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*Barriers to Innovation Activity of Enterprises
and Their Determinants*

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Abstract

Theoretical background: Innovation is essential for enterprise development and economic growth. Therefore, knowing and characterising the determinants of innovation activity in enterprises is crucial. Determining the factors that shape the innovativeness of enterprises will enable entrepreneurs to skillfully and flexibly adapt to both the current and future market situation. Innovation is a process that involves significant expenses, a long payback period, specific risks and uncertainty, as companies are exposed to various obstacles, both internal and external, throughout the innovation process. Factors limiting innovation implementation are perceived differently by companies of different sizes, ages or depending on the scale of their operations. The literature provides many classifications and divisions of barriers to innovation activity, but there is still little research on the factors influencing their perception.

Purpose of the article: The study aims to identify the factors hindering the decision to start or carry out innovative activity and the determinants of a firms' perception of barriers to innovation activity in enterprises from the Lubelskie Voivodship in 2017–2019.

Research methods: A questionnaire survey on a research sample of 104 enterprises from the Lubelskie Voivodship was conducted, and exploratory factor analysis was employed.

Main findings: The paper identifies the most important factors hindering the decision to start or carry out innovative activity in enterprises from the Lubelskie Voivodship in 2017–2019. On the basis of the results of surveys and exploratory factor analysis, it was found that an important barrier to carrying out innovative activity of entities in the Lubelskie Voivodship is the financial barrier related to the lack of capital, difficult access to it and high cost of its service, as well as high costs of innovative activity. In the opinion of entrepreneurs, the market situation, i.e. uncertain demand for new ideas and too much competition in the market and internal processes, are important factors for the development of innovation. The analysis also demonstrates that the sector and scale of activity impact the perception of barriers to innovation. For companies operating in the service sector, the constraints to innovation processes related to the financial, market and internal processes are lower than in the group of industrial and construction companies. The results also indicate a negative relation between the scale of activity and innovation obstacles related to internal processes.

Introduction

In the current market conditions, innovation is considered a source of competitive advantage, which determines whether a company stays on the market or obtains and maintains a leadership position. New or modified products make it possible to meet better customer expectations, which translates into a more advantageous competitive position for innovators (Kijek & Kijek, 2005, p. 239). Innovation is critical for firms aiming to achieve competitive advantage, enhance productivity, and ensure long-term growth. However, firms often face various barriers that inhibit their innovation efforts. These barriers can be internal or external and vary depending on the firm's characteristics, industry, and operating environment. Understanding the factors shaping a firm's perception of barriers to innovation is essential for policymakers and managers seeking to foster innovation. This paper aims to identify the factors that hinder the decision to start or carry out innovation activity and the determinants of a firm's perception of barriers to innovation activity in enterprises. The analyses were conducted based on the results of a survey conducted on a group of 104 enterprises from the Lubelskie Voivodship, covering the years of activity 2017–2019.

The remainder of the paper is organised as follows. The next section presents an overview of the literature illustrating the barriers and the determinants that can affect

a firm's perceptions of the obstacles that impede innovation activities. The third section describes the data and methods employed to assess the types and determinants of barriers to innovation of enterprises in the Lubelskie Voivodship. The fourth section demonstrates the results of the analysis, along with a discussion. Finally, recapitulates the study's main conclusions and provides some suggestions for further research.

Literature review

Several factors may hinder the taking up and pursuit of innovative activities, slow down such activities or cause them to fail. Janasz (2006, pp. 339–340) has divided the barriers to innovation of small and medium-sized companies into economic, internal and other. In the first group of hindrances, he listed high innovation costs, high economic risk and difficulties in finding appropriate financing. In the second category of impediments, he included the state of the company's resources, the level and qualification of staff, organisational "rigidity" and the lack of information about markets and technology. Among other obstacles, he singled out regulations, legal norms, procedures, and the lack of customer response to new products. Romanowska (2016, pp. 29–35) divided the barriers to innovative activity into internal, enterprise-related and external ones. Among the first group of barriers, she included as the most crucial resource constraints, i.e. the lack of financial resources or qualified staff, and those relating to people and their personality, i.e. fear of risk, innovative inertia. Kijek and Kijek (2005, pp. 239–250) presented the division of the factors causing the abandonment of innovative activities into three main groups. The first is economic factors, including a high level of economic risk, high innovation costs and the lack of funding sources. The second group included internal factors such as limited market information, low organisational flexibility, unskilled staff, and limited knowledge of technology. The last group were factors: regulatory instability and limited contact with customers. In the analyses conducted by the authors among companies that did not undertake innovative activities, economic factors were indicated in the first place as the most significant barrier to the implementation of innovation, i.e. too high costs and risk and lack of sources of financing. Further indications were the lack of qualified personnel, instability of legal regulations and limited contact with customers.

A fundamental problem for the implementation of innovations is the existence of a financial barrier manifested in the high costs of developing and implementing innovations, the shortage of own capital, as well as the lack of access and/or difficult access to external sources of financing, primarily in the early stages of their implementation (Wasilczuk et al., 2020, pp. 1–221; Santos & Cincera, 2022, pp. 1427–1439). Barriers limiting innovation processes in the enterprise can still include the high risk associated with investing in new technologies, as well as difficulties in accessing new innovative solutions developed by the R&D sector or the lack of information about new technologies and market opportunities (Akgul & Gozlu, 2015, pp. 152–165; Torres de Oliveira et al., 2022, pp. 1953–1974; Kowalik, 2016, p. 173).

A firm's perception of barriers can be determined by internal, connected with the firm's characteristics and external, contextual factors. A variable influencing the perception of factors limiting or inhibiting innovative activity by companies is undoubtedly the company size. It is also an essential determinant of the propensity of companies to carry out innovative activities. The size of the firm certainly influences firms' perceptions of the financial barrier related to the lack of or limited equity for conducting innovation processes. The larger the entity, the more often innovative activity is carried out, and the greater the expenditures are allocated to this sphere of company activity. Large innovative firms usually have the financial and organisational resources needed to implement innovation (Igna & Venturini, 2023, pp. 1–30; Rojek, 2017, p. 24; Perez-Alaniz et al., 2022, pp. 189–232). They often have their units created to carry out R&D work (in-house R&D departments). In contrast, small and medium-sized firms rarely have their R&D team, which constitutes a significant barrier to innovation processes. The size of the enterprise is also related to the perception of a barrier related to limited access to external funding. Large enterprises have greater opportunities to access external funding to carry out R&D projects compared to entities in the SME sector (Instytut Badań Strukturalnych, 2013, pp. 49–51; Ministerstwo Infrastruktury i Rozwoju, 2014, pp. 135–136). There is ample evidence that young and/or small firms are more vulnerable to financial constraints than large established firms (Hall, 2009, p. 23). Larger firms are more creditworthy, have more collateral and can borrow more funds (Ali & Ahmed, 2022, p. 309). Abdu and Jibir (2018, pp. 448–456) observed that a firm size strongly impacts its innovativeness. Similarly, Mabenge et al. (2020, pp. 4–6) found that the impact of innovation seems to be stronger in larger and younger firms. Kim et al. (2016, pp. 1–13) hypothesised that large firms and SMEs have different innovation activities. Their study found that both external and internal innovative activities affected the performance of large firms, while only internal innovative activities affected the performance of SMEs. Larger manufacturing firms with proactive R&D management can develop better R&D strategies and are thus more effective in implementing innovation. Research confirms the positive impact of firm size on the intensity and efficiency of innovation activity (Levin et al., 1987, pp. 783–831; Hall, 1993, pp. 259–264; Ho et al., 2006, pp. 851–876; Matras-Bolibok, 2014, pp. 422–431). Firm size also influences the perceived barrier related to entrepreneurs' fear of change and flexibility to adapt to changing environments. Some authors argue that companies in the SME sector have greater flexibility to innovate and respond quickly to environmental changes and are better and faster at meeting customer needs (Cyfert et al., 2024, pp. 71–80). Small and medium-sized companies are more open to new ideas than larger corporations. Daunfeldt et al. (2010, pp. 1–20) proved in their research that small companies grow faster than large companies. Spescha (2019, pp. 156–179) found that smaller and more mature firms showed a more significant impact of R&D expenditures on firm sales growth. Innovative activity requires the interaction of different units of the company, so this can be more easily achieved in small or medium-sized entities (Damanpour & Schneider, 2006, pp. 215–236).

The age of the firm is an essential factor affecting the perception of barriers to innovation activity by economic agents. Pellegrino (2018, p. 182) pointed out that the importance of barriers to innovation activity may change over a firm's life cycle. Start-up or young firms may be more affected by the lack of financial resources or a shortage of relevant skills needed to implement innovations than incumbent firms, while demand uncertainty may be a more significant barrier for more experienced firms. The process of organisational learning over time can affect the ability to innovate and the outcomes of innovation activities (Huergo & Jaumandreu, 2004a, pp. 541–559). On the one hand, older firms may perceive the barrier of the lack of skilled staff, knowledge, necessary apparatus or information as irrelevant, as they generally have a greater stock of accumulated knowledge than younger firms, allowing for the exchange of ideas, the creation and improvement of effective communication in work teams, or the emergence of cross-functional work teams, which is crucial for innovation (Mabenge et al., 2020, p. 7). There is evidence of a positive impact of firm age on the innovation process, on the likelihood of better organisational performance and the development of innovative products (Hansen, 1999, pp. 82–111; Sivadas & Dwyer, 2000, pp. 31–49; Tripsas & Gavetti, 2000, pp. 1147–1161). Farooq et al. (2021, pp. 328–345) found that due to years of organisational learning, expertise and maturity, older firms perform better than younger firms in terms of innovation. Delerue and Cronje (2015, pp. 3–16) noted that larger and older firms are less affected by barriers related to the lack of demand for new products because they are more aware of market opportunities due to their greater financial strength, assets and competence. For such firms, the barrier of the lack of skilled workers is also irrelevant, as they can get more out of these opportunities by hiring talented employees capable of creating new devices, IT programs or new technology initiatives. Compared to smaller firms, larger players are also more open to change, new technological tools, innovative activities or marketing tools (Rasiah et al., 2010, pp. 45–71). New firms face difficulties related to the lack of market recognition, the lack of demand for new products and the lack of cooperation with partners. Age is a factor in perceived barriers to change and fear of uncertainty. Over time, companies strengthen their available resources, managerial knowledge and ability to deal with uncertainty (Herriott et al., 1984, pp. 298–302; Levitt & March, 1988, pp. 319–340). They also have a much greater reputation and position in the market, which facilitates relationships and contacts. On the other hand, academic research provides examples of how younger companies can be more agile in implementing change. According to Stevenson and Jarillo (1990, pp. 17–27), innovation is an attribute of new and autonomous actors who initiate change in growth industries. Yardimci (2021, pp. 2–59) found that newer firms are able to innovate more often than older firms because of their flexibility, boldness and proactive approach to doing business. Huergo (2006, pp. 1377–1388) and Huergo and Jaumandreu (2004b, pp. 193–207) noted the negative effect of age on the likelihood of innovation. According to their study, the youngest companies were more likely to implement innovations than the oldest ones. Pellegrino et al. (2012, pp. 329–340) studied the difference between young and older innovative companies

in Italy. The time a firm has been on the market also influences firms' perceptions of the barrier related to the lack of financial resources to carry out innovative activities, including R&D. Young players tend to have less equity and limited access to external funding for innovation. They observed that investment in innovative machinery and equipment played a considerable role for young, innovative firms. In the case of these firms, they further observed the lack of impact of internal R&D activities on the intensity of innovation activity, which could indicate that these actors found it challenging to launch R&D activities and allocated expenditures to other innovation activities. Coad et al. (2016, pp. 5–6) showed that new firms invested more in R&D than established firms when their task was to enter new markets, suggesting that older firms invested less in R&D than younger firms.

The type of business is also an essential factor influencing the perception of barriers to innovation activity among companies (Vega-Jurado et al., 2008, pp. 616–632). Bellini et al. (2017, pp. 91–107) based on the results of their study, found that in relation to the sector of firms, manufacturing firms were the most innovative, followed by service firms and then trading firms. Firms that operate in different sectors engage differently in technology acquisition and innovation, which can result in a range of possible innovation solutions and affect their firm's performance. The type of business can influence the perception of the barrier associated with the cost of innovative activity. Firms in some sectors may be more inclined to engage in R&D due to higher sunk costs and levels of competitiveness. Segarra and Teruel (2014, pp. 805–821), when analysing the relationship between R&D investment and firm growth, highlighted the sectoral differences found between manufacturing and service firms. The impact of R&D on firm growth was found to be greater for manufacturing industries. In high-tech sectors, technological barriers may be perceived as crucial due to dynamically changing quality and safety requirements and the need for continuous investment in R&D. In contrast, in the service sector, characterised by a lesser dependence on technological progress, barriers may relate mainly to organisational aspects, related to the need to adapt to changing customer expectations and to the effective management of human resources.

The external environment, particularly the regulatory and institutional framework in which a firm operates, also influences its perception of innovation barriers. Firms that operate in highly regulated industries, such as healthcare or finance, often perceive regulatory compliance as a significant barrier to innovation. The need to navigate complex legal frameworks, obtain regulatory approvals, and adhere to industry standards can impose additional costs and slow the innovation process (Blind, 2012, pp. 391–400). In contrast, with its increasing pressure for sustainability, the energy sector may see regulation as an impetus for innovation, which contributes to the development of new technologies and business models (Mazzucato, 2015). The opposing hypothesis is that environmental regulations constrain firms' innovation activities and generate additional costs, which negatively affects their competitiveness and, consequently, their ability to innovate (Blind, 2012, pp. 391–400).

The scale of an enterprise's activity also influences the perceived barriers to its innovation activity. Costs of innovative activity, the lack of sources of financing, the lack of or limited access to information on external sources of innovation financing, uncertain demand for new ideas, and too much competition on the market are barriers whose relevance (importance) decreases with the increase of the scale of activity conducted by the enterprise. Entities that operate on a large scale can obtain a strong market position, because, when they are the only producer of an innovative product on the market, they receive a higher consumer benefit. However, micro and small enterprises often operate in a local or regional market, and their activity is related to a clearly defined segment of it, where there is no or relatively low competition, so they can also obtain a high consumer return. Those operating internationally have access to various alternative options for financing innovation.

Research methods

In order to identify barriers to innovative activity, a survey was conducted on a research sample of 104 business entities from the Lubelskie Voivodeship. For the purposes of the research, a survey questionnaire was developed based on the PNT-02 and PNT-02u forms for 2017–2019, supplemented with several questions from the PNT-02 form for 2016–2018. The research covered the period 2017–2019, while data were collected from December 2020 to March 2021.

To simplify the structure of the variables and to identify more general dimensions of the barriers to innovative activity of the surveyed companies, an exploratory factor analysis was applied. Its primary objective is to determine factor loadings so that the influence of specific factors can be eliminated as much as possible in favour of the main factors. The Bartlett test of sphericity was used to assess the assumption of sphericity of the correlation matrix between variables, while the measure of sampling accuracy for the factor analysis assumptions was verified using the Kaiser–Mayer–Olkin test. The first step of factor analysis is to identify the number of factors, which is usually done based on a statistic called the eigenvalue of a factor, reflecting the strength of associations between scale items that correlate strongly with each other and form a factor (Bedyńska & Cypriańska, 2013, p. 248 et seq.) For this purpose, the Cattell's scree plot and the Kaiser criterion were used. In the Cattell's scree plot, according to the generally accepted procedure, factors forming the so-called slope should be included, and those forming the so-called scree plot in the graph made by combining points describing the magnitude of the eigenvalue (variance) of successive factors should be ignored (Górniak & Wachnicki, 2010, p. 95). To determine the number of factors, the Kaiser criterion, which assumes the existence of as many factors as obtained an eigenvalue higher than 1, was also used. Once the number of factors has been determined, their factor loadings should be obtained in order to determine which scale items are strongly saturated with a given factor. The principal components method was used to calculate

the factor loadings. In order to obtain a better fit between the factor structure and the output variables, i.e. to obtain an even more pronounced structure, the factors were rotated using the standardised Varimax method. Factor scores were calculated for each factor with the application of the regression scoring.

It was also possible to realise the aim mentioned above using statistical and econometric methods, including descriptive statistics, tabular and graphical methods, and descriptive presentation of results. The SPSS and STATA programs were used for statistical and econometric analyses.

Results

With regard to company size, micro companies dominated among the respondents – nearly 60% (0–9 employed persons) (Table 1). Respondents from small companies (10–49 employed persons) accounted for almost 28% of the research sample. The number of respondents from medium-sized companies (50–249 employed persons) was 12.50% of the sample.

Table 1. Structure and number of surveyed enterprises by size

Company size	Number of companies	Share (%)
Micro	62	59.62
Small	29	27.88
Medium	13	12.50
Total	104	100.00

Source: Authors' own study.

Mostly young companies took part in the survey. The average age of the companies surveyed was over 17 years. Considering the sectors of activity (Figure 1), which were represented by the companies participating in the survey, the largest number of companies in the surveyed group operated in the industry and construction sector (68%), whereas in the services sector – 32%.

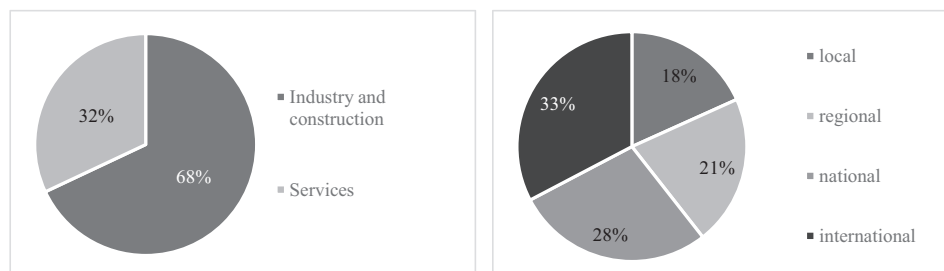


Figure 1. Structure of surveyed enterprises by sector and scale of activity

Source: Authors' own study.

Taking into account the range of activities of the surveyed companies, entities operating on the international market dominated – one in three surveyed companies operated on this market. Almost 28% operated in the country, 21.15% in the region and the least on the local market – 18.27%.

With regard to the period of operation of the entities surveyed, 30% of the companies had been operating in the market for less than ten years. The length of operation in the ranges of 20–30 years, 30–40 years and over 40 years was characterised by groups of enterprises with the following relative sizes: 23%, 23% and 24%.

The surveyed entrepreneurs indicated the degree of importance of 11 factors hindering the decision to start or carry out innovation activities in the enterprise in 2017–2019. Each factor was rated by respondents on a scale from 1 to 5 points, depending on its importance for the surveyed enterprise (a rating scale was adopted, where: 5 – *very important constraint*, 1 – *not important*). The hierarchy of barriers was established on the basis of the average ratings of entrepreneurs (Figure 2).

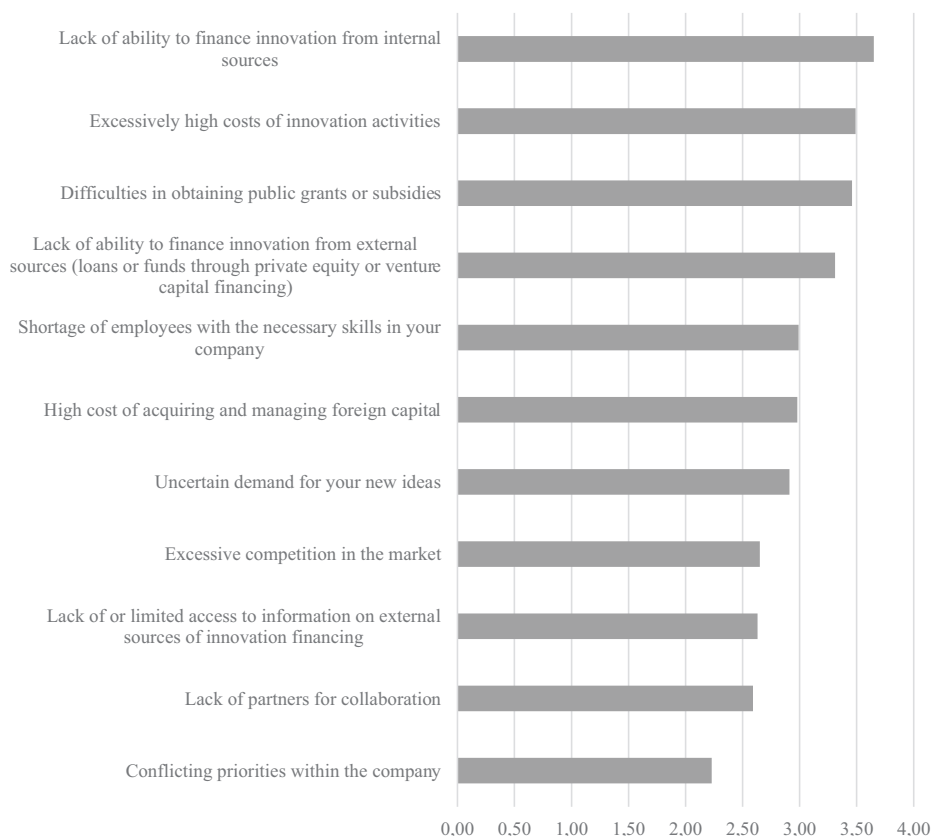


Figure 2. Barriers to innovative activity according to the average ratings of all surveyed companies

Source: Authors' own study.

The most important constraints to innovative activity of the surveyed entities concerned the following areas: financing of innovation (the lack or limited own resources, the lack of possibility to use external sources of financing, difficulties in obtaining grants or public subsidies) and the specificity and complexity of the innovation process (too high costs). In contrast, less importance was attributed to factors related to the external environment: uncertain demand, competition, the lack of cooperation partners, the lack of or limited access to information on external sources of funding and diverging priorities within the company.

To reduce the dimension of the barriers to innovation activity of the surveyed companies, the exploratory factor analysis was performed. The Bartlett test yielded a large measure of discrepancies – the chi-square statistic measuring these discrepancies was equal 253.020, and the associated risk of confusion (significance) when all coefficients were considered significant was less than 0.0001. The value of the Kaiser–Meyer–Olkin test was 0.902, which can be assessed as a very good result.¹ Based on the results obtained, the data were found to be significantly relevant to the assumptions of factor analysis, providing a basis for its application.

For the investigated barriers to innovation activity, Cattell's scree plot on the graph starts with the eigenvalue of the fourth factor, suggesting the adoption of three factors for further analysis (Figure 3).

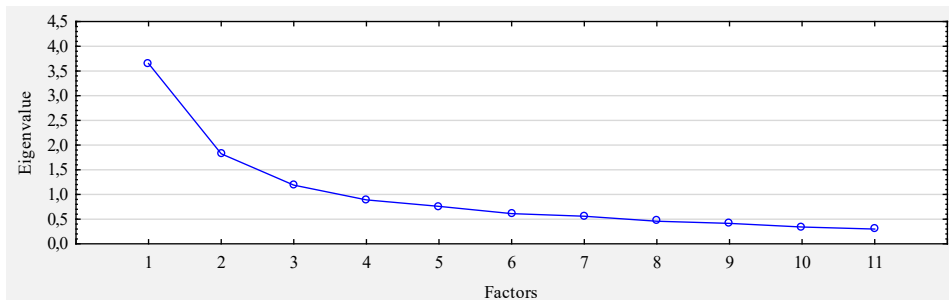


Figure 3. Cattell's scree plot for barriers to innovation activity among surveyed companies

Source: Authors' own study.

Applying the Kaiser criterion also indicated using the first three factors with eigenvalues above 1 for further analysis (Table 2). These factors explain 60.58% of the variance of all variables. The significance of the remaining factors is low, as the corresponding eigenvalues are smaller than unity.

¹ The Kaiser–Meyer–Olkin coefficient compares partial correlations with bivariate correlation coefficients. A KMO score ≥ 0.5 is assumed to give a satisfactory reduction of variables.

Table 2. Eigenvalue and percentage of explained variance for the main factors

Factor	Eigenvalue	% of total variance	Cumulative eigenvalue	Cumulative variance (%)
1	3.650871	33.19	3.650871	33.19
2	1.823215	16.57	5.474086	49.76
3	1.189689	10.82	6.663775	60.58

Source: Authors' own study.

Factor loadings values were calculated using the principal component method. Analysing the presented factor loadings matrix (Table 3), it can be seen that the first factor is highly correlated with five primary variables, i.e.: the lack of possibility of financing innovation from internal sources, the lack of possibility of financing innovation from external sources – loans or funds within the framework of private equity financing (including venture capital), difficulties in obtaining grants or public subsidies, too high costs of innovative activity, high cost of obtaining and servicing foreign capital. All of the aforementioned variables relate to the financial aspects associated with the lack of capital – both own and third-party capital, difficult access to it and the high costs associated with it and with the implementation of innovation. This factor was labelled company finances. The second factor was labelled market situation, as it shows a high correlation with the following variables: uncertain demand for new ideas and too much competition in the market. The third factor identified is described by two initial variables relating to the situation within the company. These variables are the diverging priorities within the company and the lack of or limited access to information about external sources of innovation funding. As such, the third factor describes internal processes.

The obtained results are consistent with the results of similar studies. The fact that innovative activity is hampered by barriers such as the lack of funds, information or qualified personnel, among others, was pointed out by Mansfield (1981, pp. 610–615), Dougherty (1992, pp. 179–202) as well as Agarwal and Bayus (2002, pp. 1024–1041). Mancusi and Vezzulli (2014, pp. 1153–1172) argued that mainly economic barriers may occur in innovative firms due to the high cost of creating new solutions. According to Kleijnen et al. (2009, pp. 344–357), barriers of infrastructure, financing, qualified R&D personnel, access to technological information, and state activity in R&D are considered important impediments to firms' innovation activities. According to D'Este et al. (2012, pp. 482–488) and Zanello et al. (2016, pp. 884–912), financial and cost barriers, including the lack of internal resources, the lack of external funding, and high costs of innovation hinder R&D and technology acquisition to the greatest extent. Considerations by Stawasz (1999, p. 220) and Koziół (2006, pp. 21–23) indicate a strong domination of financial barriers over all others. Poznańska (2017, pp. 193–204), on the basis of the results of a study conducted in a group of 100 industrial entities, included among the most significant barriers to innovative activity: the lack of qualified personnel, the lack of the company conducting anticipatory analyses of demand for its products, the lack of sufficient own financial resources for costly innovative activities, the lack of

interest of scientific units in cooperation with companies in the commercialisation of research results. PARP's (2023, p. 60) analyses show that one of the most frequently indicated reasons for companies not undertaking innovative activities in 2022 was the lack of sufficient financial resources (Table 3).

Table 3. Factor loadings for barriers to innovation activity indicated by respondents

Primary variables (barriers to innovation activity)	Factor 1	Factor 2	Factor 3
Lack of funding opportunities for innovation from internal sources*	0.820213**	0.006191	-0.005497
Lack of external finance for innovation – loans or private equity (including venture capital)	0.820829	-0.052010	-0.095354
Difficulties in obtaining public grants or subsidies	0.707653	-0.025576	0.262509
Too high costs of innovative activities	0.694654	0.289357	0.115721
High cost of raising and handling debt capital	0.646104	0.247570	0.226242
Uncertain demand for new ideas	0.105529	0.808507	0.065889
Too much competition in the market	0.007163	0.846441	0.020335
Divergent priorities within the company	-0.130778	0.218340	0.725184
Lack of or limited access to information on external sources of funding for innovation	0.260802	-0.078136	0.811699

* those factor loadings attributed to a factor are in bold

** variables with loadings greater than 0.6 were left for further analysis

Source: Authors' own study. (loads marked above 0.600000)

To determine the impact of enterprise characteristics and factors related to their environment on the identified three main constraints that effectively inhibit both the decision to start and continue innovation activities, the average values of factor scores for each factor in different groups of enterprises were calculated (Table 4).

Table 4. Differentiation in the occurrence of latent barriers to innovative activity by size, scale, sector of activity, and age of the surveyed enterprises

Variable		Latent barrier	Corporate finance	Market situation	Internal processes
Company size	Micro		-0.08	-0.096	0.122
	Small		0.029	0.118	-0.239
	Medium		-0.028	0.195	-0.051
Scale of operations	Local		-0.099	-0.131	0.231
	Regional		0.109	0.033	0.139
	National		0.212	-0.014	0.009
	International		-0.196	0.064	-0.227
Sector	Industry and construction		0.168	0.045	-0.005
	Services		-0.317	-0.085	-0.317
Age	1–10		0.022	-0.233	0.186
	10–20		-0.005	0.100	-0.453
	20–30		0.155	-0.069	0.141
	Over 30		-0.273	0.431	0.093

Source: Authors' own study.

The analysis of the average ratings of the identified latent barriers to innovation activity in the different groups of enterprises allows us to state that in the case of companies operating in the service sector, the constraints to innovation processes related to the financial, market and internal processes are lower than in the group of industrial and construction companies. It is consistent with the results of Retkoceri and Kurteshi (2018, pp. 73–94), who show a significant difference in fear of an unpredictable future and fear of failure. These barriers are more expressed among manufacturing companies and mainly because of the rigidity of the production process. In services, innovation output is constantly changing and can be adapted more quickly than in production processes.

In the case of constraints related to internal processes, it can be concluded that the increase in the scale of operations forces companies to take measures to improve information flows and reduce potential decision-making conflicts. This regularity can be linked to the concept of learning by exporting, as the internationalisation process allows firms to access new knowledge and technologies to improve their innovation capabilities and overcome innovation-related barriers (Álvarez & González, 2023). The results are also in line with D'Este et al. (2014, pp. 1–19), who find that higher internationalisation is associated with lower knowledge-related innovation obstacles.

With regard to the other factors analysed, their impact on the intensity of barriers to innovation activity is ambiguous and requires additional insight.

Conclusions

The research reveals the primary barriers companies face in financing and implementing innovation. The most significant challenges include the lack of internal funding, high innovation costs, and difficulties in securing public grants or external financing. Additionally, companies struggle with a shortage of skilled employees, which further impedes innovation efforts. Other obstacles, such as intense competition, uncertainty in market demand, and limited access to information about funding, also play a role in hindering innovation. Overall, financial constraints and resource limitations are the key hurdles for companies trying to innovate.

The present analysis demonstrates that the sector and scale of activity impact the perception of barriers to innovation. Service sector enterprises experience comparatively lower barriers to innovation activity than their industrial and construction counterparts. The inherent rigidities associated with production processes likely exacerbate these concerns, hindering innovation in these sectors. Contrarily, the dynamic nature of service-oriented innovation allows for more rapid adjustments and adaptations in response to market demands. The results indicate a negative relation between the scale of activity and innovation obstacles related to internal processes. As organizations increase market expansion, they are likely to engage in knowledge accumulation processes that mitigate barriers associated with innovation.

While this study provides valuable insights into the comparative barriers to innovation, it is important to acknowledge its limitations as it focuses on micro, small and medium-sized enterprises (SMEs), potentially overlooking the unique challenges faced by larger firms. Moreover, the conclusions are limited to the results of quantitative analysis. To overcome these limitations, future studies may extend the analysis to include large firms that would contribute to a more comprehensive understanding of this phenomenon. Additionally, qualitative research exploring the experiences of firms that have successfully mitigated innovation barriers, particularly in the manufacturing sector, may provide valuable insights for practitioners.

References

- Abdu, M., & Jibir, A. (2018). Determinants of firms innovation in Nigeria. *Kasetsart Journal of Social Sciences*, 39(3), 448–456. <https://doi.org/10.1016/j.kjss.2017.07.006>
- Akgul, A.K., & Gozlu, S. (2015). The role of organizational resources and market competitiveness in innovativeness. *Journal of Business, Economics and Finance*, 4(1), 152–165. <https://doi.org/10.17261/Pressacademia.2015110016>
- Agarwal, A., & Bayus, B. (2002). The market evolution and take-off of new product innovations. *Management Science*, 48(8), 1024–1041. <https://doi.org/10.2139/ssrn.310864>
- Ali, A., & Ahmed, S. (2022). Big data analytics and supply chain performance: The mediating role of supply chain capabilities and innovation. *Management Science Letters*, 12(4). <https://doi.org/10.5267/j.msl.2022.4.003>
- Álvarez, R., & González, M.A. (2023). *Are Innovation Barriers Different for Chilean Exporters and Non-Exporters?* Universidad de Chile, Departamento de Economía.
- Bedyńska, S., & Cypryańska, M. (Eds.). (2013). *Statystyczny drogowskaz 1*. Wyd. Akademickie SEDNO.
- Bellini, E., Dell’Era, C., Frattini, F., & Verganti, R. (2017). Design-driven innovation in retailing: An empirical examination of new services in car dealership. *Creativity and Innovation Management*, 26(1), 91–107. <https://doi.org/10.1111/caim.12184>
- Blind, K. (2012). The influence of regulations on innovation: A quantitative assessment for OECD countries. *Research Policy*, 41(2), 391–400. <https://doi.org/10.1016/j.respol.2011.08.008>
- Coad, A., Segarra, A., & Teruel, M. (2016). Innovation and firm growth: Does firm age play a role?. *Research Policy*, 45(2). <https://doi.org/10.2139/ssrn.2276414>
- Cyfert, S., Szumowski, W., & Glabiszewski, W. (2024). Building SMEs performance through relationship quality. The role of supply chain flexibility. *LogForum*, 20(1), 71–80. <https://doi.org/10.17270/J.LOG.000946>
- Damanpour, F., & Schneider, M. (2006). Phases of the adoption of innovation in organizations: Effects of environment, organization and top managers. *British Journal of Management*, 17(3). <https://doi.org/10.1111/j.1467-8551.2006.00498.x>
- Daunfeldt, S.O., Elert, N., & Johansson, D. (2010). The economic contribution of high-growth firms: Do definitions matter? *Ratio Working Paper*, 151.
- D’Este, P., Rentocchini, F., & Vega-Jurado, J. (2014). The role of human capital in lowering the barriers to engaging in innovation: Evidence from the Spanish innovation survey. *Industry and Innovation*, 21(1). <https://doi.org/10.1080/13662716.2014.879252>
- D’Este, P., Iammarino, S., Savona, M., & Von Tunzelmann, N. (2012). What hampers innovation? Revealed barriers versus deterring barriers. *Research Policy*, 41(2), 482–488. <https://doi.org/10.1016/j.respol.2011.09.008>

- Dougherty, D. (1992). Interpretive barriers to successful product innovations in large firms. *Organization Science*, 3(2), 179–202. <https://doi.org/10.1287/orsc.3.2.179>
- Delerue, H., & Cronje, T. (2015). Network technology adoption by us biotechnology firms: A contextual approach of social media applications. *International Journal of Innovation Management*, 19(5). <https://doi.org/10.1142/s1363919615500474>
- Farooq, R., Vij, S., & Kaur, J. (2021). Innovation orientation and its relationship with business performance: Moderating role of firm size. *Measuring Business Excellence*, 25(3). <https://doi.org/10.1108/MBE-08-2020-0117>
- Górniak, J., & Wachnicki, J. (2010). *Pierwsze kroki w analizie danych SPSS for Windows*. SPSS.
- Hall, B.H. (1993). The stock market's valuation of R&D investment during the 1980's. *American Economic Review*, 83(2), 259–264.
- Hall, B.H. (2009). The financing of innovative firms. *Review of Economics and Institutions*, 14(2). <https://doi.org/10.5202/rei.v1i1.4>
- Hansen, M.T. (1999). The search–transfer problem: The role of weak ties in sharing knowledge across organizational subunits. *Administrative Science Quarterly*, 44(1). <https://doi.org/10.2307/2667032>
- Herriott, S.R., Levinthal, D., & March, J.G. (1984). Learning from experience in organizations. *American Economic Review*, 75(2), 298–302.
- Ho, Y.K., Tjahjapranata, M., & Yap, C.M. (2006). Size, leverage, concentration, and R&D investment in generating growth opportunities. *The Journal of Business*, 79(2), 851–876. <https://doi.org/10.1086/499140>
- Huergo, E. (2006). The role of technological management as a source of innovation: Evidence from Spanish manufacturing firms. *Research Policy*, 35(9), 1377–1388. <https://doi.org/10.1016/j.respol.2006.07.005>
- Huergo, E., & Jaumandreu, J. (2004a). Firms' age, process innovation and productivity growth. *International Journal of Industrial Organization*, 22(4), 541–599. <https://doi.org/10.1016/j.ijindorg.2003.12.002>
- Huergo, E., & Jaumandreu, J. (2004b). How does probability of innovation change with firm age?. *Small Business Economics*, 22(3–4), 193–207. <https://doi.org/10.1023/B:SBEJ.0000022220.07366.b5>
- Igna, I., & Venturini, F. (2023). The determinants of AI innovation across European firms. *Research Policy*, 52(2). <https://doi.org/10.1016/j.respol.2022.104661>
- Instytut Badań Strukturalnych. (2013). *Ocena luki finansowej w zakresie dostępu polskich przedsiębiorstw do finansowania zewnętrznego. Wnioski i rekomendacje dla procesu programowania polityki spójności w okresie 2014–2020. Raport końcowy*. Warszawa.
- Janasz, W. (Ed.). (2006). *Zarys strategii rozwoju przemysłu*. Difin.
- Kijek, A., & Kijek, T. (2005). Znaczenie innowacji w kształtowaniu jakości produktu. *Annales Universitatis Mariae Curie-Skłodowska, sectio H – Oeconomia*, 39.
- Kim, S., Kim, E., Suh, Y., & Zheng, Z. (2016). The effect of service innovation on R&D activities and government support systems: The moderating role of government support systems in Korea. *Journal of Open Innovation: Technology, Market, and Complexity*, 21, 1–13. <https://doi.org/10.1186/s40852-016-0032-1>
- Kleijnen, M., Lee, N., & Wetzels, M. (2009). An exploration of consumer resistance to innovation and its antecedent. *Journal of Economic Psychology*, 30(3), 344–357. <https://doi.org/10.1016/j.joep.2009.02.004>
- Kowalik, J. (2016). Ekonomiczne uwarunkowania innowacyjności przedsiębiorstw w UE. Analiza przestrzenno-czasowa. *Zeszyty Naukowe Politechniki Śląskiej, Seria: Organizacja i Zarządzanie*, 97, 169–180. <https://doi.org/10.1016/j.joep.2009.02.004>
- Kozioł, K. (2006). Cele i bariery działalności innowacyjnej polskich przedsiębiorstw wysokiej technologii. *Przegląd Organizacji*, 5(796), 21–23. <https://doi.org/10.33141/po.2006.05.05>
- Levin, R.C., Klevorick, A.K., Nelson, R., & Winter, S. (1987). Appropriating returns from industrial research and development. *Brookings Papers on Economic Activity*, 18(3), 783–831. <https://doi.org/10.2307/2534454>
- Levitt, B., & March, J. (1988). Organizational learning. *Annual Review of Sociology*, 14, 319–338. <https://doi.org/10.1146/annurev.so.14.080188.001535>

- Mabenge, B.K., Ngorora-Madzimure, G.P.K., Makanyeza, C. (2020). Dimensions of innovation and their effects on the performance of small and medium enterprises: The moderating role of firm's age and size. *Journal of Small Business and Entrepreneurship*, 34(6), 684–708.
<https://doi.org/10.1080/08276331.2020.1725727>
- Mancusi, M.L., & Vezzulli, A. (2014). R&D and Credit rationing in SMEs. *Economic Inquiry*, 52(3), 1153–1172. <https://doi.org/10.1111/ecin.12080>
- Mansfield, E. (1981). Composition of R&D expenditures: Relationship to size of firm, concentration and innovative output. *The Review of Economics and Statistics*, 63(4). <https://doi.org/10.2307/1935857>
- Matras-Bolibok, A. (2014). Does firm's size impact innovative performance?. *International Journal of Innovation and Learning*, 15(4), 422–431. <https://doi.org/10.1504/IJIL.2014.062477>
- Mazzucato, M. (2015). The green entrepreneurial state. In I. Scoones, M. Leach, P. Newell (Eds.), *The Politics of Green Transformations*. Routledge.
- Ministerstwo Infrastruktury i Rozwoju. (2014). *Ocena efektów wsparcia dużych przedsiębiorstw w ramach realizacji polityki spójności w Polsce*. Warszawa.
- PARP. (2023). *Monitoring innowacyjności polskich przedsiębiorstw. Wskaźnik dojrzałości innowacyjnej. V edycja – 2023, Raport końcowy z badań*. Warszawa.
- Pellegrino, G. (2018). Barriers to innovation in young and mature firms. *Journal of Evolutionary Economics*, 28(4), 181–206. <https://doi.org/10.1007/s00191-017-0538-0>
- Pellegrino, G., Piva, M., & Vivarelli, M. (2012). Young firms and innovation: A microeconomic analysis. *Structural Change and Economic Dynamics*, 23(4), 329–340.
<https://doi.org/10.1016/j.strueco.2011.10.003>
- Perez-Alaniz, M., Lenihan, H., Doran, J., & Hewitt-Dundas, N. (2022). Financial resources for research and innovation in small and larger firms: Is it a case of the more you have, the more you do?. *Industry and Innovation*, 30(2), 189–232. <https://doi.org/10.1080/13662716.2022.2036597>
- Poznańska, K. (2017). Ograniczenia działalności innowacyjnej przedsiębiorstw przemysłowych w Polsce. *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania*, 48(3), 193–204.
<https://doi.org/10.18276/sip.2017.48/3-16>
- Rasiah, R., Kaur, K., & Kumar, A. (2010). Does firm size matter in export, technology, and marketing activities of Indian garment firms? *Asian Journal of Technology Innovation*, 18(1), 45–71.
<https://doi.org/10.1080/19761597.2010.9668682>
- Retkoceri, B., & Kurteshi, R. (2018). Barriers to innovation in services and manufacturing firms: The case of Kosovo. *HOLISTICA – Journal of Business and Public Administration*, 9(2), 73–94.
- Rojek, D. (2017). Wewnętrzne czynniki innowacyjności przedsiębiorstw. *Zarządzanie. Teoria i Praktyka*, 21(3), 23–32.
- Romanowska, M. (2016). Determinanty innowacyjności polskich przedsiębiorstw. *Przegląd Organizacji*, 2(913), 29–35. <https://doi.org/10.33141/po.2016.02.05>
- Santos, A., & Cincera, M. (2022). Determinants of financing constraints. *Small Business Economics*, 58(2–3), 1427–1439. <https://doi.org/10.1007/s11187-021-00449-w>
- Segarra, A., & Teruel, M. (2014). High-growth firms and innovation: An empirical analysis for Spanish firms. *Small Business Economics*, 43(4). <https://doi.org/10.1007/s11187-014-9563-7>
- Sivadas, E., & Dwyer, R.F. (2000). An examination of organizational factors influencing new product development in internal and alliance-based processes, *Journal of Marketing*, 64(1).
<https://doi.org/10.1509/jmkg.64.1.31.17985>
- Spescha, A. (2019). R&D expenditures and firm growth – is small beautiful?. *Economics of Innovation and New Technology*, 28(2), 156–179. <https://doi.org/10.1080/10438599.2018.1443154>
- Stawasz, E. (1999). *Innowacje a mała firma*. Wyd. UŁ.
- Stevenson, H.H., & Jarillo, J.C. (1990). A paradigm of entrepreneurship: Entrepreneurial management. *Strategic Management Journal*, 11, 17–27. https://doi.org/10.1007/978-3-540-48543-8_7

- Torres de Oliveira, R., Gentile-Lüdecke, S., & Figueira, S. (2022). Barriers to innovation and innovation performance: The mediating role of external knowledge search in emerging economies. *Small Business Economics*, 58(4). <https://doi.org/10.1007/s11187-021-00491-8>
- Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: evidence from digital imaging. *Strategic Management Journal*, 21(10–11), 1147–1161. [https://doi.org/10.1002/1097-0266\(200010/11\)21:10/113.0.co;2-r](https://doi.org/10.1002/1097-0266(200010/11)21:10<113.0.co;2-r)
- Vega-Jurado, J., Gutiérrez-Gracia, A., Fernández-de-Lucio I., & Manjarrés-Henríquez, L. (2008). The effect of external and internal factors on firms' product innovation. *Research Policy*, 37(4), 616–632. <https://doi.org/10.1016/j.respol.2008.01.001>
- Wasilczuk, J., Janasz, K., Kaczmarska, B. (2020). *Przedsiębiorczość i finansowanie innowacji*. PWE.
- Yardimci, E.B. (2021). *R&D volatility and firm growth: The case of manufacturing firms in Turkey*. Hacettepe University Graduate School of Social Sciences Department of Economic.
- Zanello, G., Fu, X., Mohnen, P., & Ventresca, M. (2016). The creation and diffusion of innovation in developing countries: A systematic literature review. *Journal of Economic Surveys*, 30(5). <https://doi.org/10.1111/joes.12126>