them to improve and consolidate their market position. The implementation of projects that usually exceed the financial capabilities of enterprises, with insufficient levels of own financial resources, prompts business units to seek funds from other sources, the most important of which are funding from financial institutions, as well as public support from the EU and national budgets.

The purpose of the article, having first introduced the essence of innovation funding, is to assess the innovative activity of enterprises in Poland in 2013-2022 on the basis of data from the Central Statistical Office of Poland taking into account innovation expenditures and sources of funding innovative activity of industrial and service enterprises in the adopted studied period, as well as to examine the relationship between the level of innovation expenditures in SME entities and large enterprises and the respective sources of their funding.

2. Sources of Financing for Innovative Activities

Innovation activity, which is the process of transforming existing capabilities into new ideas and putting them into practice, is associated with large expenditures, long payback periods and specific risks (Makieła, 2013; Fagerberg, 2005). One of the main factors influencing innovation decisions, allowing further development and faster adaptation to the constant changes in the environment, is the opportunities for funding innovative solutions. Financial determinants of innovation can be either external or internal. The former are independent of the policies and financial decisions of economic managers, and their nature and impact are closely related to the development of the economy and the financial system operating within it. The latter depend primarily on the entity's financial policy and market strategy, the implementation of which affects the financial structure. In order to optimally select a funding structure, it is necessary to determine current and future funding needs, taking into account the availability of a given source, as well as its price. Maintaining the right capital structure is very important, as it allows the company to maintain its credibility and promotes the provision of resources for further funding, thus reducing the risk of not having sources of capital for innovative ventures (Krawczyk, 2012; Bal-Woźniak, 2020).

Business owners who intend to pursue innovative ventures face many dilemmas that can effectively constrain them. Among the most important factors inhibiting the implementation of innovations by companies are undoubtedly the sources of funding, the cost of the innovation process and economic risks (Chen, Hai, Wu, 2015; Santos, Cincer, Cerulii, 2024). The high risk of not achieving the expected results of innovation implementation, which increases the cost of raising funds, is an important reason for not undertaking innovative activities (Crowley, 2004).

In terms of analysis of factors shaping the structure of funding, it is important that companies prefer equity in funding, including in funding innovative activities (Brojakowska-Trząska, 2018; Pia, Lin, 2020). Own financial resources that are often inadequate mean that implementation of innovative projects that enable the enterprise to develop and increase its value requires external capital. Therefore, the concept of funding innovative activities makes it reasonable to adopt the so-called financial engineering, i.e. funds from various sources (Janasz, Kaczmarska, Wasilczuk, 2020). Equity can be raised both from internal sources, i.e. from a portion of the organization's net profit, and from external sources, among others from the proceeds from increasing shares and issuing stocks. In turn, external capital is the means by which funds are provided to enterprises from various institutions operating in their environment (Janiszewski, 2022). However, the ability to raise the necessary capital depends on the scope of business, the period of operation and the development phase of the enterprise, the form of ownership, the quality of the management team in place, the situation in the external environment, but most importantly - the venture being implemented. The financial needs of the companies that implement innovations are also subject to changes, which, among others, are due to the costs related to development of a new product or service, the state of technical sophistication of the innovation project and its degree of risk, or the phase of the innovation process to which the funding relates (Kokot-Stępień, 2018; Szatkowski, 2016; Zakrzewska, Kijek, 2017).

Innovative activities can be financed from the company's equity resources, as well as from market sources and public funds. However, companies face significant difficulties in funding innovation from external sources. Obtaining public support is hampered by a complicated procedure, excessive formalization and bureaucracy, a large number of normative acts and their frequent changes, as well as insufficient cooperation between science and business. Complicated procedures for granting subsidies, often unclear criteria for examining applications, as well as the way in which subsidies are granted (advance payments or reimbursement of costs incurred) are a significant barrier to obtaining national and EU subsidies. In turn, banks, fearing excessive risk, often take a dim view of funding risky innovative ventures. Among the impediments to accessing bank loans are lack of credit history, lack of the required collateral, interest rates and complicated banking procedures (Lewandowska, 2018; Janasz, 2020).

The improvement in availability of debt capital for innovative activities of enterprises should translate into their development and increase in incomes. It is important to start activities that allow for the implementation of innovative products and financial services which stimulate the increase in opportunities for financing with outside capital (Krawczyk-Sokołowska, Łukomska-Szarek, 2017).

3. Innovation Activity of Businesses in Poland

In Polish enterprises, the level of outlays on innovation is still relatively low, but what is satisfactory is the fact that in the years covered by the analysis, the value of outlays on innovation steadily increased from nearly 33 to over 55.7 billion zlotys. Thus, taking into account the border years of the research period, their level increased quite significantly, by nearly 22.7 billion zlotys, or 69%.

Based on data from the Central Statistical Office, Figure 1 illustrates the financial outlays incurred in 2013-2022 for the innovative activity of enterprises in Poland. In addition, the structure of individual sources of financing for this activity was assessed, as shown in Figure 2.

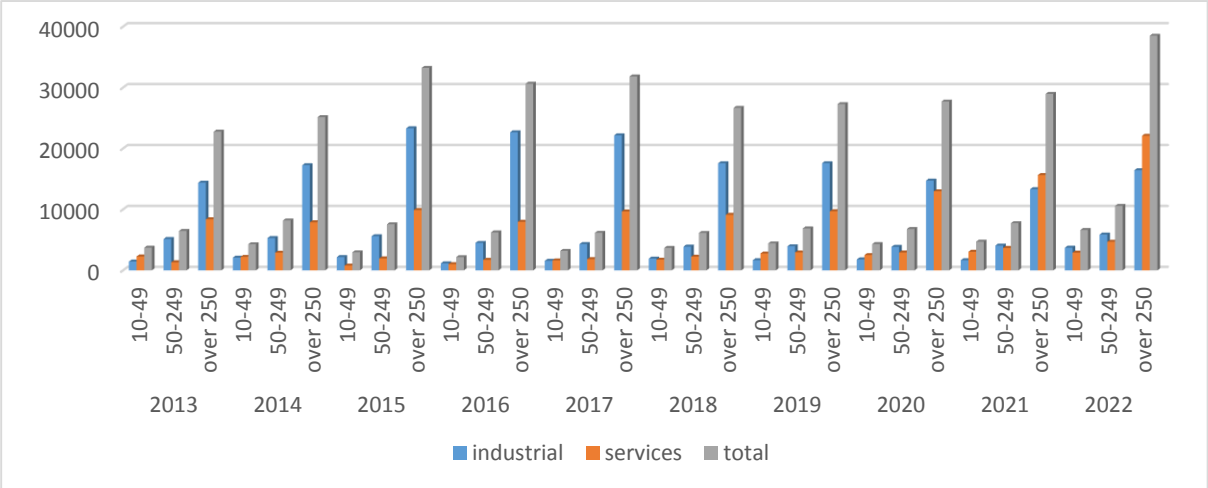

Figure 1. Expenditures on innovation activity of enterprises in Poland in 2013-2022.

Source: Own elaboration based on the data of the Central Statistical Office of Poland (CSO).

The largest impact on this value came from ventures implemented by companies in the services sector, where spending on innovation increased by more than PLN 17 billion. In terms of the size of their operations, expenditures increased to the greatest extent in large businesses (an increase of more than PLN 15.7 billion), while in small businesses the increase in expenditures of more than PLN 2.9 billion meant an increase of 78% in the years 2013-2022. In turn, taking into account the sector and size of business entities, the largest growth was recorded in medium-sized service companies, where expenditures increased 3.5 times in 2013-

2022. What is noteworthy is the fact of poor cooperation between enterprises and the scientific community, which, on the one hand, may be due to the mismatch between the offer of the scientific community and the needs of enterprises and, on the other hand, from the fact that the knowledge of this offer is very poor among entrepreneurs, hence enterprises most often prepare innovations on their own, at most cooperating with other economic entities.

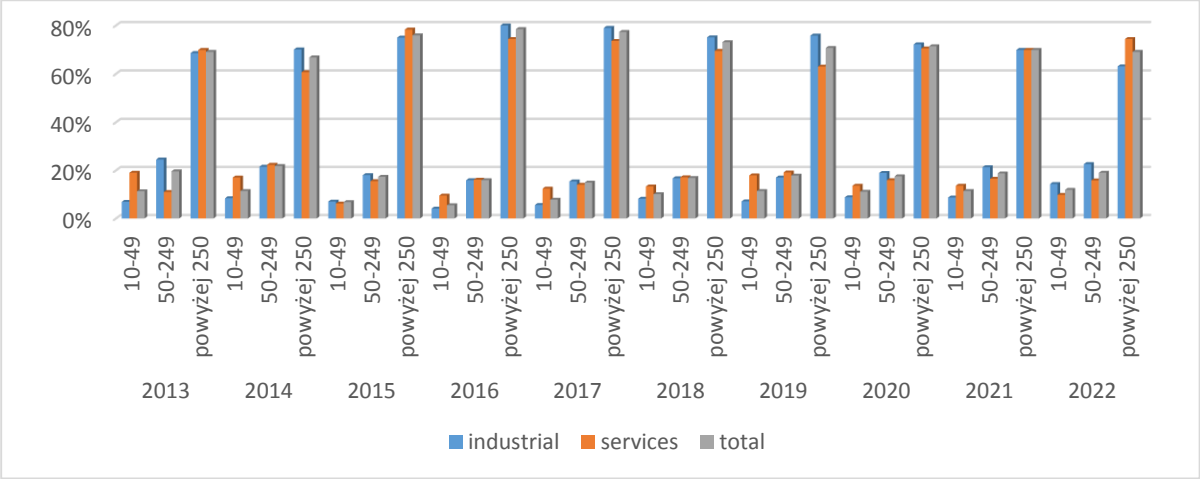

Figure 2. Structure of expenditures on innovation in Poland in 2013-2022.

Source: Own elaboration based on the data of the Central Statistical Office of Poland (CSO).

Due to the scale of their operations, the largest expenditures on innovation were made by large enterprises, whose share ranged from 67% in 2014 to 79% two years later. Innovation expenditures in business units employing between 50 and 249 people accounted for an average of 20%, while in small entities innovation expenditures accounted for about 10%. The highest level of innovation expenditures was recorded in large industrial enterprises, the value of which in total expenditures on the implementation of projects to ensure development represented from 61% in 2014 to as much as 78% the following year. Business units employing more than 250 people, having a higher propensity to take risks and, above all, a significantly larger budget than other entities, generally implemented higher-value projects, including capital-intensive product and process innovations, which in turn translated into their level of innovation activity. In medium-sized industrial enterprises, outlays ranged from 15% in 2017 to 25% in the first studied year, while due to limited capital resources, units with less than 50 employees allocated the least to innovation, and their share of total innovation outlays ranged from just 4% in 2016 to 14% in 2022.

4. Funding Innovations in Polish Enterprises

The most popular form of funding innovative activities of enterprises in Poland, regardless of the size of their operations, is own funds (table 1). Unfortunately, the funding of activities

solely by earned profits, is developing into a significant barrier to development, and is one of the main reasons for the low level of innovation in the Polish economy.

Table 1.
Level and structure of the financing sources for innovative activities in Poland in 2013-2022

		Own		Bank credits		From the state budget		From abroad		Others	
		MLN PLN	%	MLN PLN	%	MLN PLN	%	MLN PLN	%	MLN PLN	%
2013	**industrial**	14897,8	71	1456,2	7	330,5	2	1897,5	9	2376,9	11
	services	9544,8	80	996,6	8	234	2	999,2	8	206,3	2
2014	**industrial**	17032,2	69	2487,9	10	400,8	2	2477,5	10	2223,2	9
	services	8701,9	67	1326,8	10	283,3	2	2162,2	17	521	4
2015	**industrial**	19277,3	62	3574,1	11	626,7	2	2181,2	7	5434,9	18
	services	9221,6	73	789	6	202,1	2	2110,5	17	317,7	4
2016	**industrial**	20272,4	72	1897,1	7	462,1	2	497,5	2	5175,4	17
	services	9442,9	88	449	4	177,4	2	300,2	3	336,7	4
2017	**industrial**	21159,4	76	2019,5	7	441,2	2	1029,5	4	3373,9	11
	services	11262	86	537,6	4	278,8	2	506,3	4	557,5	4
2018	**industrial**	17658,2	75	1892,4	8	722,2	3	1266,9	6	1849	8
	services	11534,2	88	278,2	2	337,2	3	661,7	6	283,5	1
2019	**industrial**	17386,4	75	1520,8	7	696	3	1384,9	6	2190,8	9
	services	12750	83	568,6	4	364,3	2	1168,5	8	549,4	3
2020	**industrial**	15404,5	76	1237,6	6	657,1	3	1644	8	1435	7
	services	15697,1	85	705,7	4	260,9	1	1258,7	8	476,9	2
2021	**industrial**	14527,9	76	1141,2	6	715,8	4	1855,9	10	800,7	4
	services	19639	88	475,5	2	556,6	2	1243,5	6	434,1	2
2022	**industrial**	19866,8	76	1914,6	7	809,5	3	2387,1	9	1033,7	5
	services	26455,9	89	647	2	543	2	1305,9	4	737,7	3

Source: Own elaboration based on the data of the Central Statistical Office of Poland (CSO).

In 2013 and 2022, industrial enterprises covered the implementation of innovation projects with their own funds worth nearly PLN 177.5 billion. In the first five years of the studied period, the use of funds from this source steadily increased from nearly 14.9 to more than 21 billion zlotys (a 42% increase), with the 2017 value being the highest. In 2018, the trend reversed and the degree of use of own funds decreased to and including 2021 (a decrease of more than 31%), in which expenditures of just over PLN 14.5 billion (the lowest level) were covered from this source. In the last year, the growing trend returned, with nearly PLN 19.9 billion of funds spent by companies in the course of their business on innovation. Taking into account, in turn, the extreme years of the studied period, the use of own funds increased by almost 5 billion zlotys, by more than 33%. The share of use of own funds in funding the innovative activity of industrial enterprises ranged from 62% in 2015 to 75-76% in 2017-2022. In turn, in the studied period, in the service sector enterprises, innovation expenditures of PLN 134.3 billion were covered from their own funds. The lowest level of own funds was recorded in 2014, when the amount of PLN 8.7 billion accounted for 67% of all sources of funding for projects. However, from 2015 to the end of the analyzed period, the use of this source increased with each successive year, and finally in 2022 it amounted to almost PLN 26.5 billion, making the share of own funds as high as 89%. In service companies, which usually implement marketing and

organizational innovations, the value of which is often lower than process and product innovations implemented by industrial entities, the degree of use of own funds was much higher, and their share averaged 83% of the total sources of funding for innovation activity.

During implementation of innovation projects, funds from abroad were used to a much lesser extent. In the entire period covered analyzed, in industrial enterprises subsidies from the EU budget covered nearly PLN 16.6 billion in innovation expenditures. The share of EU funds ranged from 2% in 2016, when the value of subsidies did not even reach half a billion zlotys, to 9-10% in 2013-14 and 2021-2022. The largest amount of funds from this source, at about PLN 2.4 billion, was used in 2014 and 2022. In services sector enterprises, on the other hand, funds raised from abroad totaled PLN 11.7 billion. In 2014-2015, the value of more than 2.1 billion accounted for 17% of all sources of funding for the innovative activity of this group of entities. In other years, the share of EU subsidies was much smaller, ranging from 3% in 2016 to 8% in 2019. At that time, the Smart Growth Programme implemented within the 2013-2020 financial perspective and the European Funds for Modern Economy Programme implemented in the current perspective, as well as regional programs implemented in the respective provinces, were of key importance for entities developing innovative activities. Support for this type of projects, as carrying a risk higher than investment projects, has been a priority for state aid. They were the main source of support for units implementing innovative ventures. Of particular importance was support for the development of SMEs through investments aimed at implementing technological, marketing and organizational innovations. It is worth adding, however, that with non-refundable funding, companies receiving the funds are not obliged to repay them, but nevertheless the condition for receiving them is an own contribution, which entrepreneurs must provide on their own. In addition, the companies receive funds to cover the so-called Eligible Costs, in the form of an advance or reimbursement of expenses, so it covers expenses from its own financial resources in advance. Moreover, as a condition for obtaining subsidy funding, it is necessary to demonstrate the innovativeness of the venture, and sometimes it is also mandatory to share the results of the innovative project in question. Unfortunately, despite the existing opportunities, this causes enterprises that are not very willing to use funds from the national or EU budget, to give up support fearing the accompanying procedures and preliminary requirements.

Even less important, especially in service-sector companies, were funds provided by banks in the form of bank loans. In this group, funds from this source made it possible to cover innovation expenditures worth PLN 6.8 billion. In 2016-2022, the share of bank loans was small and fluctuated between 2-4%, while only in 2014 the amount of just over PLN 1.3 billion accounted for 10% of the total sources of funding for innovation activity. In industrial enterprises, which typically implement more capital-intensive product and process innovations, bank loans financed expenditures of more than PLN 19.1 billion. For these companies, the share of this source of funding was higher than in service entities, averaging 7%, and in 2015, with a value of nearly PLN 3.6 billion, even 11%. The great reluctance to use foreign capital in

innovation activity is due, on the one hand, to a low level of the willingness to undertake financial risks, the desire to have full control over the enterprise, and on the other hand entrepreneurs are afraid of dependence on banks and financial institutions, including private equity funds, so they prefer to develop more slowly, but more safely, having all the activity under control, usually implementing projects whose cost of implementation does not exceed their financial capacity. In addition, companies, especially smaller ones, often have difficult access to capital from financial institutions, associated with the questionable creditworthiness of the borrower, which in turn is reflected in the interest rate and thus the price of the potential loan, as well as in the collateral required for the amount borrowed.

However, the smallest one was the share of funds obtained from the state budget, mainly in the form of bank guarantees, redemption of part of the loan, or special-purpose subsidies, because their share in all the enterprises amount to ca. 2%. Although not included in the lists published by the Central Statistical Office of Poland, companies also used other sources of funding, such as leasing, loans from family and friends, as well as venture capital or support from business angels.

In industrial enterprises from the SME sector, own funds accounted for between 43% in 2015 and 68% in 2021, while in units employing 50-249 people, the degree of using own financial surpluses was significantly higher, ranging from 67% in 2014 to as much as 89% in the last year covered by this analysis. In turn, in small enterprises, own financial resources accounted, on average, for slightly more than half of the sources of funding used for innovation projects. SMEs also used funds obtained from abroad to finance innovation activity, which in 2014 accounted for as much as 26% of all sources, while in 2017-2022 their share was 14-16%. This was undoubtedly due to the fact that a large part of the EU programs related to innovative activities were aimed at this group of entities, which in the indicated period were definitely more often used by units employing up to 49 people. Small businesses also had a relatively high share of bank loans, especially in the years when the amounts of EU funding were the highest, which may have been due to the required own contribution, and the shortage of own financial resources often resulted in the need to take out loans in banks. In large businesses, the main source of funding, i.e. own funds, accounted for between 78% in 2015 and 83% in 2022. The share of other sources was small, ranging from 1% to 6% in the case of funds received from the national or EU budget to about 5% in the case of bank loans (the exception was the amount of more than PLN 2 billion in 2015, which accounted for 10% of the total sources of innovation funding).

After analyzing innovation expenditures, as well as the sources of funding for innovation activity, the relationship between the studied variables was examined, taking into account not only the division into industrial and service enterprises, but also the scale of their activities. The Pearson correlation coefficient was used for this purpose, and the results of the study are presented in tables 2 and 3.

Table 2.
Correlation of financing sources and innovation expenditures in industrial enterprises

Correlation						
Sources		**Internal sources**	**Bank credits**	**From the state budget**	**From abroad**	**Others**
Scope of business	10-49	0,913069	0,674352	0,435340	0,879134	0,487928
	50-249	0,689339	0,469794	0,108022	0,642105	0,623094
	Over 250	0,947729	0,773652	-0,42416	-0,69616	0,916918

Source: Own elaboration

Taking into account the dependence of innovation expenditures in industrial enterprises on their sources of funding, it can be seen that to the greatest extent the ability to cover innovation expenditures with own funds occurred in small and large enterprises (very high dependence, above 0.9). Access to bank loans was important for entities employing more than 250 people, which implement the most capital-intensive innovations, moreover, they often have an established market position and adequate collaterals for repayment of liabilities, and in entities employing from 10 to 49 people, which could use them to finance the own contribution required in EU subsidies and cover the eligible costs of a given project, as the possibility of obtaining funds from abroad significantly stimulated their innovative activity. In general, small innovative companies were eager to take advantage of various forms of support, and participated in the programs aimed at them and allowing them to obtain EU funding. The significant support was also a grant, the so called "technological bonus" in the form of partial redemption of the credit taken to finance technological innovation. On the other hand, large enterprises, due to the lack of additional support for innovation activity, compensated for the shortage of financial resources with alternative sources of funding, among which venture capital funds were particularly important, constituting an important source of funding for projects. In medium-sized businesses, however, leasing and loans were also an important source supporting innovation activity.

Table 3.
Correlation of financing sources and innovation expenditures in service enterprises

Correlation						
Sources		**Internal sources**	**Bank credits**	**From the state budget**	**From abroad**	**Others**
Scope of business	10-49	0,933042	0,381944	0,585188	0,818191	0,112648
	50-249	0,986652	0,140540	0,461680	0,778762	0,692017
	Over 250	0,986321	0,181002	0,178995	0,001341	0,151493

Source: Own elaboration.

The innovative activity of enterprises in the service sector, regardless of the size of their operations, was most influenced by their own financial resources, since in all enterprises there is a very high correlation (in small ones 0.93 and in others - close to one) between this source of funding and the level of innovation expenditures. In contrast, service companies with little or no technological background were far less likely to use external capital, which is particularly evident in the case of bank loans, which may have been due to a lack of adequate collaterals.

What is more, the marketing and organizational innovations they implement most often tend to be less capital-intensive, so business units are often able to cover expenses with the profit they generate. Nonetheless, it can be seen that the small entrepreneurs using EU funding, which covered only part of the costs of their projects, were far more likely to depend on funds obtained from financial institutions for their innovation activity. In addition especially during the pandemic, SMEs were eager to take advantage of various forms of support from both the EU and national budgets by implementing innovative solutions that allowed them to survive in the new market realities. Entrepreneurs with an idea of an innovative product, but not having scientific resources to develop it could also benefit from funding granted by Polish Agency for Enterprise Development under the program *Innovation vouchers for SMEs* supporting the entire process of innovation implementation.

5. Summary

Any innovation, no matter what kind of company implements it, involves financial expenses that are often beyond the capacity of the individual company. The need for a specific source of capital is highly dependent on the risk of the venture, the implementation of which requires funding. The ways of obtaining each of the forms of funding also vary, as does their availability, which often depends on additional formal conditions related to access to a particular source (Podstawka, 2020).

Analyzing the structure of funding innovative activities shows that the dominant source is own funds, the high share of which is due to low propensity to take risks, especially in the case of SMEs, as well as to often limited access to external capital and the high cost of obtaining it. The existence of a relationship in this area was confirmed by a correlation study, which, with the exception of medium-sized industrial enterprises, was close to one. Taking into account the external forms of funding, the most significant were the funds obtained from abroad, which was particularly evident in the case of small business entities (correlation of more than 0.8), which, being beneficiaries of many subsidies from EU programs, were eager to supplement the shortage of financial resources. A high correlation also occurred in the case of bank loans, which, in the case of SMEs benefiting from European Union support, earlier allowed coverage of costs that were later reimbursed, while in large industrial entities - they allowed the implementation of technological innovations that required significant expenditures. Medium- and large-sized companies also used alternative forms of funding, such as leasing, loans and VC funds.

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