Humanities and Social Sciences **2024**
Research Journal 31, No. 4 (2024), pp 147-157 **October-December**

Received: November 2024
Accepted: December 2024
DOI: 10.7862/rz.2024.hss.49

Tomasz KIJEK[1]
Anna MATRAS-BOLIBOK[2]
Beata PODSTAWKA[3]

DETERMINANTS OF ENTERPRISE COLLABORATION ON INNOVATION

The paper explores the factors that impact a firm's propensity to collaborate on innovation activities based on a questionnaire survey conducted with 104 innovation-active enterprises from Lubelskie Voivodeship, covering the years 2017-2019. The factor analysis was applied to categorize collaboration partners into institutional, market, and internal. To explain the enterprise's propensity to collaborate on innovation, we employed two linear regression models. As determinants of cooperation, we included the absorptive capacity, the firm size, and the scale of activity. The results reveal that absorptive capacity, firm size, and scale of activity significantly enhance collaboration with institutional partners, while firm size has a greater impact on the propensity to collaborate with market partners among microenterprises compared to small enterprises. The findings underscore the role of innovation expenditures and firm-specific characteristics in shaping collaborative innovation behaviors, emphasizing the critical importance of partnerships for fostering innovation in enterprises.

Keywords: innovation, collaboration, SME, absorptive capacity, firm size.

1. INTRODUCTION

Innovation is a critical driver of economic growth, competitive advantage, and organisational success in a knowledge-based economy. The complexity of innovation processes often exceeds the capabilities of a single firm, necessitating collaboration with external partners. Collaboration on innovation activity allows firms to access complementary resources, share risks, and accelerate the development and commercialisation of new products, services, and processes. It is proven to be positively correlated to innovation performance (Xie, Liu, Chen, 2023).

Understanding the determinants of enterprise collaboration on innovation has become a vital area of study. Despite the growing interest in collaborative innovation, the factors influencing enterprises' decisions to engage in such partnerships remain diverse and

[1] Tomasz Kijek, Maria Curie-Sklodowska University, Poland; e-mail: tomasz.kijek@mail.umcs.pl. ORCID: 0000-0002-0134-4943.
[2] Anna Matras-Bolibok, Maria Curie-Sklodowska University, Poland; e-mail: anna.matras-bolibok@mail.umcs.pl (corresponding author). ORCID: 0000-0001-9646-4472.
[3] Beata Podstawka, Maria Curie-Sklodowska University, Poland; e-mail: beata.podstawka@mail.umcs.pl. ORCID: 0000-0001-5151-4114.

context-dependent. Firm-level characteristics, such as size, absorptive capacity, and strategic orientation, play a significant role in shaping collaboration opportunities. At the same time, external factors, including industry dynamics, policy environments, and network characteristics, shape the landscape of collaboration. Additionally, the success of cooperation often hinges on the partners' attributes, such as trust, complementary capabilities, and shared goals.

Existing literature provides valuable insights into these determinants, but gaps remain in understanding the mechanisms that impact the propensity to collaborate with various partners. This study seeks to address these gaps aiming at exploring the determinants of collaboration with institutional and market and internal partners.

The remainder of the paper is structured as follows: The next section presents an overview of the literature illustrating the role of collaboration on innovation activities and its determinants. The third section describes the data and methods employed to assess the types and determinants of collaboration on innovation activities of enterprises in the Lubelskie Voivodship. The fourth section demonstrates the results of the analysis, along with a discussion. Finally, it recapitulates the study's main conclusions and provides some suggestions for further research.

2. LITERATURE REVIEW

The concept of collaborative innovation is rooted in the understanding that no single firm can possess all the resources, expertise, and knowledge required to innovate effectively in today's complex and rapidly evolving markets. The idea of open innovation, emphasising that firms must collaborate with external entities to leverage complementary assets and access external knowledge was introduced by Chesbrough (2003). This approach has become increasingly relevant as technological advancements and globalisation have made innovation processes more interconnected and multidisciplinary, and gained significant attention among academics and practitioners (Dahlander, Gann, Wallin, 2021).

Collaboration between business entities is a long-term, pro-partner approach beyond individual purchase-sale transactions (Ritter, Ford, 2004). Establishing such relationships requires time and involves a series of interactions, resulting in significant interdependence between cooperating entities (Håkansson, Johanson, 1992; Blois, 1998). This inter-dependence involves partners engaging in joint activities to exchange resources, which may be limited to specific aspects of the enterprise's operations (Forsgren et al., 1995). Innovation activities largely depend on the firm's relationships with entities that provide information, knowledge, technology, and human and financial resources necessary for innovation. These connections link the enterprise with other actors in the innovation system, such as R&D units, universities, suppliers, customers, competitors, and entities responsible for innovation policy (Matras-Bolibok, 2012).

Collaboration with other entities offers firms better and broader access to knowledge and new technologies, promoting the exchange of experiences and knowledge while reducing the costs and risks associated with innovation activities (Nieto, Santamaria, Fernandez, 2015). Moreover, as Tiwari, Mohnen, Palm, and van der Loeff (2007) point out, firms belonging to collaborative networks find it easier to secure financial support for R&D activities. Such collaboration can be prospective and long-term without necessarily delivering immediate or measurable economic benefits for the participating partners (Yu, Lee, 2017).

The benefits of collaboration for enterprises can include the implementation of innovative solutions, access to the latest knowledge, increased competitiveness, improved product quality, enhanced company prestige, acquisition of new customers and/or markets, increased export opportunities, higher profits, creation of new jobs, and reduced operational costs (Chen, Vanhaverbeke, Du, 2016). At the operational level, establishing relationships with external entities leads to greater efficiency, while at the strategic level, it improves the competitive position of the enterprise (Sudolska, 2011).

Collaboration on innovation activities can take various forms, depending on the nature of the partnership and its objectives. These include Industry-University-Research (IUR) and Supply Chain (SC) collaborations (Xie, Liu, Chen, 2023). IUC collaborations involve partnerships between enterprises and academic or research institutions. These collaborations are particularly valuable for accessing cutting-edge knowledge and technologies. Firms benefit from the theoretical and experimental expertise of universities, while academic institutions gain insights into practical applications. Archibugi and Coco (2004) argue that such collaborations enhance knowledge transfer and bridge the gap between theoretical research and industrial application. SC collaborations occur between firms and their suppliers or customers. Such partnerships enable firms to integrate innovation into their supply chains, improving product quality, reducing costs, and accelerating time-to-market. Camisón and Villar (2009) highlight that supply chain partnerships are particularly effective in fostering incremental innovations.

The type of collaboration impacts the firms' innovation performance. Xie, Liu and Chen (2023) find that SC collaborative innovation has a greater impact on firms' innovation performance compared to IUR collaborations. Their findings also demonstrate that formal and informal institutional frameworks enhance the positive relationship between collaborative innovation and innovation performance.

Belderbos et al. (2018) conclude that past R&D collaboration experience significantly influences the formation of new partnerships, with the type and success of prior collaborations shaping firms' preferences for specific partner types. The dynamics of collaboration are path-dependent, where successful collaborations enhance trust and learning, thereby increasing the likelihood of future partnerships with the same partner types. Furthermore, their findings underscore the importance of strategically diversifying partnerships to optimise innovative performance, particularly through collaborations that combine complementary resources and capabilities. Also, according to Van Beers and Zand (2014), R&D cooperation with diverse partners positively impacts firms' innovation performance, particularly when collaborations involve various partner types, such as competitors, suppliers, and universities. However, they reveal that the benefits of partner diversity diminish beyond a certain point, emphasising the need for firms to balance diversity with the complexity of managing such collaborations effectively. These findings suggest that functional and geographical diversity influence innovation through distinct mechanisms. Functional diversity fosters a broad range of knowledge intake and synergies essential for developing and commercialising novel products. In contrast, geographical diversity enhances the successful adaptation of existing products to meet local requirements, such as technical standards, market regulations, and customer preferences.

The propensity to engage in collaborative innovation is also influenced by the firm-level characteristics. A firm's absorptive capacity, understood as an ability to recognize, assimilate, and apply external knowledge, is critical for successful collaboration. Cohen and Levinthal (1990) highlight that firms with high absorptive capacity are better equipped to integrate knowledge gained through partnerships. The propensity to collaborate with

other entities in the implementation and financing of innovations is determined by firm's absorptive capacity, expressed in the level of expenditure on R&D activities as well as other innovation-related investments (Faria, Lima, Santos, 2010; Lasagni, 2012). Large innovative firms typically have the financial and organizational resources necessary for implementing innovations (Igna, Venturini, 2023; Rojek, 2017; Perez-Alaniz et al., 2022). These firms often have dedicated R&D departments or units to support innovation efforts. In contrast, small and medium-sized enterprises (SMEs) rarely have their own R&D teams, which poses a significant barrier to engage in innovation processes. Larger entities not only possess the necessary resources to allocate to collaborations but also derive greater benefits. However, some studies suggest that the primary beneficiaries of collaboration can be smaller enterprises (Nieto, Santamaria, 2010) and those with lower R&D intensity (Barge-Gil, 2010). Larger firms are often more active in innovation and allocate greater resources to this area, which may reduce their interest in collaborating with other entities. Conversely, smaller firms, which lack sufficient financial resources, invest minimally in innovation, and lack R&D infrastructure and personnel, are more inclined to seek partnerships with other organizations to compensate for these limitations and create substantial development opportunities for them. Camisón and Villar (2009) conclude that absorptive capacity and innovation potential, play a pivotal role in determining their propensity for cooperative internationalization. Additionally, they reveal that firms with strong internal competencies are better positioned to establish and benefit from international partnerships, thereby enhancing their global competitiveness and market reach.

The presented considerations highlight the significance of firm size as a factor shaping the propensity to collaborate on innovation. According to Poznańska (2016), cooperation is particularly important for small and medium-sized enterprises (SMEs). Compared to large enterprises, SMEs possess lower financial and material potential, which significantly affects their ability to innovate. As a result, SMEs should prioritize collaboration with other entities, including those in the science sector, to acquire and implement innovations. Also Mazur (2011) demonstrates that smaller enterprises exhibit a higher intensity of collaboration compared to larger firms. According to Stanisławski (2014), collaboration between SMEs and large organizations is notably strong, stemming from SMEs' high willingness to undertake joint initiatives. Larger firms have an edge over SMEs in the area of innovation due to their superior creditworthiness, better financial security, and greater borrowing capacity (Ali, Ahmed, 2022). They also have more opportunities to access external funding sources for research and development (R&D) projects compared to SMEs. Consequently, smaller enterprises frequently seek collaboration with other entities to undertake R&D activities and finance innovations (Evaluation of the effects of support for large enterprises within the cohesion policy in Poland, 2014). On the other hand, Wściubiak (2019) notes that medium and large enterprises demonstrate a greater capacity to comprehensively benefit from interorganizational cooperation. Their advantage over smaller firms lies not only in better resource availability for joint initiatives but also in superior skills in managing external relationship networks and stronger power, which enables them to actively shape the terms of collaboration.

The scale of a company’s operations is also an important determinant of its propensity to engage in collaboration for innovation activities. The higher level of innovativeness and greater inclination for collaboration among enterprises operating on an international scale can be attributed to the benefits of economies of scale, which increase with greater market

share (Poznańska, 1998). Micro and small enterprises often operate within local or regional markets, where their activities are typically confined to well-defined segments with low competition. This limitation reduces their opportunities to engage in collaborative innovation activities. Conversely, companies operating on an international scale have greater opportunities to establish partnerships with other entities in the context of innovation. Furthermore, firms collaborating in international markets gain access to advanced foreign knowledge, which, when effectively absorbed, can significantly enhance their innovation capabilities. This process of knowledge assimilation through exporting is commonly referred to as "learning by exporting" (D'Angelo, Ganotakis, Love, 2020). Learning in foreign markets also facilitates the creation of formal cooperation agreements. International partners can provide firms with valuable information, guidance, and support, aiding them in absorbing the knowledge essential for the development of new products and processes.

3. DATA AND RESEARCH METHODS

To assess the determinants of collaboration in innovation activities, a survey study was conducted on a sample of 104 innovation-active enterprises from the Lubelskie Voivodeship and covered the years 2017–2019, while data collection took place between December 2020 and March 2021.

Using the survey questionnaire, we explored the firms' propensity to cooperate with various partners, i.e. non-profit organisations, guilds of craftsmanship and entrepreneurship, producers chambers and associations, public research institutes, clusters; competitors, regional development agencies; universities, consulting companies, commercial laboratories, private research institutes and laboratories; companies belonging to the group of companies; other companies, suppliers of equipment, materials, components or software, customers). To reduce the number of dichotomous variables relating to the cooperation with specific partners, we applied factor analysis. This multivariate technique allowed us to analyse correlations among observed variables and explore latent factors (Afifi et al., 2020). Factor analysis reveals q common factors that linearly reproduce the original variables:

$$y_{ij} = z_{i1}b_{1j} + z_{i2}b_{2j} + \cdots + z_{iq}b_{qj} + e_{ij} \quad (1)$$

where: y_{ij} is the value of the *i*th observation on the *j*th variable, z_{ik} is the *i*th observation on the *k*th common factor, b_{kj} is the set of linear coefficients called factor loadings and e_{ij} is the *j*th variable's unique factor.

Since the observed variables were of a binary nature, it seemed reasonable to use a matrix of tetrachoric correlations for factor analysis. We fitted our model using the principal factor method. The number of factors was determined by employing the Kaiser's rule, which requires eigenvalues greater than 1. The factors loadings over an absolute value of 0.6 were considered relevant to the interpretation of data.

After predicting scores for the identified common factors, they were used as dependent variables in the linear regression models that explain the propensity to cooperate for innovation. As determinants of cooperation for innovation, we included the absorptive capacity (AC) measured by the firm expenditures on innovation per employee and the firm size measured by assigning firms into the categories: micro (M), small (S), and medium (M). In addition, we controlled for the firm scale of activity measured by classifying

the market in which firms operate: local (L), regional (R), national (N), and international (IN).

4. RESULTS AND DISCUSSION

Based on the size of the enterprises, micro-enterprises dominated among the respondents, accounting for nearly 60% (0–9 employees). The share of small (10–49 employees) and medium-sized (50–249 employees) enterprises was equal to 12.50% and 28% of the sample accordingly. Considering the scope of the surveyed enterprises, the majority were entities operating in international markets – 33%. Nearly 28% of enterprises operated at the national level, 21.15% at the regional level, and 18.27% – in the local markets. As regards the expenditures on innovation per employee, on average, firms spent 45,5 thousand PLN. The structure of innovation expenditures was dominated by R&D investment performed in-house or outsourced to other entities. It was followed by investments in machinery and technical equipment, means of transport, tools, instruments, and equipment. The smallest outlays were earmarked for buildings, premises, and land.

Considering the type of partnership of surveyed enterprises, clients and suppliers of equipment, materials, components, or software are the most frequent partners in innovation activities, indicating the critical importance of supply chain and customer-driven innovation (Figure 1). Other enterprises and companies in the same group follow them, demonstrating the value of collaboration within business networks. Competitors, consulting companies, private laboratories and research units, as well as universities also play significant roles, emphasising the need for knowledge exchange and expertise in fostering innovation. Regional entities like development agencies and clusters highlight the role of localised innovation ecosystems. Public sector entities, public research institutes, and producers' chambers and associations are less frequently involved, and non-profit organisations and guilds of craftsmanship and entrepreneurship show the lowest levels of cooperation, indicating their more niche roles in innovation activities. Overall, the results underscore firms' focus on partnerships that directly support operational and market-driven innovation. At the same time, less emphasis is placed on leveraging the potential of research institutions and specialised organisations to diversify innovation strategies. Our findings are in line with the study by Carvalho et al. (2018), who found that cooperation for innovation within enterprises and within enterprise groups, suppliers of equipment, materials, components and software presented higher intensities than cooperation with other partners in the sample of 111817 firms from 15 European countries.

In order to reduce and systemise the variety of partners in innovation activities, explanatory factor analysis was carried out. After rotation extraction and since two eigenvalues were greater than 1, two factors were retained. These two factors account for 79.2% of the total variance (Table 1).

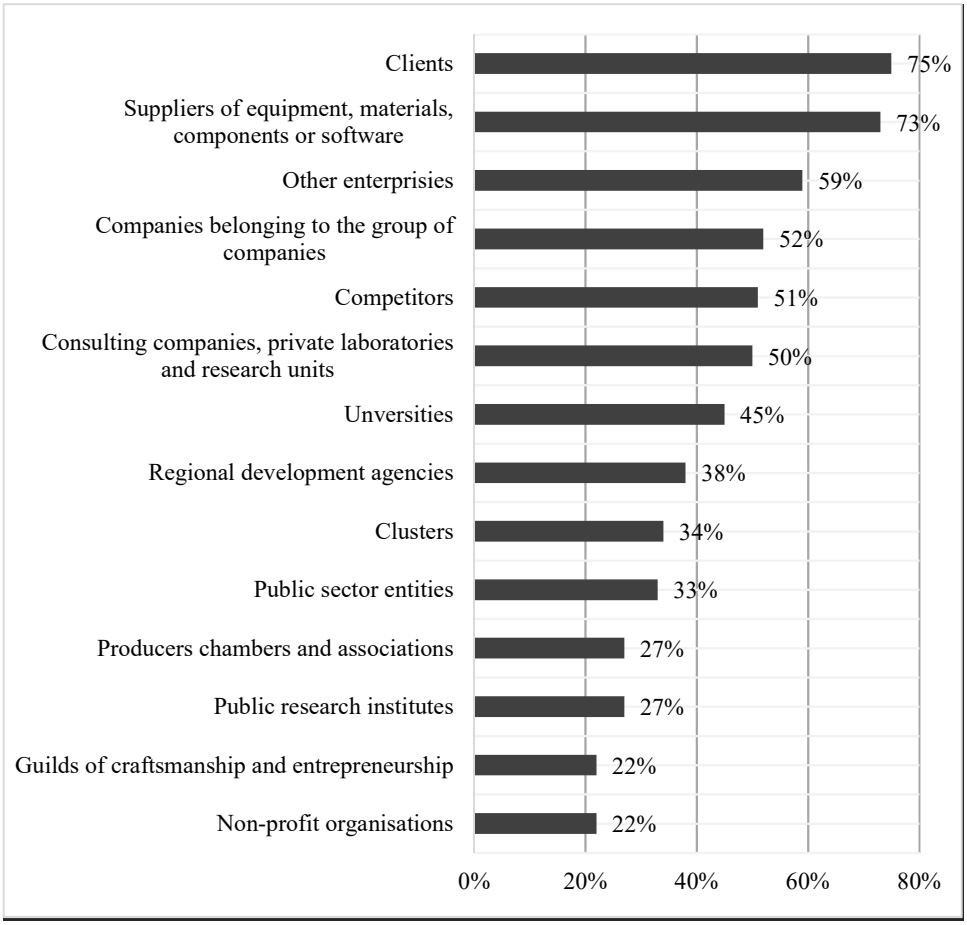

Figure 1. The propensity to collaborate on innovation activities with various partners

Source: own elaboration.

Table 1. Total variance explained

Factor	Variance	Difference	Proportion	Cumulative
Factor 1	6.553	2.017	0.468	0.468
Factor 2	4.536	-	0.324	0.792

Source: own elaboration.

As presented in Table 2, the first factor gathers cooperation partners of institutional or professional character (i.e. consulting companies, companies, private laboratories and research units, universities, public research institutes, non-profit organisations, regional development agencies, clusters, producers chambers and associations, and guilds of craftsmanship and entrepreneurship) and can be named “institutional cooperation”. Within institutional partners for cooperation identified, a few empirical studies emphasise the role of universities and research centres, as well as of public and government institutes, in

innovation (Becker, Dietz, 2004). The second factor loads positively on five items related to the market (i.e. clients, competitors, suppliers, and other companies) and the internal environment (i.e. companies belonging to the group of companies). In this situation, we named this factor "market and internal cooperation". It should be noted that some studies show that vertical and horizontal cooperation is crucial for reducing internal constraints to innovation (Carvalho et al., 2018).

Table 2. Factor loadings (pattern matrix)

Partners/items	Factor	
	1	2
Companies belonging to the group of companies	-	0.688
Suppliers of equipment, materials, components or software	-	0.826
Clients	-	0.802
Competitors	-	0.898
Other enterprises	-	0.823
Consulting companies, private laboratories and research units	0.708	-
Universities	0.769	-
Public research institutes	0.878	-
Public sector entities	0.779	-
Non-profit organisations	0.779	-
Regional development agencies	0.874	-
Clusters	0.877	-
Producers chambers and associations	0.858	-
Guilds of craftsmanship and entrepreneurship	0.674	-

Note: All loadings greater than 0.6 are presented

Sources: own elaboration.

To study the determinants of the propensity to cooperation for innovation, we employed two linear regression models (i.e. Model 1 for institutional cooperation and Model 2 for market and internal cooperation), using factor scores as dependent variables and the absorptive capacity, the firm size with "micro" as the reference category, and the firm scale of activity with "local" as the reference category as independent variables. The results of the linear regression analyses can be found in Table 3.

Our findings provide evidence to prove that absorptive capacity (AC) is crucial for undertaking cooperation in innovation with institutional partners. This may be explained by the fact that absorptive capacity enhances the ability to absorb and utilise knowledge from partners. In the case of institutional partners such as universities and public/private research institutions, cooperation in innovation typically relates to the transfer of new scientific and technological knowledge (Archibugi, Coco, 2004). This kind of knowledge requires a relatively high level of technological proximity between the interacting partners. The findings also reveal that firm size and the scale of operations are important factors influencing institutional partnerships. Small and medium-sized enterprises (SMEs) exhibit a greater willingness to cooperate with institutional partners for innovation compared to micro firms due to several key reasons. These reasons include resource availability,

Table 3. Linear regression models

Variable	Model	
	1	2
AC	0.014***	0,000
S	0.211**	-0.290**
M	0.445***	-0.055
R	0.319**	-0.120
N	0.091	0.151
IN	0.227*	0.124
Cons.	-0.286***	0.749***
R-squared	0.256	0.129
F(6, 97)	5.66***	2.41**

Note: *p < 0.10, ** p < 0.05, *** p < 0.01.

Sources: own elaboration.

strategic orientation, and the influence of institutional support, which collectively enhance their innovation capabilities. Conversely, micro firms may lack the necessary resources and strategic focus, making them less inclined to pursue institutional partnerships for innovation. The findings of our study demonstrate that micro firms are more eager to collaborate with market and internal partners than small entities. Market-oriented collaborations are particularly appealing for micro firms because they facilitate incremental innovations, reduce costs, and minimize risks associated with innovation activities.

5. CONCLUSIONS

The study provides evidence that collaboration is pivotal in enhancing innovation activities among enterprises. Firms with higher absorptive capacity demonstrate a greater propensity to engage in institutional partnerships, such as those involving universities and research institutions, due to their ability to assimilate and apply new knowledge effectively. The results also indicate that firm size and scale of activity are significant determinants of collaboration with institutional partners. Moreover, the results indicate that microenterprises exhibit a higher tendency, compared to small enterprises, to cooperate with market and internal partners to overcome resource limitations.

The findings underscore the need for tailored policies to support collaborations between firms and institutional partners, particularly for SMEs that face resource constraints. Moreover, fostering regional innovation ecosystems, including research institutions and industry networks, is crucial for enabling effective partnerships. Future research could expand this analysis by exploring the impact of specific types of collaborations on innovation outcomes and examining cross-regional differences to provide a broader perspective on collaborative innovation strategies.

REFERENCES

Afifi, A.A., May, S., Donatello, R.A., Clark, V.A. (2020). *Practical multivariate analysis* (6th ed.). Boca Raton, FL: CRC Press.

Ali A., Ahmed S. (2022). *Big data analytics and supply chain performance: The mediating role of supply chain capabilities and innovation. "Management Science Lettersc"*, 12(4). DOI: 10.5267/j.msl.2022.4.003.

Archibugi, D., Coco, A. (2004). *International partnerships for knowledge in business academia: A comparison between Europe and the US. "Technovation",* 24(7). DOI: 10.1016/S0166-4972(02)00102-6.

Belderbos, R., Gilsing, V., Lokshin, B., Carree, M., Sastre, J.F. (2018). *The antecedents of new R&D collaborations with different partner types: On the dynamics of past R&D collaboration and innovative performance. "Long range planning"*, 51(2). DOI: 10.1016/j.lrp.2017.10.002.

Barge-Gil, A. (2010). *Cooperation-based innovators and peripheral cooperators: An empirical analysis of their characteristics and behavior. "Technovation",* 30(3). DOI: 10.1016/j.technovation.2009.11.004.

Becker, W., Dietz, J. (2004). *R&D cooperation and innovation activities of firms – evidence for the German manufacturing industry. "Research Policy"*, 33(2). DOI: 10.1016/j.respol.2003.07.003.

Blois, K. (1998). *Don't all firms have relationships? "Journal of Business & Industrial Marketing",* 13(3). DOI: 10.1108/08858629810222289.

Camisón, C., Villar, A. (2009). *Capabilities and propensity for cooperative internationalization. "International Marketing Review",* 26(2). DOI: 10.1108/02651330910950394.

Carvalho, L., Madeira, M.J., Carvalho, J., Moura, D.C., Duarte, F.P. (2018). *Cooperation for innovation in the European Union: outlook and evidences using CIS for 15 European countries. "Journal of the Knowledge Economy"*, 9. DOI: 10.1007/s13132-018-0520-6.

Chen, Y., Vanhaverbeke, W., Du, J. (2016). *The interaction between internal R&D and different types of external knowledge sourcing: An empirical study of Chinese innovative firms. "R&D Management",* 46(S3). DOI: 10.3846/tede.2018.5694.

Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology.* Harvard Business School Press.

Cohen, W.M., Levinthal, D.A. (1990). *Absorptive capacity: A new perspective on learning and innovation. "Administrative science quarterly"*, 35(1).

Dahlander, L., Gann, D.M., Wallin, M.W. (2021). How open is innovation? A retrospective and ideas forward. *"Research Policy"*, 50(4). DOI: 10.1016/j.respol.2021.104218.

D'Angelo, A., Ganotakis, P., Love, J.H. (2020). *Learning by exporting under fast, short-term changes: The moderating role of absorptive capacity and foreign collaborative agreements. "International Business Review",* 29(3). DOI: 10.1016/j.ibusrev.2020.101687.

Faria, P. de, Lima, F., Santos, R. (2010). *Cooperation in innovation activities: The importance of partners. "Research Policy",* 39(8). DOI: 10.1016/j.respol.2010.05.003.

Forsgren, M., Hägg, I., Håkansson, H., Johanson, J., Mattson, L.G. (1995). *Firms in networks: A new perspective on competitive power.* Uppsala University, Uppsala.

Håkansson, H., Johanson, J. (1992). A model of industrial networks [In:] Axelsson, B., Easton, G., eds., *Industrial networks: A new view of reality* (p. 28–34). Routledge.

Igna, I., Venturini, F. (2023). *The determinants of AI innovation across European firms. "Research Policy",* 52(2). DOI: 10.1016/j.respol.2022.104661.

Lasagni, A. (2012). *How can external relationships enhance innovation in SMEs? New evidence for Europe. "Journal of Small Business Management",* 50(2). DOI: 10.1111/j.1540-627X.2012.00355.x.

Matras-Bolibok, A. (2012). *Efektywność współpracy przedsiębiorstw w zakresie działalności innowacyjnej. "Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu",* 262.

Mazur, J. (2011). *Współpraca przedsiębiorstw w teorii i praktyce polskiej*. *"International "Journal of Management and Economics",* 32.

Nieto, M.J., Santamaria, L. (2010). *Technological collaboration: Bridging the innovation gap between small and large firms. "Journal of Small Business Management",* 48(1). DOI: 10.1111/j.1540-627X.2009.00286.x

Nieto, M.J., Santamaria, L., Fernandez, Z. (2015). *Understanding the innovation behavior of family firms. "Journal of Small Business Management",* 53(2). DOI: 10.1111/jsbm.12075.

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"*. DOI: 10.1080/13662716.2022.2036597.

Poznańska, K. (1998). *Uwarunkowania innowacji w małych i średnich przedsiębiorstwach.* Warszawa: Dom Wydawniczy ABC.

—— (2016). *Współpraca małych i średnich przedsiębiorstw z podmiotami zewnętrznymi w zakresie innowacyjności. "Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach",* 280, 143–156.

Ritter, T., Ford, D. (2004). *Interactions between suppliers and customers in business markets* [In:] Håkansson, H., Harrison, D., Waluszewski, A., eds., *Rethinking marketing: Developing a new understanding of markets* (p. 99–115). John Wiley & Sons.

Rojek, D. (2017). *Wewnętrzne czynniki innowacyjności przedsiębiorstw. "Zarządzanie. Teoria i Praktyka",* 21(3).

Stanisławski, R. (2014). *Open innovation wśród małych i średnich przedsiębiorstw jako instrument kształtowania przewagi konkurencyjnej. "Economics and Management",* 2. DOI: 10.12846/j.em.2014.02.13.

Sudolska, A. (2011). *Uwarunkowania budowania relacji proinnowacyjnych przez przedsiębiorstwa w Polsce.* Toruń: Wydawnictwo Naukowe UMK.

Tiwari, A.K., Mohnen, P., Palm, F.C., van der Loeff, S.S. (2007). *Financial constraints, capital structure and innovation: An empirical investigation. "UNU-MERIT Working Papers",* 011.

Wściubiak, Ł. (2019). *Motywy współpracy międzyorganizacyjnej w działalności innowacyjnej – perspektywa przedsiębiorstw produkcyjnych w Polsce. "Przegląd Organizacji",* 8(955). DOI: 10.33141/po.2019.08.02.

Yu, G.J., Lee, J. (2017). *When should a firm collaborate with research organizations for innovation performance? The moderating role of innovation orientation, size, and age. "The Journal of Technology Transfer",* 42(6). DOI: 10.1007/s10961-016-9469-4.

Van Beers, C., Zand, F. (2014). *R&D cooperation, partner diversity, and innovation performance: an empirical analysis. "Journal of Product Innovation Management"*, 31(2). DOI: 10.1111/jpim.12096.

Xie, X., Liu, X., Chen, J. (2023). *A meta-analysis of the relationship between collaborative innovation and innovation performance: The role of formal and informal institutions. "Technovation"*, 124. DOI: 10.1016/j.technovation.2023.102740.