

Factors Influencing Knowledge Sharing, Cooperation, and Relationship Building Between Academia and Business

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Abstract: Building relationships between businesses and research centres enables the creation of synergies that stimulate development and the flow of best practices. A key element of cooperation and the development of science-business relationships is the sharing of knowledge, which leads to the transformation of intellectual capital into organizational and market value; Technology Transfer Centres (TTCs) serve as intermediaries in the flow of knowledge between the academic community and the business sector. The aim of this article is to identify factors that facilitate cooperation between enterprises and scientific research centres, as well as factors limiting such cooperation, with a focus on the Kuyavian-Pomeranian region in Poland. The research conducted was part of a larger research project dedicated to improving the process of transferring and commercializing innovative solutions between science and the economy. The study covered enterprises from the Kuyavian-Pomeranian region in Poland and TTC units operating in Poland. Data were collected through computer-assisted telephone interviews (CATI), and the research tools consisted of questionnaires developed based on literature reviews. The study determined the significance for both groups of respondents of the factors identified by the research team as either facilitating or limiting cooperation between enterprises and scientific research centres. The findings can be used by businesses, universities, and research centres alike to better tailor their offerings and improve cooperation processes.

Keywords: Cooperation, Relationship building, Knowledge sharing, Technology transfer centres (TTCs)

1. Introduction

The modern global economy increasingly relies on intangible assets, which form the foundation of innovation and competitiveness. In the era of the knowledge-based economy, innovation is no longer viewed as the result of isolated actions by individual entities, but rather as the effect of synergy arising from a dense network of connections between the scientific sector and industry (Drewniak et al., 2023; Słupska et al., 2019; Bergman, 2010). Additionally, in recent decades, there has been a shift from a closed innovation model to an open model, in which organizations deliberately leverage external knowledge flows to accelerate innovation processes (Viederyte, 2020). In this context, the role of research centres has evolved beyond traditional functions of teaching and conducting basic research to include active participation in socio-economic development (Plata, 2024; Pukin, 2019). Businesses, in turn, increasingly view universities as strategic partners that provide not only a well-educated workforce but also unique expert knowledge (Bejerano et al., 2023; Almeida, 2021; Brodny and Tutak, 2022).

This article attempts to identify the factors that facilitate and limit cooperation between businesses and research institutions, with a focus on the Kuyavian-Pomeranian region in Poland. Despite numerous studies on cooperation between businesses and research centres, a research gap remains regarding the analysis of factors that facilitate and limit such cooperation, particularly when considering the diverse perspectives of the participants in the cooperation process.

2. Theoretical Background

In a knowledge-based economy, companies face ever-increasing pressure to seek innovative solutions and enhance their competitiveness. Acquiring the right knowledge- and skill-based resources—ones that are not at risk of becoming obsolete quickly—has become a key determinant of success for modern companies (Drewniak et al., 2023; Słupska et al., 2019). Knowledge resources in enterprises include so-called internal organizational knowledge and external knowledge. The former is knowledge accumulated over many years of the enterprise's development and encompasses established standards, patterns of behaviour and operations, as well as patents, licenses, inventions, and improvements (Nonaka et al., 2000). External knowledge, on the other hand, lies at the boundary between the enterprise and its environment (Gold et al., 2001). It is acquired

through building relational competencies and learning from one another. Nowadays, a company's competitive advantage is based not only on its internal resources but is also shaped by the outcomes of cooperation with its environment (Słupska, 2023). This compels companies to deliberately manage knowledge flows both into and out of the organization to accelerate market innovation (Viederyte, 2020). Additionally, internal knowledge resources form the foundation of absorptive capacity, which determines an organization's readiness to recognize the value of external knowledge and to effectively assimilate and commercially exploit it (Viederyte, 2020; Ryszko, 2015; Dell'Anno and Del Giudice 2015).

Academic research centres are identified as a strategic source of knowledge, providing talent and unique expertise (Reichert, 2019). Perkmann et al. (2013) describe universities' engagement in industry cooperation primarily as formal activities, such as collaborative research, contract research, and consulting, as well as informal activities, such as providing ad hoc advice and networking with practitioners. It is precisely these informal channels that often prove more effective from the perspective of tacit knowledge transfer, which conflicts with the tendency toward formalization and bureaucratization of cooperation evident in the policies of many universities. Universities actively provide resources in the form of talent and scientific research, facilitating the co-creation of knowledge among partners through intermediary services, shared organizational structures, and access to researchers and research infrastructure. Additionally, universities have a natural inclination to explore the frontiers of knowledge and discover new opportunities and technologies, as well as interdisciplinary approaches to problem-solving (Reichert, 2019). Therefore, building relationships between businesses and research centres enables the creation of synergies, which in turn stimulates the development and exchange of best practices (Jasińska, 2019). It should be noted, however, that the academic approach, based on openness and long-term cognitive exploration, conflicts with corporate logic, which seeks to appropriate results and ensure rapid implementation (Tzavidas, et al., 2020). Technology Transfer Centres (TTCs) act as intermediaries in the processes of knowledge flow between the academic community and the business sector, helping to partially alleviate these tensions. Their primary task is to build "technological bridges" that enable the commercial exploitation of research results (Bergman, 2010; Abbas et al., 2018). However, TTCs are often underfunded, operate under varying institutional conditions, and have their own internal limitations that affect their effectiveness in mediating between the distinct organizational cultures of science and business (Siegel et al., 2003).

A key element of cooperation and the development of science-business relationships is knowledge sharing—that is, the process of exchanging information and experiences that enables the transformation of individual intellectual capital into organizational and market value (Ryszko, 2015; Bylok, 2025). Despite obvious benefits, such as increased innovation, cost reduction, and access to financing, the process of building relationships between academia and business faces significant barriers related to, among other things, organizational differences, lack of trust, and communication difficulties (Dell'Anno and Del Giudice 2015; Fan and Beh, 2024; de Wit-de Vries et al., 2019). The literature has long emphasized that the motivation to share knowledge is not self-evident. Opportunistic behaviour, fear of losing a competitive advantage, or informal mechanisms for appropriating research results can effectively block cooperation even in the presence of formally concluded agreements (Dell'Anno and Del Giudice, 2015; Fan and Beh, 2024). Another important aspect of the cooperation between businesses and research institutions under consideration is the effectiveness of knowledge transfer. Knowledge transfer focuses on the practical application of research results and innovations in economic practice and aims to commercialize knowledge and solve specific industrial problems by providing new discoveries and technologies (Bejerano et al., 2023; Loučanová, 2025). The effectiveness of knowledge transfer depends largely on the so-called absorptive capacity of enterprises and the desorptive capacity of research centres, that is, their readiness to effectively transfer and utilize new solutions (Dell'Anno and Del Giudice 2015). However, the concept of desorption capacity remains less developed theoretically and empirically compared to absorption capacity, which constitutes a significant gap in the existing body of research. In summary, cooperation between research institutions and enterprises is a multidimensional process of exchanging resources, knowledge, and technology, which in a modern knowledge-based economy is evolving toward interactive co-creation (OECD, 2019).

3. Research Methodology

The completed studies form an integral part of a research project titled "Improving the Transfer and Commercialization of Innovative Solutions Between Science and the Economy." They were conducted in late 2024 and during the first months of 2025. The project included four main studies: a survey of companies in the Kuyavian-Pomeranian region of Poland, a study of TTCs in Poland, 10 case studies of the best TTCs in Poland, and three expert panels.

The survey of enterprises was conducted using two purposively selected samples, taking into account the minimum sample size. The first sample consisted of small and medium-sized enterprises, and the second sample consisted of large enterprises. A proportional distribution was applied, consistent with the number of entities, across the strata of manufacturing, service, and commercial enterprises. The list of entities was prepared based on data from the Statistical Office. The research tool was a questionnaire developed based on the relevant literature. The division into manufacturing, commercial, and service companies applied to each sample separately. In the group of small and medium-sized enterprises, the estimated sample size was 367. In the group of large enterprises, the estimated sample size was 66. The margin of error was set at 5% for SMEs and 10% for large enterprises. The group of respondents consisted of management representatives. Data were collected during computer-assisted telephone interviews (CATI).

The TTCs study planned to survey 100 entities. The majority of the surveyed entities were TTCs affiliated with the Association of Academic Technology Transfer Centres (PACTT). Due to their large number (93), the study was expanded to include non-affiliated TTCs. The research tool was a questionnaire developed based on the relevant literature. Among the TTCs affiliated with PACTT, 79 entities were ultimately surveyed, while 21 TTCs were not affiliated with PACTT. Respondents included TTCs managers or specialists with expertise in the studied area concerning TTCs cooperation with enterprises, as well as the transfer and commercialization of innovative solutions. Data were collected through computer-assisted telephone interviews (CATI).

This article presents excerpts from a survey of businesses and a TTCs study in the form of a mini-report on the factors influencing cooperation between businesses and research institutions. The survey on these factors included identically worded questions in the questionnaires, which made it possible to gather information from both parties involved in the cooperation. Due to the length of this article, the results of the business survey are presented in aggregate form.

4. Results

To present an analysis of the factors facilitating cooperation between businesses and academic research centres in the region under study, Table 1 first presents aggregated data for all surveyed businesses. The factor rated highest by the surveyed businesses was the high level of competence and expertise among university staff (73.2% - the sum of "high importance" and "very high importance" responses). Equally important was the opportunity for employee training and development (71.4%). Next, the companies identified factors such as: access to research infrastructure (66.3%) and access to funding and grants for research and development (65.9%). The factors of least importance according to the respondents included the university's image and prestige (54%) as well as location and geographical proximity (56.4%).

Table 1: Factors facilitating cooperation between businesses and research centres (Total N=433)

Factors	Importance for cooperation between businesses and research institutions (facilitating importance) [scale used: 0 – not important; 1 – very low importance; 2 – low importance; 3 – moderate importance; 4 – high importance; 5 – very high importance]					
	0	1	2	3	4	5
access to funding and grants for research and development	11.3%	2.5%	9.2%	11.1%	17.6%	48.3%
access to research infrastructure	11.8%	1.2%	5.1%	15.7%	24.5%	41.8%
access to innovative ideas and research	12.7%	2.1%	6.7%	16.4%	23.6%	38.6%
access to modern technologies	12.2%	1.4%	5.5%	15.7%	17.8%	47.3%
the university's flexibility and openness to business needs	12.2%	1.4%	5.3%	15.5%	25.2%	40.4%
location and geographical proximity	12.9%	1.4%	7.9%	21.5%	29.1%	27.3%
opportunity to carry out joint research and development projects	12.5%	1.4%	6.9%	14.5%	24.2%	40.4%
opportunities for employee training and development	11.5%	0.7%	4.2%	12.2%	26.6%	44.8%
networking and cooperation within clusters through university contacts	14.3%	1.6%	9.9%	15.5%	20.8%	37.9%

Factors	Importance for cooperation between businesses and research institutions (facilitating importance)					
	[scale used: 0 – not important; 1 – very low importance; 2 – low importance; 3 – moderate importance; 4 – high importance; 5 – very high importance]					
	0	1	2	3	4	5
facilitations in recruiting highly qualified employees	12.5%	0.7%	7.4%	15.2%	26.6%	37.6%
university support in market analysis and product development	12.5%	1.8%	8.1%	14.8%	26.3%	36.5%
support from government and public policy	11.8%	1.6%	5.1%	17.3%	25.9%	38.3%
high level of competence and expertise among university staff	11.1%	1.4%	3.9%	10.4%	25.6%	47.6%
enhanced image and prestige through cooperation with renowned universities in the region	15.2%	1.4%	12.0%	17.3%	24.2%	29.8%

Source: Own work.

The TTCs survey found that access to modern technologies is the factor that most strongly encourages companies to cooperate with the TTCs surveyed (99.0% - the sum of “high importance” and “very high importance” responses). Also significant for establishing such cooperation were: access to funding and grants for research and development (91.0%), access to research infrastructure (90.0%), and support for companies in market analysis and product development (89.0%). The results are presented in Table 2.

Table 2: Factors facilitating cooperation between enterprises and the surveyed TTCs (Total N=100)

Factors	Importance for cooperation between businesses and research institutions (facilitating importance)					
	[scale used: 0 – not important; 1 – very low importance; 2 – low importance; 3 – moderate importance; 4 – high importance; 5 – very high importance]					
	0	1	2	3	4	5
access to funding and grants for research and development	0.0%	0.0%	0.0%	9.0%	35.0%	56.0%
access to research infrastructure	0.0%	0.0%	0.0%	10.0%	66.0%	24.0%
access to innovative ideas and research	0.0%	0.0%	0.0%	21.0%	50.0%	29.0%
access to modern technologies	0.0%	0.0%	0.0%	1.0%	55.0%	44.0%
the university's flexibility and openness to business needs	0.0%	0.0%	3.0%	30.0%	38.0%	29.0%
location and geographical proximity	0.0%	0.0%	3.0%	33.0%	35.0%	29.0%
opportunity to carry out joint research and development projects	0.0%	0.0%	1.0%	20.0%	47.0%	32.0%
opportunities for employee training and development	0.0%	0.0%	1.0%	24.0%	42.0%	33.0%
networking and cooperation within clusters through university contacts	0.0%	0.0%	3.0%	11.0%	51.0%	35.0%
facilitations in recruiting highly qualified employees	0.0%	0.0%	4.0%	28.0%	38.0%	30.0%
university support in market analysis and product development	0.0%	0.0%	0.0%	11.0%	57.0%	32.0%
support from government and public policy	0.0%	0.0%	2.0%	35.0%	26.0%	37.0%
high level of competence and expertise among university staff	0.0%	0.0%	1.0%	14.0%	52.0%	33.0%
enhanced image and prestige through cooperation with renowned universities in the region	0.0%	0.0%	2.0%	31.0%	38.0%	29.0%

Source: Own work.

The data presented in Table 1 and Table 2 show that TTCs rated the factors surveyed as significantly more important in fostering cooperation. Additionally, it should be noted that among the TTCs surveyed, none of the respondents selected the “not important” option for any of the factors, which clearly distinguishes these assessments from those of businesses.

The study also examined factors limiting cooperation between enterprises and scientific research centres in the region. The most frequently cited limitations by enterprises were differences in goals and priorities between science and business (66.1% - sum of “high importance” and “very high importance” responses). Another significant obstacle was the lack of appropriate contacts and collaborative networks (60%). Other barriers included the low level of flexibility on the part of universities in adapting to business needs (58.4%) and differences in organizational culture (57.7%). Less importance was attributed to factors such as bureaucracy and formalities (51.3%), and risks related to intellectual property protection (52.4%). The results are presented in Table 3.

Table 3: Factors limiting cooperation between businesses and research centres in the region (Total N=433)

Factors	Importance for cooperation between businesses and research institutions (limiting importance) [scale used: 0 – not important; 1 – very low importance; 2 – low importance; 3 – moderate importance; 4 – high importance; 5 – very high importance]					
	0	1	2	3	4	5
lack of appropriate contacts and collaborative networks	18.0%	1.4%	6.2%	14.3%	21.5%	38.6%
differences in goals and priorities between academia and business	17.1%	0.5%	3.0%	13.4%	23.3%	42.7%
bureaucracy and red tape	17.3%	2.1%	7.9%	21.5%	28.4%	22.9%
high costs of cooperation with a university	16.6%	1.8%	10.9%	15.9%	25.9%	28.9%
low level of flexibility on the part of universities in adapting to business needs	16.9%	1.4%	5.3%	18.0%	24.2%	34.2%
differences in organizational culture	18.0%	0.5%	5.3%	18.5%	30.7%	27.0%
limited access to research results	17.6%	1.8%	9.2%	17.6%	26.6%	27.3%
lack of understanding and communication	17.3%	1.6%	9.7%	14.3%	18.9%	38.1%
lack of adequate human resources to undertake such cooperation	18.0%	1.6%	9.0%	15.7%	18.5%	37.2%
low support from administration and public policy	18.0%	2.8%	6.2%	18.0%	25.2%	29.8%
low awareness of the benefits of cooperation	17.6%	2.8%	8.1%	16.4%	26.3%	28.9%
risks related to intellectual property protection	19.9%	4.4%	10.2%	13.2%	20.8%	31.6%

Source: Own work.

In turn, the surveyed TTCs indicated that cooperation was primarily limited by: a lack of appropriate contacts and collaborative networks (89.0% - sum of “high importance” and “very high importance” responses), a lack of understanding and communication (88.0%), high costs of cooperation (87.0%), and bureaucracy and formalities (86.0%). The results are presented in Table 4.

Table 4: Factors limiting business cooperation with the surveyed TTCs (Total N=100)

Factors	Importance for cooperation between businesses and research institutions (limiting importance) [scale used: 0 – not important; 1 – very low importance; 2 – low importance; 3 – moderate importance; 4 – high importance; 5 – very high importance]					
	0	1	2	3	4	5
lack of appropriate contacts and collaborative networks	0.0%	0.0%	0.0%	11.0%	56.0%	33.0%
differences in goals and priorities between academia and business	0.0%	0.0%	2.0%	10.0%	56.0%	32.0%
bureaucracy and red tape	0.0%	0.0%	3.0%	10.0%	20.0%	67.0%
high costs of cooperation with a university	0.0%	0.0%	2.0%	12.0%	22.0%	64.0%
low level of flexibility on the part of universities in adapting to business needs	0.0%	0.0%	3.0%	17.0%	49.0%	31.0%
differences in organizational culture	0.0%	0.0%	1.0%	26.0%	39.0%	34.0%
limited access to research results	0.0%	0.0%	3.0%	27.0%	42.0%	28.0%
lack of understanding and communication	0.0%	0.0%	0.0%	31.0%	46.0%	23.0%
lack of adequate human resources to undertake such cooperation	0.0%	0.0%	1.0%	33.0%	39.0%	27.0%
low support from administration and public policy	0.0%	0.0%	3.0%	32.0%	39.0%	26.0%
low awareness of the benefits of cooperation	0.0%	0.0%	1.0%	35.0%	33.0%	31.0%
risks related to intellectual property protection	0.0%	0.0%	3.0%	33.0%	35.0%	29.0%

Source: Own work.

The data presented in Table 3 and Table 4 show that TTCs rated the factors surveyed as significantly more important in limiting cooperation. Additionally, it should be noted that among the TTCs surveyed, none of the respondents selected the “not important” option for any of the factors, which clearly distinguishes these assessments from those of businesses.

5. Conclusions

The study identified factors that facilitate and limit cooperation between businesses and research institutions in the region under study in Poland. The results reveal a consistent difference in perception between the two groups of respondents. TTCs rated both the factors facilitating and those limiting cooperation significantly higher (as being of greater importance) than business representatives. The vast majority of surveyed TTCs rated most of the analysed factors as being of high or very high importance, and none of the respondents representing TTCs indicated that any of the examined factors was irrelevant to cooperation. Businesses, on the other hand, were more reserved in their assessment of the importance of individual factors (both those facilitating and those limiting cooperation), and among the surveyed companies were entities that considered certain factors to be completely irrelevant to establishing cooperation with scientific research centres.

When it came to factors facilitating cooperation, the surveyed companies placed the highest importance on the high level of competence and expertise among university staff, as well as the opportunity to train their own personnel. Significantly, for the business sector, the ‘soft’ factor of academic staff expertise (73.2%) proved more important than the ‘hard’ factor of access to equipment and laboratories (66.3%). TTCs, on the other hand, identified access to modern technologies and access to R&D funding and grants as key factors facilitating cooperation. Both groups of respondents rated the image and prestige resulting from cooperation with renowned universities, as well as the partner’s location and geographical proximity, relatively lowest.

Among the factors limiting cooperation, the surveyed companies identified differences in goals and priorities, as well as difficulties in establishing contacts with representatives of the academic community, as the most significant barriers. TTCs, on the other hand, identified the lack of appropriate collaboration networks, a lack of understanding and communication, and the high costs of cooperation as the most serious obstacles. A particularly interesting finding is the discrepancy in the assessment of bureaucracy and complex procedures.

This factor was perceived as a significant barrier by 86% of TTC respondents, while among companies, this percentage was only 51.3%.

6. Discussion

The perspective of companies that place the highest importance on the competencies of research staff and the ability to train their own personnel confirms theoretical arguments emphasizing the importance of knowledge and skills for companies' ability to cooperate with the research sector and for their innovative activity (Drejer and Østergaard, 2017). These findings also align with the concept of absorptive capacity, according to which the ability to identify, assimilate, and utilize external knowledge forms the foundation of effective cooperation (Dell'Anno and Del Giudice, 2015; Muscio, 2007). Similar findings are presented by Fernández-Esquinas et al. (2016), who demonstrated that the most common forms of cooperate between firms and universities involve training, human resource exchange, and consulting services.

A more in-depth analysis may suggest that these discrepancies reflect differing understandings of the very value of science-business cooperation, which ties into the broader debate on the multidimensional nature of the motivations of participants in university-industry relationships (Perkmann et al., 2013). Companies demonstrate an orientation consistent with the principles of absorptive capacity and engage in relationships with academia not so much to acquire ready-made technological solutions, but to enhance their own ability to identify and assimilate external knowledge in the future. TTCs, on the other hand, exhibit an orientation characteristic of the institutional role of a technology intermediary (Siegel et al., 2003; Bergman, 2010). This duality of perspectives reveals significant differences. TTCs design cooperation offers centred on technological resources and financial instruments, while the surveyed companies primarily seek access to expert knowledge and opportunities to learn from academic partners. TTCs thus risk playing the role of an intermediary whose offerings remain structurally mismatched to the actual needs of the local business sector.

With regard to the factor of geographical proximity, the results obtained differ from the findings presented in the literature, where many authors emphasize that spatial proximity significantly fosters cooperation and the flow of knowledge (Dell'Anno and Del Giudice, 2015; OECD, 2019). However, the results are partially consistent with the research by Nilsen and Lauvås (2018), who demonstrated that social proximity combined with high organizational proximity allows for overcoming barriers resulting from short geographical distances. It can therefore be assumed that in the region under study, a partner's competencies and quality are more important than its location. This may be related both to the growing role of cross-regional cooperation and to the digitization of communication processes, which are gradually reducing the significance of the distance barrier.

The findings regarding barriers confirm that differences in goals and priorities constitute one of the most persistent obstacles to science-business cooperation (Howaniec and Okrzesik, 2015). What is surprising, however, is the reversal in the perception of the bureaucratic barrier. The fact that TTCs rate it significantly higher than businesses may suggest that it is the intermediary institutions that pay the most attention to complex procedures and safeguarding measures, rather than businesses. This result clearly diverges from earlier studies, which showed that bureaucracy is perceived as a serious barrier primarily by enterprises (Cyran, 2015), and requires further verification in subsequent research.

The findings have significant implications for the design of regional policies aimed at fostering science-business cooperation. Effective support instruments should take into account the dual nature of participants' motivations. Further analysis of the collected research data will include more advanced comparative and exploratory analyses, taking into account the differences between SMEs and large enterprises, in order to identify broader patterns regarding perceived factors of cooperation, which will help to a greater extent to fill the identified research gap.

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