SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2026
ORGANIZATION AND MANAGEMENT SERIES NO. 249

THE NETWORK-EMBEDDED PROCESS OF TECHNOLOGICAL KNOWLEDGE ACQUISITION IN STARTUPS: A QUALITATIVE STUDY

Maciej KĘDZIERA[1*], Aleksandra WITOSZEK-KUBICKA[2]

[1] Krakow University of Economics, Department of Organizational Behaviors; mkedzier@uek.krakow.pl, ORCID: 0000-0003-3931-419X
[2] Krakow University of Economics, Department of Organizational Behaviors; witoszea@uek.krakow.pl, ORCID: 0000-0001-5304-3379
*Correspondence author

Purpose: The purpose of the paper is to identify and analyze the sources of technological knowledge acquisition that function as central and intermediary nodes in the relational networks of startups. The study seeks to demonstrate the networked character of technological knowledge flows and their role in strengthening startup innovation and competitiveness.
Design/methodology/approach: The study adopts a qualitative research approach. Data were collected through expert interviews with representatives of the startup ecosystem. The empirical material was analyzed using qualitative data analysis software (Atlas.ti), which enabled the identification of key sources of technological knowledge and the reconstruction of relational networks linking these sources.
Findings: The results indicate a diversity of technological knowledge sources available to startups and reveal the existence of complex networks of relationships among them. Some actors perform central roles, while others act as intermediaries facilitating the flow of technological knowledge. The analysis highlights the importance of interactions between various ecosystem actors in supporting startups' access to technological knowledge.
Research limitations/implications: The study is based on qualitative interviews with experts, which may limit the generalizability of the results. Future research could complement these findings by applying quantitative methods, analysing larger samples of startups, or examining differences between industries and national innovation ecosystems.
Practical implications: The findings provide guidance for startups and organizations supporting entrepreneurship by identifying actors that play a key role in technological knowledge exchange. The results may also support incubators, accelerators, and policymakers in strengthening collaboration mechanisms within startup ecosystems.
Originality/value: The study contributes to the literature by presenting a qualitative analysis of technological knowledge acquisition networks from the perspective of actors operating in the startup ecosystem. It addresses a research gap concerning the limited number of qualitative studies exploring the network structure of technological knowledge sources for startups.
Keywords: technological knowledge; startups; knowledge acquisition; innovation networks; startup ecosystem.
Category of the paper: Research Paper.

1. Introduction

The business world is undergoing rapid and extensive transformation on a global scale (Fuentes-Fernández et al., 2024). Contemporary organizations, in their pursuit of development and increased competitiveness, face numerous managerial challenges related to the proper understanding of the business environment. Managers are therefore required to monitor and interpret market trends while demonstrating the ability to anticipate ongoing changes in the market and adapt their strategies accordingly (de Diego Ruiz, Almodóvar, Birkinshaw, 2024).

The pervasive advancement of technology is also generating a range of changes in business operations. Consequently, digital technologies have acquired a strategic dimension, as they can support collaboration and knowledge sharing with business partners and customers (Abuseta, Iyiola, Aljuhmani, 2025). It is therefore important for organizations to effectively leverage the potential embedded in new technologies within their business activities. However, the ability to exploit technological opportunities is often conditioned by the possession of technological knowledge.

Thus, ensuring appropriate sources of technological knowledge acquisition becomes crucial, particularly for startups that frequently rely on new technologies in their business activities. Startup companies have broad opportunities in terms of acquiring technological knowledge. Establishing cooperation with other entities often becomes a necessity for firms competing through innovation (Wściubiak, 2019). Nevertheless, knowledge sources are highly diversified, as each firm pursues its own mission and develops specific interactions with different entities (Pinto, Guerreiro, Fernández-Esquinas, 2023).

It is recognized that companies can acquire knowledge from outside the organization, thereby enriching their expertise, fostering development, and striving for innovative success (Adam, Alofaysan, 2023). At the same time, organizations experience increasing pressure to possess knowledge that is essential for maintaining competitiveness in a knowledge-based economy (Danko, Crhová, 2024). Therefore, ensuring access to sources of technological knowledge remains a strategic issue for startups seeking growth and scalability.

In light of these considerations, it is justified to examine from which external organizations or individuals startups most frequently acquire technological knowledge. Identifying the sources of technological knowledge acquisition may represent an important step toward enhancing the innovativeness and competitiveness of startups. Moreover, the relationship maps between individual knowledge sources proposed in this article deepen the understanding of the analyzed phenomenon and may therefore provide significant practical value for startup managers. At the same time, it is noted that the literature on the subject still lacks in-depth analyses of the sources of technological knowledge acquisition and the relationships between them in the context of startup ecosystems. This paper fills this gap through a qualitative analysis of the network of relationships, identifying the crucial role not only of access to central nodes

but also of intermediary nodes that support the effectiveness of technological knowledge acquisition.

2. The Role and Importance of Technological Knowledge in Contemporary Organizations

Technological knowledge constitutes a critical component of an organization's intangible resources, directly determining the ability to design, produce, and improve products and processes, while indirectly influencing the pace of learning and adaptation to environmental changes (Barney, 1991). In the national literature, it is emphasized that managing a knowledge-based organization involves focusing management functions on knowledge-related resources, the processes associated with them, and the conditions enabling their efficient functioning (Mikuła, 2018). Consequently, the role of technological knowledge is twofold: (1) it represents substantive content enabling the creation of technical solutions, and (2) it is an object of management that requires appropriate mechanisms for identification, transfer, protection, and utilization.

Current diagnoses of innovation policies and trends indicate increasing pressure on the efficiency and speed of implementing new technologies under conditions of accelerated change and growing uncertainty (OECD, 2025). From a macro perspective, innovation indicators such as the European Innovation Scoreboard (EIS) and the Global Innovation Index (GII) consistently emphasize the importance of the capacity to generate, absorb, and utilize knowledge as a foundation of organizational and economic innovativeness (European Commission, 2025; WIPO, 2025).

Technological knowledge can be understood as a resource encompassing information about technologies (e.g., parameters, standards, requirements), operational competencies (know-how), understanding of mechanisms (know-why), and relational knowledge (know-who), indicating where and from whom complementary competencies can be obtained. A crucial distinction is made between explicit and tacit knowledge, as this determines the possibility of knowledge transfer and scaling within an organization (Nonaka, 1994). In the case of technological knowledge, a substantial portion is tacit (e.g., engineering practices, diagnostic intuition, implementation experience), which creates specific requirements for organizational learning and knowledge-sharing mechanisms.

The strategic value of technological knowledge is manifested in its capacity to generate value. It underpins the design, production, integration of systems, cybersecurity, and data analytics. The dynamic capabilities perspective suggests that under conditions of volatility, competitive advantage stems from the ability to sense opportunities, seize them, and reconfigure resources (Teece, 2007). In this context, technological knowledge is both an object of

reconfiguration (e.g., updating technological architectures) and a mechanism enabling such reconfiguration (e.g., integration competencies and implementation capabilities). Polish literature also highlights the strategic dimension of knowledge management, including the development of knowledge strategies, identification of competence gaps, and decisions regarding the development of knowledge resources and relationships within the environment (Mikuła, 2006). Thus, the strategic nature of technological knowledge results not only from its quality but also from its alignment with long-term organizational development directions. At the same time, various technological solutions can support processes involving knowledge (Kędziera, 2025).

Technological knowledge is a direct predictor of innovativeness because it enables organizations to generate solutions and implement and scale them. However, a key condition is absorptive capacity, defined as the ability to recognize the value of external knowledge, assimilate it, and apply it commercially (Cohen, Levinthal, 1990). This capacity depends on the existing competence base, which enables organizations to understand and integrate new knowledge. Depending on the conceptualization, absorption may involve not only assimilation but also transformation and exploitation of knowledge (Zahra, George, 2002).

Comparative reports (EIS, GII) indicate that innovation outcomes are strongly associated with R&D expenditure, the quality of human capital, and the intensity of collaboration within innovation systems. At the organizational level, this translates into the need to simultaneously strengthen technological competencies and network-based collaboration mechanisms (European Commission, 2025; WIPO, 2025). These conclusions are consistent with the assumptions of the open innovation concept, according to which companies increasingly rely on the purposeful use of external knowledge sources and cooperation with diverse actors in their environment (Chesbrough, 2003).

3. Sources of Technological Knowledge Acquisition

In the literature, knowledge acquisition is regarded as one of the key processes of knowledge management. This process includes the identification, acquisition, and introduction into the organization of knowledge originating both from internal resources and from the external environment, determining the possibilities for further transfer, use, and development of knowledge within the organization (Mikuła, 2006). Technological knowledge acquisition therefore has a hybrid character.

On the one hand, organizations acquire knowledge endogenously through research and development activities, learning-by-doing, and implementation experience. On the other hand, they absorb knowledge from the external environment through partnerships, technology transfer, and resources available within innovation ecosystems. The effectiveness of this

process depends both on the alignment of knowledge sources with organizational strategy and on absorptive capacity, understood as the ability to recognize the value of new knowledge, assimilate it, transform it, and use it in practice (Cohen, Levinthal, 1990; Zahra, George, 2002).

Internal sources of technological knowledge include, in particular, R&D activities, development work, experience derived from technology implementation, and learning through solving technical problems. Not only the generation of knowledge within projects is important, but also its preservation and diffusion across the entire organization (Pietruszka-Ortyl, 2020). Approaches structuring knowledge management processes emphasize the need to design the organizational environment, including its structure, culture, and organizational climate, in a way that supports knowledge creation and sharing (Mikuła, 2006). In the context of technological knowledge, this includes, among others, the formalization of project reviews, retrospectives, documentation standards, and mechanisms for transferring competencies between teams and projects. External sources of technological knowledge include cooperation with universities and research institutions, technological alliances, relationships with suppliers and customers, licensing solutions, and the use of open-access components.

According to the concept of open innovation, knowledge flows into and out of organizations can significantly shorten technology development cycles and increase the diversity of generated innovations (Chesbrough, 2003). In this perspective, competitive advantage increasingly depends not on the full internalization of resources but on access to distributed competencies operating within broader ecosystems. The importance of network relationships is also confirmed by innovation reports and indicators, which consistently point to collaboration and science–business relations as key determinants of innovation performance (European Commission, 2025; WIPO, 2025). From the organizational perspective, this implies the need for deliberate management of the portfolio of relationships and the development of capabilities to integrate knowledge originating from heterogeneous sources.

4. The Specificity of Startup Activity in the Context of Technological Knowledge

A startup can be defined as an organization operating under conditions of high uncertainty whose objective is to search for a repeatable and scalable business model (Blank, 2013; Ries, 2011). The literature emphasizes that startups are characterized by a low level of formalization, high operational flexibility, and strong dependence on the competencies of the founding team and key employees. On the one hand, this facilitates rapid decision-making and adaptation to market changes; on the other hand, it increases the risk of excessive personalization of knowledge and its concentration at the individual level (Blank, 2013).

Combined with the pressure of rapid market validation and persistent resource constraints, knowledge management in startups typically takes an agile form, closely linked to iterative product development. Startups primarily learn through market experiments, rapid prototyping, and testing hypotheses concerning value and growth (Ries, 2011). From the perspective of technological knowledge, this implies a high frequency of short cycles of knowledge creation, updating, and obsolescence, while limiting the development of extensive formal structures.

In many startups, technological knowledge forms the core of the value proposition, and competitive advantage results from unique technological competencies (e.g., algorithms, system architectures, data integration) or from the speed of implementing and iterating solutions. Consequently, aligning knowledge management strategies with the nature of the product and technology becomes particularly important. In areas where technology functions as a key strategic resource, it is necessary to simultaneously apply mechanisms for knowledge protection (intellectual property protection, trade secrets) and build capabilities for scaling and diffusing knowledge within the organization (Mikuła, Pietruszka-Ortyl, 2003).

At the same time, financial, temporal, and human resource constraints mean that startups rely more heavily than mature organizations on network-based forms of technological knowledge acquisition. Intensive use of advisors, mentors, investors, technology communities, cloud infrastructure providers, and ecosystem partners makes the ability to operate effectively within relational networks a substitute for missing internal resources. In this perspective, absorptive capacity becomes a critical organizational capability (Cohen, Levinthal, 1990). From a process perspective, this requires at least a minimal but sufficient competence base enabling the assessment of the quality of externally acquired knowledge, its selection, transformation, and application in the context of a specific product or technology (Zahra, George, 2002). Simultaneously, startups may use instruments supporting internal knowledge transfer; research indicates that motivational and project-based solutions, including elements of gamification, can strengthen employee engagement in knowledge-sharing activities (Witoszek-Kubicka, 2023).

5. Methods

The purpose of this article was to identify and analyze the sources of technological knowledge acquisition that function as central and intermediary nodes within the relational networks of startups. Accordingly, the following research question was formulated: Which sources of technological knowledge perform the role of central and intermediary nodes in the relational network identified among startups?

To achieve the objective of the study and answer the research question, a qualitative research approach was applied. Sixteen interviews were conducted with representatives of the business environment supporting startups, using remote online communication. The respondents were experts cooperating with organizations that support the startup ecosystem (e.g., science and technology parks). Their overall professional experience ranged from 6.5 to 35 years, while their experience related specifically to startups ranged from 3 to 16 years. The selection of experts from the external environment was justified by their broader and more cross-sectional perspective on startup-related challenges, as well as a lower risk of bias.

The collected empirical material in the form of interviews was analyzed using computer-assisted qualitative data analysis software. Currently, numerous software tools from the CAQDAS (Computer-Assisted Qualitative Data Analysis Software) family support qualitative data analysis. The development of such software has been strongly influenced by the assumptions of grounded theory, which shaped the design of their analytical functionalities (Bryda, 2014). In this study, Atlas.ti software was used due to its intuitive interface, grounded theory–based architecture, and advanced capabilities for creating relational networks between individual codes (Konopasek, 2008; Niedbalski, 2014).

The interview data were first uploaded into the Atlas.ti environment, after which relevant coding categories were developed. In the next stage of analysis, the interview material was coded until theoretical saturation was reached. As Gibbs (2011) notes, codes can be understood as short labels assigned to fragments of text that relate to a specific issue. In this study, the codes represented sources of technological knowledge acquisition for startups.

The identified sources of technological knowledge acquisition were subsequently presented through generated maps that also illustrated possible relationships between the individual codes. These maps enable a better understanding of the diversity of technological knowledge sources used by startups and the potential relational networks among them. Consequently, they may provide practical value for the managerial staff of startup companies.

6. Results and Discussion

Figure 1 presents a relational map of the sources of technological knowledge acquisition used by startup companies, identified through the analysis of the interview data. The map reflects the structure of codes and the relationships between them. Each node represents a distinct source of technological knowledge acquisition. The symbol “G” indicates the number of occurrences of a given code in the empirical material, reflecting the frequency with which experts referred to a particular source of technological knowledge. The symbol “D” denotes the number of relationships in which a given code is involved with other codes, indicating its degree of connectivity within the analyzed network of knowledge sources.

The relationships between individual sources of technological knowledge are illustrated by arrows of different colors, enabling the distinction of the nature of these connections. Green arrows represent relationships with a positive impact, indicating that a given source of knowledge supports or strengthens the use of another source. Red arrows indicate a negative impact, understood as limiting or weakening the importance of another technological knowledge source. Blue arrows denote neutral relationships, indicating co-occurrence or functional linkage between sources without a clearly defined direction of influence.

The analysis of the relational map indicates that selected sources of technological knowledge function as central nodes. This is reflected both in the number of references by experts (G) and in the number of connections with other codes (D). In particular, technology parks are characterized by a relatively high number of occurrences in the empirical material (G = 5) and a significant number of relationships with other knowledge sources (D = 2), indicating their role as institutional platforms integrating access to technological knowledge. An even more pronounced central node function is performed by experts, who reach one of the highest values in terms of the number of connections in the network (D = 7, with G = 5), confirming their importance as intermediaries and knowledge brokers within the startup ecosystem. Universities also stand out due to a high frequency of references (G = 11) and the presence of connections with other sources (D = 2), confirming their role as significant providers of technological knowledge, particularly of a formal and expert nature. This result is consistent with findings in the literature, which indicate that knowledge institutions and actors possessing specialized competencies serve as integrators of knowledge flows within innovation ecosystems, providing access to expert knowledge and reducing information asymmetry for startups (Nonaka, Takeuchi, 1995; Argote, Ingram, 2000).

It's also worth noting specialized online channels, which were characterized by a high number of references (G = 5) and connections to other sources at a high level (G = 2). This suggests that specialized online channels can also be an important source of technological knowledge for startups. At the same time, a connection between this source and online trends was observed. This may lead to the conclusion that the observed trends may lead to a search for more advanced technological knowledge.

Attention should also be given to sources such as inter-firm collaboration, training, and industry meetings, which perform intermediary node functions within the analyzed network. Inter-firm collaboration is characterized by a moderate number of references (G = 4) and a relatively high number of connections (D = 5), suggesting its role as a mechanism linking different categories of actors and knowledge sources. A similar pattern is observed in the case of training (G = 6; D = 5), which functions as a channel of knowledge transfer, particularly explicit knowledge, while simultaneously facilitating knowledge internalization through interaction. Industry meetings, despite a lower number of references (G = 2; D = 3), demonstrate significant connections with other sources, confirming their role as occasional yet important contact points enabling the flow of tacit knowledge. Such intermediary nodes support the

diffusion of knowledge between diverse groups of actors and enable the recombination of knowledge resources, which the literature associates with increased organizational innovativeness (Burt, 1992; Obstfeld, 2005). The findings of Pittaway et al. (2004) indicate that network relationships with suppliers, customers, and intermediaries such as industry and professional associations are key factors influencing innovation. In the context of our research, we note that an extensive network for acquiring technological knowledge sources within the framework of open innovation can enhance startups' innovativeness.

The obtained results are also consistent with the assumptions of the open innovation concept, according to which startups, due to their limited internal resources are particularly dependent on external sources of technological knowledge. At the same time, the findings emphasize that the effectiveness of knowledge acquisition depends not only on access to central nodes but also on the presence of intermediary nodes, which enable relationship building, learning through interaction, and the transfer of tacit knowledge. In the context of the research question, it can therefore be concluded that the network of technological knowledge acquisition among startups has a functionally differentiated structure in which central nodes provide access to key knowledge resources, while intermediary nodes facilitate their diffusion and practical utilization. The study also highlights that it is the combination of central and intermediary nodes, not just the dominant role of one, that creates multi-channel learning environments. Thus, the diverse flow of technological knowledge creates unique conditions for the growth of innovation and startup development. This study also demonstrates that startups face numerous challenges related to building relationships in the external environment. The multidimensional nature of technological knowledge sources also raises questions regarding the speed of its acquisition, the level of accessibility, and its cost-effectiveness.

This study, however, has certain limitations. The study was based on interviews with representatives of organizations supporting startup development. Adopting this perspective imposes a specific perspective on the sources of technological knowledge, focusing primarily on the experiences and observations of intermediaries rather than the startups themselves. This approach may result in the possibility of partially omitting important startup conditions, internal processes, and adopted strategies for acquiring technological knowledge. Future research could therefore focus on adopting an internal perspective, and thus be conducted among startup founders or representatives. An interesting research direction would also be examining the sources of technological knowledge acquisition and the relationships between them in public administration institutions.

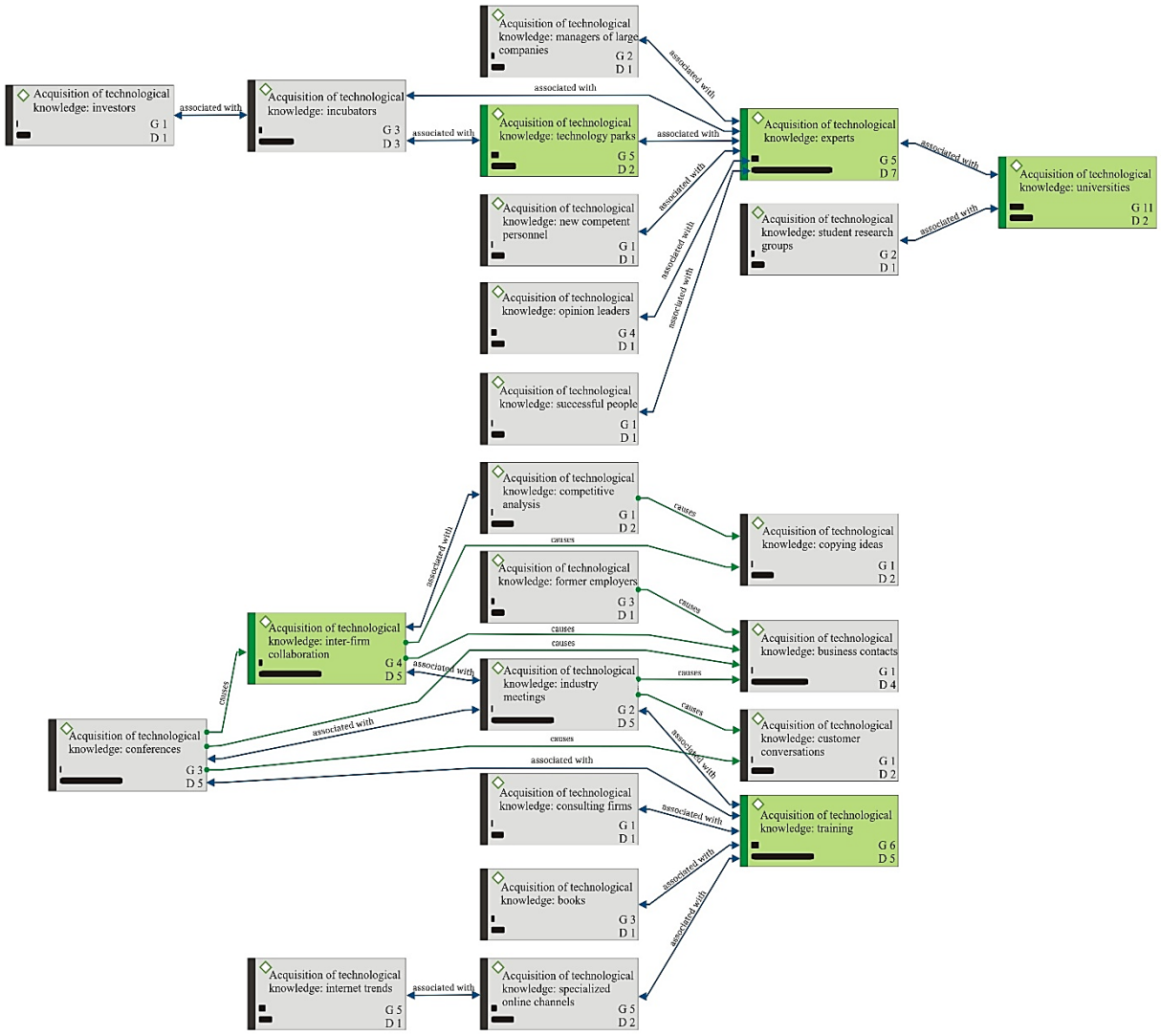

Figure 1. Relational map of technological knowledge acquisition sources among startups.
Source: own elaboration.

7. Summary

Startup companies have access to numerous and diverse sources of technological knowledge acquisition. The conducted study indicates that key sources include technology parks, experts, and universities. An important role is also played by inter-firm collaboration and training activities, which support the acquisition of technological knowledge within startups.

This study presents the networked nature of individual codes (sources of technological knowledge acquisition) in the form of relational maps. These maps may provide practical value for managers responsible for the development of new technologies and the implementation of innovative solutions in organizations. The research also addresses a theoretical gap related to the limited number of qualitative studies presenting networks of technological knowledge

acquisition from the perspective of actors operating in the startup environment. In doing so, the study contributes an alternative perspective to the literature, which often focuses primarily on the viewpoint of startup founders. Such an approach allowed for the identification of technological knowledge sources in a more systemic and cross-sectional manner.

The study also leads to broader theoretical implications, demonstrating the complementary nature of central and intermediary nodes as sources of technological knowledge acquisition for startups. This leads to the conclusion that the effectiveness of technological knowledge acquisition may depend on startups' ability to configure diverse knowledge source connections within their ecosystem. The study therefore indicates that for startups, a strategic approach to building a network of knowledge sources is crucial to their development.

Nevertheless, it is difficult to construct a universal map of technological knowledge sources and the relationships between them that could serve as a universal solution ensuring startups' competitive strength in the market. The selection of technological knowledge sources should also be considered in relation to the financial capabilities of a startup, as some of these sources may involve significant costs. Access to technological knowledge may constitute an important pathway for development and increased innovativeness not only for startups but also for other types of organizations.

Acknowledgements

The publication was co-financed/financed from the subsidy granted to the Krakow University of Economics - Project nr 048/ZZZ/2025/POT.

References

1. Abuseta, H., Iyiola, K., Aljuhmani, H. Y. (2025). Digital Technologies and Business Model Innovation in Turbulent Markets: Unlocking the Power of Agility and Absorptive Capacity. *Sustainability*, *17(12),* 5296. https://doi.org/10.3390/su17125296
2. Adam, N. A., Alofaysan, H. (2023). External knowledge flows and small and medium-sized enterprises' innovation capabilities enhancement: An empirical investigation. *Sustainability*, *15(5),* 4071. https://doi.org/10.3390/su15054071
3. Argote, L., Ingram, P. (2000). Knowledge transfer: A basis for competitive advantage in firms. *Organizational Behavior and Human Decision Processes*, *82(1),* 150-169. https://doi.org/10.1006/obhd.2000.2893

4. Barney, J.B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99-120.
5. Bryda, G. (2014). CAQDAS a badania jakościowe w praktyce. *Przegląd Socjologii Jakościowej*, *10(2),* 12-38.
6. Burt, R.S. (1992). *Structural holes: The social structure of competition*. Harvard University Press.
7. Chesbrough, H.W. (2003). *Open innovation: The new imperative for creating and profiting from technology.* Harvard Business School Press.
8. Cohen, W.M., Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly, 35*(1), 128-152.
9. Danko, L., Crhová, Z. (2024). Rethinking the role of knowledge sharing on organizational performance in knowledge-intensive business services. *Journal of the Knowledge Economy*, 1-21.
10. de Diego Ruiz, E., Almodóvar, P., Birkinshaw, J. (2024). The effects of a firm's internationalization, age, and environmental turbulence on the capabilities that comprise strategic agility. *International Entrepreneurship and Management Journal*, *20(3),* 1935-1961.
11. European Commission (2025). *European Innovation Scoreboard 2025*. Directorate-General for Research and Innovation.
12. Fuentes-Fernández, R., Sánchez-García, E., Martínez-Falcó, J., Marco-Lajara, B. (2024). Uncovering external factors that influence the acquisition of knowledge for innovative purposes. *Operational Research*, *24(3),* 45.
13. Gibbs, G. (2011). *Analizowanie danych jakościowych*. Warszawa: PWN.
14. Kędziera, M. (2025). Strategiczne zarządzanie wiedzą jako czynnik rozwoju organizacji wysokiego ryzyka-studium przypadku NASA. *Nauki Ekonomiczne*, *42,* 1-14.
15. Konopasek, Z. (2008). Making thinking visible with Atlas.ti: Computer assisted qualitative analysis as textual practices. *Forum: Qualitative Social Research*, *9(2), Article 12*.
16. Mikuła, B. (2006). Zadania organizacji w zakresie zarządzania wiedzą. *E-mentor*, *5(17).*
17. Mikuła, B. (2018). Zarządzanie oparte na wiedzy – podstawowe założenia. *Studia Ekonomiczne. Gospodarka–Społeczeństwo–Środowisko*, *2*, 34-46.
18. Mikuła, B., Pietruszka-Ortyl, A. (2003). Elementy strategicznego zarządzania wiedzą w przedsiębiorstwie. *Przegląd Organizacji*, 7/8, 6-9.
19. Niedbalski, J. (2014). Zastosowanie oprogramowania Atlas.ti i NVivo w realizacji badań opartych na metodologii teorii ugruntowanej. *Przegląd Socjologii Jakościowej*, *10(2),* 60-80.
20. Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science, 5*(1), 14-37.
21. Nonaka, I., Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.

22. Obstfeld, D. (2005). Social networks, the tertius iungens orientation, and involvement in innovation. *Administrative Science Quarterly*, *50(1),* 100-130.
23. OECD (2025). *OECD Science, Technology and Innovation Outlook 2025*. OECD Publishing.
24. Pietruszka-Ortyl, A. (2020). *Kooperacja w perspektywie zasobów niematerialnych organizacji*. C.H. Beck.
25. Pinto, H., Guerreiro, J.A., Fernández-Esquinas, M. (2023). Sources of knowledge in the firm: a review on influential, internal and contextual factors in innovation dynamics. *SN Business & Economics*, *3(2),* 57.
26. Pittaway, L., Robertson, M., Munir, K., Denyer, D., Neely, A. (2004). Networking and innovation: a systematic review of the evidence. *International Journal of Management Reviews*, *5*(3-4), 137-168.
27. Ries, E. (2011). *The Lean Startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. Crown Business.
28. Teece, D.J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319-1350.
29. WIPO (2025). *Global Innovation Index 2025*. World Intellectual Property Organization.
30. Witoszek-Kubicka, A. (2023). Leveling up knowledge management: Harnessing gamification for effective knowledge acquisition, distribution, dissemination, and sharing. *Zeszyty Naukowe Administracja i Zarządzanie, vol. 61, no. 134,* 187-193.
31. Wściubiak, Ł. (2019). Motywy współpracy międzyorganizacyjnej w działalności innowacyjnej-perspektywa przedsiębiorstw produkcyjnych w Polsce. *Przegląd Organizacji*, *8*, 12-18.
32. Zahra, S.A., George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review, 27*(2), 185-203.