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RESEARCHERS' PERCEPTION OF COGNITIVE DISTANCE IN UNIVERSITY-INDUSTRY COLLABORATION

Master's thesis

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I have written this Master's Thesis independently. Any ideas or data taken from other authors or other sources have been fully referenced.

Piret Pikma
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(signed digitally)

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Abstract

Cognitive distance plays an important role in the collaboration between stakeholders with different cognitive understandings of the processes fundamental to the joint project. Although there has been an increase in studies focusing on the motivations and outcomes of university-industry (U-I) collaborations, there is a gap in the knowledge describing the perceived cognitive distance of the stakeholders, its impact and the means to overcome it.

This paper introduces the origins of cognitive distance perceived by the collaborating researchers in U-I cooperation identified from in-depth interviews with scientists with extensive experience in U-I projects and the relation between cognitive distance inputs and the scientists' expectations of the partnership. As a result, three aggregated perceived cognitive distance dimensions were identified: industry's view of the collaborative scientist, industry maturity, and the depth and speed of research.

Additionally, the data was analysed to establish the perceived means to lessen the effect of cognitive distance to support the increase of successful U-I collaborations and reduce the number of failed projects. Communication and coaching were noted as distinguishable methods to bridge the partners' views and understandings in U-I collaboration.

Keywords: cognitive distance, perception, university-industry collaboration, scientist, communication, Estonia

CERCS code: S211 Sociology of science

1. Introduction

University-Industry (U-I) collaboration based knowledge transfer has lately been an important research subject in the field of economics and management, as well as a significant subject in the science and technology policy agenda of several developed and developing countries (Balconi *et al.*, 2004).

Within OECD economies, a growing preference for network promotion policies (over those that provide direct financial assistance) has been enforced to increase the number of innovation-related collaborations (Bougrain & Haudeville, 2002). Furthermore, the idea that the low number of investments into research and development (R&D) activities have been caused by the lack of interaction between academia and industry rather than driven by market failure has been attractive to European policymakers who haven't been able to meet the Barcelona targets (business enterprise expenditure on R&D at 2% of GDP, within an overall target of R&D expenditure at 3% of GDP) (de Jong & Freel, 2010). Thus, governments are actively promoting the formation and development of U-I networking by designing and implementing innovation policies accordingly (Ankrah & AL-Tabbaa, 2015; Park & Leydesdorff, 2010; Perkmann *et al.*, 2013; Philbin, 2008).

The transfer of know-how between academia and industry is expected to give rise to innovation, as this collaboration combines not only heterogeneous partners but also heterogeneous knowledge (Rajalo & Vadi, 2017). Furthermore, there is strong confirmation in the literature that this heterogeneity provides a solid base for learning and innovation and that a strategic U-I collaboration is a productive mechanism to implement this potential (Ahuja, 2000; Hagedoorn, 1993; Powell *et al.*, 1996; Rosenkopf & Almeida, 2003). Thus, it can be concluded that the success of innovation and development is hidden in novel combinations of knowledge from different partners and in the joint effort to produce new knowledge (Nooteboom, 2000).

Heterogeneity or diversity is associated with the number of partners with divergent know-how and skillset involved in learning and innovation collaboration. However, next to the number of partners involved, the second dimension of diversity is how their knowledge and skills vary. This difference is described as cognitive distance. Cognitive distance is based on the notion that people perceive, interpret, understand, and evaluate the world according to mental categories developed in their physical and social environment. As a result, people see and make sense of the surrounding world differently. (Nooteboom, 2000; Nooteboom *et al.*, 2007; Wuyts *et al.*, 2005)

It has been stated that for a successful collaboration to result in novel knowledge, a balance needs to be found between cognitive distance and cognitive proximity (Nooteboom, 2000). Hence cognitive distance presents both a problem and an opportunity- when the cognitive distance is negligible, *i.e.*, people share the same knowledge, there is a limited amount of new knowledge to share. However, when the cognitive distance is too large, it is too difficult to unitedly understand the purposes and actions within the collaboration (van Baalen *et al.*, 2005). Therefore, the existence of cognitive distance presents two possible outcomes for the interested parties: there is a possibility of both the opportunity to gain novel added value and the risk of misunderstanding leading to a failure (Nooteboom *et al.*, 2007).

Although there is no guarantee that heterogeneous collaborations generate innovative results, there are methods to improve the collaboration and thus the outcome. One way is perspective-taking. In order for partners with varying understanding and experiences to obtain a realistic and united assessment of the project, it is necessary to comprehend the situation from the perspective of others. Perspective-taking increases the amount of information available to process a given problem and promotes more positive perceptions of the interaction and the joint collaborative efforts. (Johnson & Johnson, 1989) Therefore, it is vital to understand the stakeholders' perception of the cooperation to improve the U-I collaboration.

Research focusing on U-I collaboration has investigated the effect of numerous factors, *e.g.*, motives and perspectives (Rajalo & Vadi, 2021; Siegel *et al.*, 2003; Yusuf, 2008), cultural differences (Bjerregaard, 2010; Davenport *et al.*, 1998), institutional barriers (Bruneel *et al.*, 2010), the symmetry of motives, and the reconceptualisation of the collaboration (Rajalo & Vadi, 2017, 2021). The focal point of research so far has been the effect of cognitive distance when it comes to U-I collaboration and the theoretical descriptions of the effect. However, there is a significant research gap when it comes to the perception of the cognitive distance of stakeholders in the U-I collaboration.

This paper aims to identify the inputs of cognitive distance from researchers' perception when characterising cooperation with the industry and the effect of cognitive distance on the collaboration expectations from the researchers' point of view. Additionally, it reflects on the perceived coping methods to limit the effects of cognitive distance to maximise the productivity and effectiveness of the U-I collaboration.

The rest of this paper consists of four sections. Section 1 overviews the existing literature on cognitive distance in U-I collaboration and its origin and management. Section 2 describes the empirical study – the processes of data collection and analysis methods, and findings. In section 3, a detailed descriptive summary of the results compared to previous studies is given. The last section follows the discussion with a conclusion.

2. Review of literature

The foundation of U-I collaboration is knowledge transfer which can be described as a two-way information sharing of capabilities, skillsets and know-how between participating partners (Guerrero *et al.*, 2015). The process can either be binary or conglomerate communication through various knowledge transfer mechanisms, *e.g.*, joint conferences, secondments, and training (Alexander & Childe, 2013). From the knowledge transfer with universities, the industry gains know-how vital for innovation, economic success and development (Hobbs *et al.*, 2017). Of the latter, innovation is of utmost importance. If a company wants to be relevant and produce high-profit margins in the nowadays volatile and competitive market, it needs to innovate its products and services. Hence innovation is important for business success. Unfortunately, not all companies have neither the time nor the capabilities to innovate. Thus U-I collaboration is an efficient possibility for them to guarantee their modernity by cooperating with researchers working at universities who can contribute up-to-date know-how to innovate their product design and production processes. (Paay *et al.*, 2021)

The term cognitive distance can be generally described as people’s beliefs about distances in large-scale spaces, between places far apart and between places that are not visible from each other (Montello, 1991). To examine the term in the frames of U-I collaboration, it would be beneficial to describe the label cognitive as a broad range of mental activity, including perception, sense-making, categorisation, value judgments, expectations, emotions, and feelings. From this perspective, the categories of cognition are constructed from a person’s development in different physical and social conditions (national, regional and organisational culture, traditions and habits, social norms and values, education, *etc.*); therefore, they interpret, understand, and evaluate the world differently. The previous elucidation is the foundation of the cognitive distance between people, *i.e.*, between collaborative parts. (Nooteboom, 2000; Nooteboom *et al.*, 2007; Wuyts *et al.*, 2005)

The collaborations between universities and industry are based on the diversity of the partners’ knowledge base. Evolutionary economics demonstrates that this diversity is pivotal for innovation and knowledge exchange to create Schumpeterian new combinations (Schumpeter, 2002). At the same time, the collaborators need to be aware that there is a fine line between the opportunity to acquire novel added value and the risk of misunderstanding in such cooperation. Therefore, a trade-off has to be made between cognitive distance, for the sake of novelty leading to innovation, and cognitive proximity, for the sake of coherent comprehension, *i.e.*, new info has no value if it cannot be understood. Therefore for a collaboration to be successful, choosing the appropriate partner means considering the preconditions between the parties. (Ankrah & AL-Tabbaa, 2015; Nooteboom, 2000; Nooteboom *et al.*, 2007; Rajalo & Vadi, 2017; Wuyts *et al.*, 2005)

An essential element of social capital is the knowledge created and shared between facilities with different capabilities and capacities. The inventors of novel insights can be divided into two separate groups. Proprietary technology inventor networks are highly fragmented, except in technological fields wherein science has a crucial role, *e.g.*, chemical engineering. At the same time, academic researchers are more open. They exchange information with a broader audience across various organisations. Hence, academic researchers have an essential role and perceived duty to increase a country's social capital. (Balconi *et al.*, 2004; Cohen & Levinthal, 1990)

Universities are more and more frequently and somewhat aggressively trying to commercialise their scientific developments due to declining funding and inclining pressure to find applications for their research for social gain (Miller *et al.*, 2014, 2018). Therefore, the number of academic spin-offs has significantly increased during the last decades. The top management of these spin-offs is mainly homogeneous. They are constructed by the academic founders of members from their networks; hence, for the most part, they have the same educational, knowledge, and industry experience. More importantly, they often lack commercial experience. Therefore, the addition of at least one team member with commercialisation expertise is necessary. However, not any person with such experience is suitable because a certain level of comprehension of the technology applied in the academic spin-off is needed. As noted beforehand, for success, both cognitive distance and proximity need to an extent exist. Too high levels of cognitive distance between the academic and commercial team members interfere with the knowledge sharing necessary to reach the set common goal. (Knockaert *et al.*, 2011; Wuyts *et al.*, 2005)

There are numerous factors that affect U-I collaboration, and if they are managed efficiently, they positively affect the perceived success of knowledge and technology exchange. However, if the same factors are mismanaged, a corresponding negative effect emerges on the perceived success of knowledge and technology transfer. The main hindering factors can be broadly divided followingly: 1) resources; 2) contractual policies; 3) management and organisational issues; 4) social issues. Additionally, it has been shown that the management and organisational issues allocation has the most considerable impact on the cognitive distance between universities and industry. (Ankrah & AL-Tabbaa, 2015; Cohen & Levinthal, 1990)

As previously discussed, cognitive distance presents both problems and possibilities. Both interested parties need to have a knowledge cap that the partner can fill to create new insights and reach various means in U-I collaboration. Furthermore, they need a certain level of cognitive proximity to keep the partners comprehensibly communicating. Based on Weick's evolutionary theory (1979), although stakeholders want to reach different ends, they have to collaborate and pursue them *via* common means, *i.e.*, once people are engaged in joint commitments, the individual goals shift from diverse to common. As Weick argues, diversity remains, but they become subordinated to an emerging set of shared ends. This means that although scientists and entrepreneurs seek different goals (understanding vs monetary gain) in U-I collaboration, they can reach them by working together. (van Baalen *et al.*, 2005)

Therefore, it can be deduced that an optimal cognitive distance exists. Nooteboom *et al.* described the effectiveness of learning between interested parties as a reversed U-shaped relation between novelty value and understandability (Figure 1). They hypothesised that the optimal level of cognitive distance from a learning perspective lies between low and high levels of cognitive distance. There is an intensive effect of cognitive distance on the probability of a prosperous collaboration between different stakeholders. (Nooteboom *et al.*, 2007)

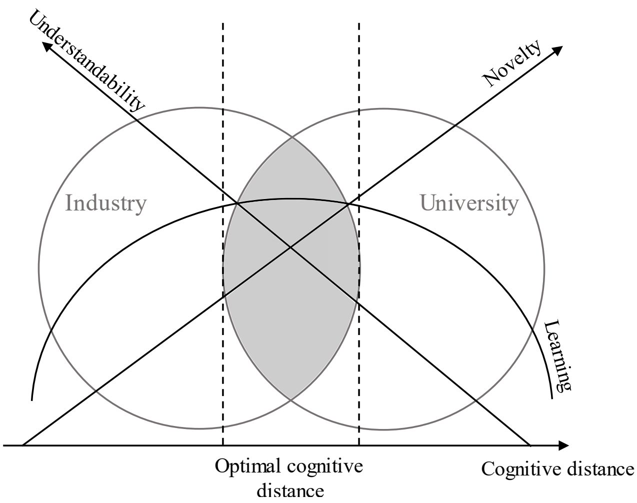

Figure 1. Schematic model of optimal cognitive distance for successful university-industry collaboration. (Note: The figure is revised based on Nooteboom *et al.*, 2007)

This theory has found gradual support - while cognitive distance related to technology understanding was found to have a trivial effect on the probability and success of the collaboration, differences in stakeholders' organisational and strategic characteristics proved to have the inverse U-shaped correlation. (Ankrah & AL-Tabbaa, 2015; Wuyts *et al.*, 2005) This supports the notion that U-I collaboration outcomes can be in part predicted by analysing the managerial background characteristics and therefore reflect cognitive understandings of key personnel within the collaborating organisations (Hambrick & Mason, 1984).

Figure 1 additionally describes the positions of industry and university in the ranges of novelty and understandability. University research aspires for novel insights and solutions and is at the frontline of innovation. On the other hand, traditional industry often applies more commonly acknowledged and understandable methods that are transferrable to large scale manufacturing cost-effectively. Therefore, managing the cognitive distance between the partners in the U-I collaboration is necessary for an outcome that supports the development and is understandable for all the parties involved.

In certain situations, it might be impossible to manage the cognitive distance, to lessen it. Therefore one might consider bridging it. There is a difference between reducing cognitive distance and bridging it. Reducing cognitive distance would require increasing the overlapping of cognitive domains and the way of thinking and processing information. Bridging cognitive distance is based on communication, which involves merging one's cognitive range with someone else's cognitive domain, *i.e.*, understanding the world's view from someone other's perspective. However, it does not necessarily involve the reduction of cognitive distance. Good communication and explanation help with understanding, which entails that people can make sense of how their partner thinks, *i.e.*, they can understand each other at a cognitive distance. (Nooteboom, 2000)

When describing the perceived basis of any collaboration and its parties and their cognitive distance, one must also consider their expectations for the management and result of such cooperation since prior expectations play an essential role in perception. Expectations can be defined as beliefs about something that will happen or be disclosed in the future. Each party's expectations are based on their previous experiences and their comprehension of the world, *i.e.*, a disagreement between the collaborators' expectations and realised collaboration might be augmented by cognitive distance (*e.g.*, cultural differences, academic vs industry norms, *etc.*). Consequently, they contribute to motivation, learning, decision-making, affective reactions, and social interchanges. (Castañer & Oliveira, 2020; Hoorens, 2012)

It has been argued that the fundamental characteristics of the role of expectations in innovation evolution root in emotional and logical justifications. Emotional justifications are often of minimal specification when it comes to time and reasoning, often shared by persons who rely on beliefs rather than rational scrutinies. Contrastingly, logical justifications are deductive based on comprehensive inquiries and set in a specific time frame. Therefore, various types of innovation expectations can be described: positive emotional, negative emotional, positive logical, and negative logical. (Shi & Herniman, 2022)

Although emotional expectations entail less specific (and sometimes less accurate) information about innovative developments than logical ones, they are vital in decision making at the early phase of the innovation process due to the often minimal availability of logical expectations. During the process, the technical and conceptual understanding increases and thus, logical expectations become more realisable. As a result, the role and impact of logical expectations in decision-making increase in the later stages of innovation processes. (Shi & Herniman, 2022)

Based on previous, it can be stated that emotional and logical expectations influence innovation collaborations from social settings to individual decision-making. (Shi & Herniman, 2022) Considering that the emotional and logical expectations depend on one's cognitive scale, these expectations can add to the cognitive distance, especially in the early stages of innovative collaboration, when expectations are more emotion-based.

Therefore, communication is all-important for R&D project teams as it manages cognitive distance and expectations, thus easing planning, decision-making and supporting coordination during the collaboration (Castañer & Oliveira, 2020; Kuen & Zailani, 2012; Moenaert *et al.*, 1994; Sicotte & Delerue, 2021).

3. Data collecting and methods

3.1. Research venue

In order to investigate the perception of cognitive distance, one has to take into account the surroundings where the data has been collected. The site of this study is Estonia, where R&D is carried out mainly by public and private sector education and research institutions. Although a small country both by population (~ 1.3 million people) and GDP (31.03 billion USD, 2020), Estonian research belongs to the upper 50% of the world in all 22 fields of research named in the Essential Science Indicators database with the most cited fields (compared to the global average of the field) according to Web of Science being physics, plant and animal sciences, clinical medicine, genetics and molecular biology, and psychiatry and psychology. Additionally, for Estonian authors' publications published from 2009 to 2016, 9.99% reached the top 10% of the world's most-cited publications. This indicator places Estonia #13 in the European Union regarding scientific impact. Moreover, 10 Estonian researchers are among the world's top 1% of researchers by citations in their field. (*Research In Estonia*, n.d.)

Research in Estonia is primarily financed based on qualitative competition. Although there is a notion that competition boosts quality, the ratio between external and institutional research funding has been too high and created an overly competitive system. This undermines the universities' sustainability and prevents them from developing long-term strategies within which they can anchor measures and funding decisions. For example, the average institutional funding for research in public universities was 12.4% of total research income in 2017 and 17.8% in 2018. In contrast, it tends to be 50-80% in European countries with mature research systems. (*Peer Review of the Estonian R&I System Final Report*, n.d.)

The number of academic staff in Estonia has grown in the last ten years by 8.6%, whereas the number of women has increased by 13.6%. In 2020, the number of men and women employed in the academic world was almost equal – women 51% and men 49%. Yet only 23.9% of professors and 27.3% of leading researchers were women. The latter is also reflected in the number of approved scientific team grants led by female scientists, which in 2021 was 33%. Therefore the Estonian scientific world is steadily moving towards gender equality but is currently a male-dominated scene. (*Estonian Research Council*, n.d.)

Most researchers working in Estonia are Estonian, with only 9% being foreigners. However, that is also changing. For example, between 2008 and 2018, the number of foreign researchers in public sectors grew 3.2 times. In 2020, 547 male and 227 female foreign researchers worked in Estonia's non-profit sectors. (*Research In Estonia*, n.d.)

The Estonian business sector can be described as young since most companies were established after the Estonian Restoration of Independence in 1991. The Estonian economy has developed quickly, and its competitiveness has improved by a notable margin. However, it continues to be dominated by traditional low technology sectors with low productivity and profitability per employee. This is reflected in low high-tech employment and exports, moderate business expenditure on R&D, and a modest number of researchers in the business sector. Nevertheless, seven unicorns have been established in Estonia, giving a base to the Estonian reputation as a start-up nation. (*Estonian Research Council*, n.d.; *Peer Review of the Estonian R&I System Final Report*, n.d.; *Research In Estonia*, n.d.)

Overall, the current public research funding gap increases scientists' motivation to collaborate with the private sector. Yet the academic evaluation process still neglects to consider U-I cooperation projects as value-added to developing a scientific career.

3.2. Research methodology and data acquisition

Qualitative data was acquired from in-depth face-to-face interviews with researchers from the three largest Estonian universities: University of Tartu, University of Tallinn and Tallinn University of Technology. The data was collected as part of the Estonian Research Council grant PRG791 Innovation Complementarities and Productivity Growth by Sigrid Rajalo.

Given the nature of this research, the sample was not chosen at random (Nowell & Albrecht, 2019). The chosen interviewed researchers have been leaders of at least three U-I collaboration projects (the majority had more experience). The sample group interviewed is diverse in terms of the length of their career since defending their PhD thesis and the number of U-I collaboration projects they have participated in. Out of the 11 scientists, one is female, and one is a foreigner. Therefore it represents the Estonian research landscape well (Table 1).

Table 1**.** Notations of interviews with corresponding info on field of research, career length and number of U-I collaboration projects of interviewees.

Interview notation	Field of research of scientist	Career length in years*	Number of U-I collaboration projects
A	Mechatronics and electrical power engineering	16	59
B	Robotics engineering	11	38
C	Geo-ecology	13	103
D	Mechanical and industrial engineering	20	20
E	Physics and optoelectronics	14	19
F	Chemistry and ecology	12	55
G	Materials science	15	18
H	Civil engineering	15	75
I	Materials science	18	32
J	Educational sciences	12	19
K	Bioorganic chemistry	36	46
	Mean	16.5	44
	Median	15	38
	Standard deviation	6.9	27

* From acquiring PhD to 2021

Table 2. Data examples of codes identified from the interviews conducted with scientists.

Aggregated cognitive distance perception dimension	Second-order code	First-order code	Data example from interviews
Industry's view of collaborative scientist		Employee	*"The attitude of a large company towards the university as a subcontractor is the biggest stumbling block. It does not create a relationship of trust."* (A)
		Partner	*„It was still a collaboration in the sense that we made a recommendation, and they adjusted their technology, and there was a constant exchange of data and coordination on what was being done here and what was being done there."* (E)
		Service provider	*„If I have a joint project with industry, they order what we do, it is clear who is doing what, /…/. One is like a customer, the other is like a service provider."* (I)
		Public service	*„First of all, you are the wage of the state, basically free-loaders, and you get money from the state, so you should find it out for us."* (H)
		Mistrust	*„They did not believe the results we got. When he did these calculations himself, he believed that there was a mistake."* (A)
Industry maturity	Young-small	Limited finances	*"When it comes to the matter of innovation when we look at companies, start-ups in Estonia, they are poor."* (B)
		Incapacity	*„One thing that I notice with the start-ups, we work a lot with them, they cannot do a long-term contract anyway. Because they don't know what they want to do next months."* (B)
	Mature-large	Stable finances	*„It is a mature company; they have more money to invest."* (F)
		Developmental maturity	*„As a rule, they even have their own development departments."* (E)
	Management	Conscious leader	*„But well, there are people who have made some things clear to themselves; it is not uncommon."* (K)
		Imperceptive leader	*„In some part, people are just stuck in their own habits and traditions; maybe they don't know."* (C)

Aggregated cognitive distance perception dimension	Second-order code	First-order code	Data example from interviews
Depth and speed of research	Industry	Time-sensitive	*„He was interested to get the greatest impact as fast as possible.“* (J)
		Cost-sensitive	*„We estimate how long and how much money it is going to take, and he says it's too slow and too expensive.“* (I)
		Specific interest	*„It is still the case with my projects that if a company has a problem that it wants to solve, if it does not have the time to do it, or if it does not have the competence, it will turn to the university.“* (D)
	Scientist	In-depth understanding of the field	*„In the case of research, it a kind of ongoing process where each answer raises the next new question.“* (C)
		Not time-sensitive	*„Even if something goes wrong and publishing is slow, there are still some papers. Somehow research can become relatively long and protracted as a result.“* (G)
Collaboration outcome	Success	Communication	*„The main thing is that people understand each other, that expectations are the same and understand each other's language, then you can collaborate.“* (I)
		Coaching	*„We try to make the first meetings very straightforward and eye-opening. I'm trying to think for myself what the background is, and I'm trying to tell you right away if you've been thinking about this or that. I have a lot of questions, and then I say that there are such dangers, there are such dangers, and there are such dangers.“* (A)
	Failure	Time problem	*„She is like this: so, how long does it take to do this? 3 months? I pay more, make it one month. I mean, sometimes people do not understand that things can come in series.“* (B)
		Funding problem	*„We did a lot there and got paid for it, but the trouble was that they somehow ran out of money.“* (J)
		Communication problem	*"The worlds are different; it's hard to communicate."* (F)

Qualitative data analysis of interviews after transcription was done to investigate the researchers' perception of cognitive distance in U-I collaboration, *i.e.*, purposive sampling and text mining, categorisation and coding. The Nvivo program was utilised with a combined deductive and inductive approach to code creation.

The collected data was coded based on the collaboration outcomes and the scientist's perception. Based on the literature overview regarding the understanding of the basis of cognitive distance and knowledge transfer hindering factors, *e.g.*, value judgements, sense-making, resources, management, *etc*., the codes were divided into four aggregated perception dimensions: 1) industry's view of the collaborative scientist; 2) industry maturity; 3) depth and speed of research; 4) collaboration outcome. All codes reflect the subjective perceived view of the scientist and their understanding of the projects they have participated in and the ups and downs, leading to either the collaboration to success or failure. The codes and illustrating excerpts from interviews are presented in Table 2.

Additionally, the NVivo program was used to analyse the collaboration outcome by calculating Jaccard's coefficients for coding similarity of nodes. Nodes that have been coded similarly are clustered together on the cluster analysis diagram. Sources or nodes that have been coded differently are displayed further apart on the cluster analysis diagram.

4. Analysis and discussion of results

4.1. Coding results

Several rounds of manual coding were conducted. The results are summarised in Table 3, specifying how many times a particular code emerged in interviews and the percentage of codes of the whole number.

From Table 3, it can be seen that from the collaborating scientist's perception, the most often used term to describe the U-I cooperation is the specific interest of industry, which constitutes slightly over 10% of the overall coding. Additionally, time and cost sensitivity were used to illustrate the industry needs, contributing 7.16% and 6.2% to codes, respectively. In contrast, the work methodology of scientists was characterised as not time-sensitive and as searching for in-depth understanding. These findings are in good agreement and support the idea that the university knowledge system is based on the Mertonian norms of science, *i.e.*, communalism, universalism, disinterestedness, and organised scepticism (Merton, 1973). But the private sector focuses on private gain and problem solving to maintain a competitive advantage and secure high-profit margins (Hobbs *et al.*, 2017; Paay *et al.*, 2021).

"When dealing with a company that does not have such a research unit, there is a problem that may only be a problem for that company." (D)

"They want a result. And they are not interested in other processes." (G)

Table 3. Matrix of coding references describing the university-industry collaboration from the scientist's perception.

First-order code	Interviews											Total	% of total
	A	B	C	D	E	F	G	H	I	J	K		
Specific interest	4	1	4	5	8	2	5	1			5	35	10.03
Imperceptive leader	7	8	3	1		1	1	4	5		3	33	9.46
Cost-sensitive	2	3	2	2	3	3	2	6	2			25	7.16
Developmental maturity	4	1		2	4	4		1			5	21	6.02
Time-sensitive	3	2	2	3	1	2	1	1	2	3	1	21	6.02
Service provider	1	1	3	2	1		1	2	3	2	3	19	5.44
Conscious leader	2		1	2		2	2	1	1	1	2	14	4.01
In-depth understanding	2		2	2		2	3		2		1	14	4.01
Employee	7	2								3		12	3.44
Partner	3		1	2	1	2	1	1	1			12	3.44
Not time-sensitive	1		2				3	1	2	2		11	3.15
Mistrust	2	1			1	1		2	2		1	10	2.87
Incapacity		2			1	2			1		2	8	2.29
Stable finances	1				1	3	1					6	1.72
Public service	1							2	2			5	1.43
Limited finances	1	3				1						5	1.43
Problematic	9	1		3	1	3	3		5	2	3	30	8.60
Good communication	5	2	2	1	2	2	1	1	4	1	3	24	6.88
Funding problem	2	4		1	3	1		1	4	1	3	20	5.73
Coaching	3	1		1		1	2		1	1	3	13	3.72
Time problem	2	2		1				1	2	3		11	3.15
Total	62	34	22	28	27	32	26	25	39	19	35	349	100

The most often code used to describe the perceived industry's view of collaborative scientist is a service provider, followed by employee and partner. Nevertheless, 3 out of 11 interviewees mentioned that some managers from the industry perceive their expertise more as a public service rather than viewing them as service providers or equal partners.

On the other hand, from the interviews, it shone through (mentioned in 9 out of 11) that conscious leaders are well-informed and prepared to collaborate with scientists working at universities and do not have unrealistic expectations either cost or timeframe wise.

„But if they come here to university, it is still assumed here, and a priori it is known that it is still the case that we will not solve this burning thing for you in a week.“ (D)

4.2. Origins of cognitive distance from a researcher’s perception

When it comes to collaborations, it is crucial to understand how one is viewed in the eyes of others (first-order code *Industry’s view of collaborative scientist*). The scientists strongly indicated that a certain amount of management in the private sector treats them as employees and therefore feels free to make demands at any given time or place. On the other hand, since scientists see themselves as independent partners or service providers as needed by the joint project, the attitude is met with frustration and bewilderment, giving input to misunderstandings and adding to the distance within the collaborative environment.

„*But they were coming to my lab and saying, hey /name/., how are you doing, 8 o’clock in the morning. I said I am fine, how are you. They said: yes, I just noticed that /name/ is not in her office, for instance. I said: good that you noticed that. They said, but aren’t they working on this project, and then I started to have a little bit of conflict with them and made them draw the border. I’d tell them that: Look, I let you come to my lab to talk to me. You don’t have the right to open the other offices to see who is sitting in the office or not sitting in the office.“* (B)

There also exists a misguided understanding that universities are publicly owned. Therefore, their expertise and scientific work can be treated as public service, and it should be free of charge and available to anyone who sees the need to seek their support and have specific experiments done. Additionally, it was mentioned that there is an unfortunate mistrust lingering when it comes to scientists in general – that they are alienated from the real world and thus have limited knowledge of how “the real world” works.

“That perhaps student work is kind of free.” (H)

“Listen, you’re good talkers here, but you can’t really do it” (K)

Another major factor in the cognitive distance was revealed to be the maturity of the industry, which is supported by the notion that the availability of funding and developmental resources throughout the project has a positive effect on the efficiency of the R&D project (Sicotte & Delerue, 2021). As large and mature companies are financially more stable and have a good developmental understanding, the collaborating scientist feels more on the same page with them, *i.e.*, the cognitive distance is smaller. However, companies that are either small or young or both can tend to exhibit incapacity when it comes to comprehending the complicity of the specific field and their limited finances often lead to miscalculations on how much research costs.

Meanwhile, management is key when it comes to running a company, no matter how large or small. Thus, it was strongly indicated that the cognitive distance between an imperceptive leader and the collaborating scientist is sometimes too large to manage, and thus the cooperation might collapse altogether.

"*If so to speak, the highest levels of incompetence begin to lead a project, the project will fail. If I have to explain the basic things in every meeting that I don't have to explain to the specialists of the same company, that's where the problems start"* (A)

A large amount of cognitive distance in the U-I collaboration originates from the differences in the nature of the work in the private and public sectors. As described in Figure 1, the industry tends to employ understandable and fixed methods, whereas university scientists tend to focus more on the novelty aspect of information. Moreover, roughly by character, the industry is focused on a specific problem and needs it resolved as time- and cost-efficiently as possible. In contrast, scientists tend to be more interested in the "whole picture" and prefer to gain a thorough understanding rather than staying in a specific timeframe. *I.e.*, entrepreneurs tend to focus only on the outcome, as researchers are also invested in the route towards gaining that information.

"Academically, it is sometimes polished that a thing is almost ready for publication, but that it would still do this and that and make it more beautiful and look deeper or look at the data from a more beautiful side." (I)

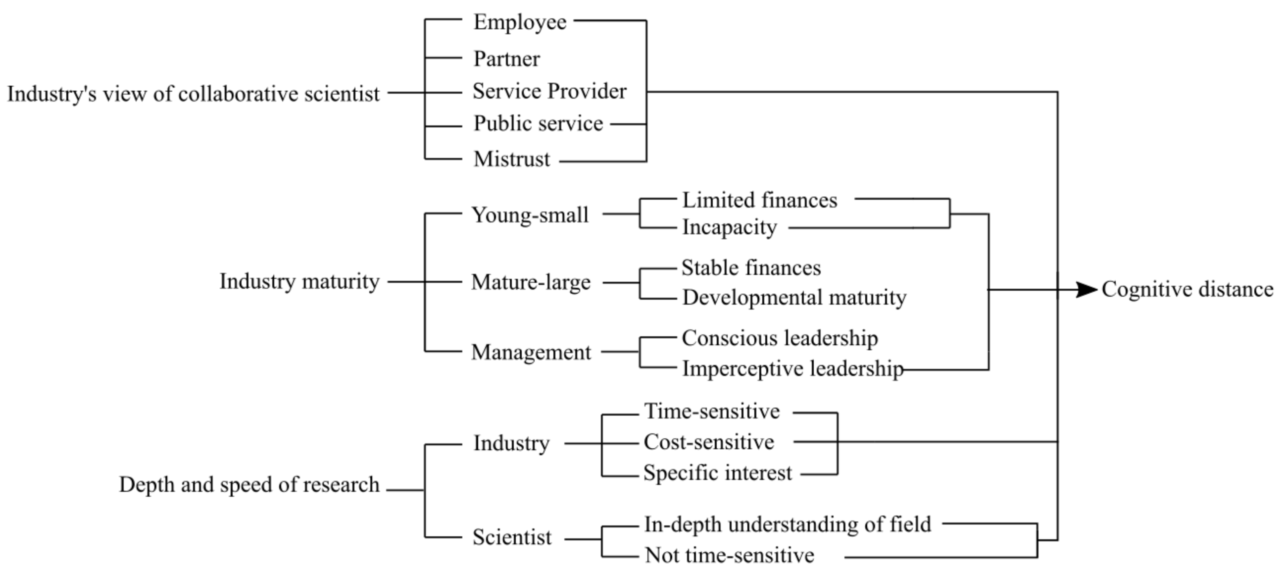

Figure 2. Tree scheme of codes indicating the inputs of cognitive distance.

Overall, based on the coding results of the scientist's perception, three aggregated perception dimensions of first and second-order codes were recognised as major inputs when it comes to cognitive distance (Figure 2). These dimensions reflect the three central concepts of value for the collaborative scientist and have an essential impact on the progress of the cooperation – industry's view of collaborative scientist, industry maturity, and the depth and speed of research – and are in good agreement with discussions in the literature.

4.3. Perceived cognitive distance as input for expectations

The university-industry collaboration relies on the cognitive understanding of the parties, which provides the basis for the expectations that the interested parties enter the innovative cooperation. As previously described, the cognitive distance between the parties can give rise to different expectations. From the collected data analysis, the discovered three aggregated perception dimensions of first-order codes can be analysed from the different expectations variations.

The industry's view of the collaborative scientist perceived by the researcher is an emotional expectation rather than a logical one. Scientist expects their role to be a partner when it comes to an innovative development collaboration. They rely on the discussions with the industry to be in-depth and open to creating a positive result. These expectations are positive emotional. However, when the industry's view is perceived as an employee or a public service provider or with a strong mistrust, the emotional expectations are met negatively. Additionally, the concept of the scientist being a service provider is positively perceived – the roles are clearly divided and stated; therefore, misunderstandings are less likely to arise. This can be described as a logical expectation.

As described in the literature, the cognitive distance related to technology understanding has a trivial effect on the probability and success of the collaboration; differences in stakeholders' organisational and strategic character have a more substantial impact (Ankrah & AL-Tabbaa, 2015; Wuyts *et al.*, 2005). The expectations for the perception inputs from the aggregated perception dimension of the industry's maturity are both emotional and logical. The logical expectations from the scientist's perception are that the collaborating partner has the financial capacity to support the requested and needed studies and developments. The emotional expectations are more often connected to the young and small enterprises. The perceived expectations are that they have little understanding of their needs and future vision and are financially more unstable. Thus, the collaboration is more likely to fail. This leads to negative emotional expectations.

On the other hand, collaborations with mature and large companies are met with positive expectations. This is based on the perception that these partners have more funds, a comprehensive understanding of their needs, and often have their own development department. However, the negative expectation is that the decision-making process within mature-large companies is long and thus can lead to problems regarding the timeline of the joint project.

The expectations regarding the perceived depth and speed of research of industry and scientists are connected to the perception of the core essence of the parties. Scientists perceive themselves as not time-sensitive and in search of an in-depth understanding of their field; thus, their expectation of their scientific work is the same. On the contrary, the industry is perceived as time- and cost-sensitive with a specific interest; therefore, the expectations for collaboration are often emotional and based on the cognitive distance between the partners.

4.4. Perceived factors to the outcome of university-industry collaboration

The collaboration outcome can be defined as a success or a failure. Collaboration can be categorised as successful when each party is satisfied with the result. For the collaborating scientists, expected positive outcomes are increased financial stability, finding real-life applications for their R&D work, and satisfying their professional curiosity. For the industry sector, it is vital to find a solution to a specific problem or gain information that will contribute to its productivity.

The basis of an unsuccessful collaboration was conveyed to be either a time problem, funding problem or problematic communication, with the latter having the highest number in coding (8.6% of total, Table 3). Considering that universities and industry representatives are motivated by different values and have respective orientations, one may even say that they "speak different languages". It is not hard to comprehend that communication may be challenging between these counterparts (Valentín, 2016). Thus, miscommunication can be considered the main reason for weak cooperation between universities and industry from the scientist's perception.

„/…/ the most challenging issue is communication. Firstly, the language, to get over it, and secondly, how everyone understands what the goal is.“ (I)

At the same time, the prosperity of a joint U-I project was rewarded to coaching and communication, as supported by the findings by Nooteboom *et al.* (Nooteboom, 2000). In addition to communication, trust, intermediaries, and experience have been found to facilitate collaboration success and help resolve the communicational issues (de Wit-de Vries *et al.*, 2019).

The collaboration outcome was analysed by calculating Jaccard's coefficients for coding similarity of nodes. Nodes that have been coded similarly are clustered together on the cluster analysis diagram. Conversely, sources or nodes that have been coded differently are displayed further apart on the cluster analysis diagram. The resulting cluster analysis is shown in Figure 3.

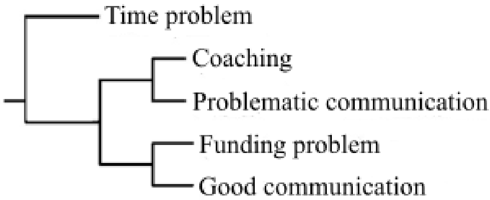

Figure 3. Collaboration outcome items clustered by coding similarity.

The analysis shows that the notation of time problem is not as strongly connected to other codes. At the same time, code pairs coaching-problematic communication and funding problem-good communication are similarly coded. The result is understandable, given that the time problem is often a different precondition set by the urgent need for problem-solving characteristics of the industry and can not be quickly diminished. However, the other two pairs complete one another. Considering the perceived scientists' view that problematic communication is often the result of imperceptive leadership, coaching can enhance understanding of the given field of research and improve communication between partners. Furthermore, when there is good communication between collaborating parties, the problems regarding funding can be adequately addressed to avoid any misunderstandings regarding the cost of research and financing opportunities.

Therefore, the given results advocate the idea that the cognitive distance between collaborative parties can be overcome by bridging it *via* communication methods, *e.g.*, coaching, sharing information, clarification of targets, *etc.*, as suggested by Nooteboom (2007).

To connect the concept of increasing the understanding between the U-I partners *via* bridging the cognitive distance between the parties and the notation that the majority of expectations are rather emotional than logical at the beginning of the joint project. Therefore, open and explanatory communication is of utmost importance at the starting point of the collaboration.

5. Conclusion

5.1. Contributions

This work contributes to the research gap in studies focusing on the effect of cognitive distance on university-industry collaboration by providing insight into the topic from the collaborating scientist's point of view.

Three major aggregated cognitive distance perception dimensions were identified. First was the industry's view of the collaborative scientist. Among the views, the perception of being treated as an employee or public service was most significant. Second is the maturity of collaborating industry. This involved the inputs of the incapacity and limited finances of young-small companies, and imperceptive leadership, with the latter having the most significant impact on the perceived cognitive distance. Finally, the third aggregated input was identified as the depth and speed of research which consisted of nodes describing the scientists' and industries' differences in the latter. Whilst the industry is perceived as driven by specific interests, scientists describe themselves as motivated by in-depth understanding.

Additionally, the identified perceived cognitive distance inputs were found to be reflected in the scientist's expectations of the industry partner. Academic researchers expect to be treated as an equal partner or as a service provider who is treated with respect and whose opinion will be taken into account in developing the objectives and milestones of the joint project. Additionally, a clear understanding of the industry's needs, especially at the management level, is highly valued and financial means to finance the project are expected.

Open and explanative communication was identified as the perceived concept to overcome the cognitive distance and for the success of the university-industry collaboration. This finding supports the idea presented in the literature that for a fruitful cooperation between universities and industry, there is not a vital need to lessen the cognitive distance but to bridge the two counterparts *via* communication.

5.2. Limitations and future research

The main limitation of this study is that the interviewees are from a specific research venue, Estonia. Since the perceived cognitive distance is greatly affected by the surrounding social and political situations, the findings may not be straightforwardly transferrable to other countries. Therefore, similar studies should be carried out in other areas to compile a more extensive understanding of the cognitive distance in U-I collaboration perceived by academic scientists.

Also, in the future, similar interviews should be conducted with industry representatives. Based on those, comparable analyses should be done to gain information on the perceived cognitive distance from the industry’s point of view. After that, these perceptions could be comprehensively compared, and based on the results, suggestions could be made to enhance the productivity of university-industry collaborations.

List of references

1. Ahuja, G. (2000). Collaboration networks, structural holes, and innovation: A longitudinal study. *Administrative Science Quarterly*, *45*(3), 425–455. https://doi.org/10.2307/2667105
2. Alexander, A. T., & Childe, S. J. (2013). Innovation: a knowledge transfer perspective. *Https://Doi.Org/10.1080/09537287.2011.647875*, *24*(2–3), 208–225. https://doi.org/10.1080/09537287.2011.647875
3. Ankrah, S., & AL-Tabbaa, O. (2015). Universities–industry collaboration: A systematic review. *Scandinavian Journal of Management*, *31*(3), 387–408. https://doi.org/10.1016/J.SCAMAN.2015.02.003
4. Balconi, M., Breschi, S., & Lissoni, F. (2004). Networks of inventors and the role of academia: an exploration of Italian patent data. *Research Policy*, *33*(1), 127–145. https://doi.org/10.1016/S0048-7333(03)00108-2
5. Bjerregaard, T. (2010). Industry and academia in convergence: Micro-institutional dimensions of R&D collaboration. *Technovation*, *30*(2), 100–108. https://doi.org/10.1016/J.TECHNOVATION.2009.11.002
6. Bougrain, F., & Haudeville, B. (2002). Innovation, collaboration and SMEs internal research capacities. *Research Policy*, *31*(5), 735–747. https://doi.org/10.1016/S0048-7333(01)00144-5
7. Bruneel, J., D’Este, P., & Salter, A. (2010). Investigating the factors that diminish the barriers to university–industry collaboration. *Research Policy*, *39*(7), 858–868. https://doi.org/10.1016/J.RESPOL.2010.03.006
8. Castañer, X., & Oliveira, N. (2020). Collaboration, Coordination, and Cooperation Among Organizations: Establishing the Distinctive Meanings of These Terms Through a Systematic Literature Review: *Https://Doi.Org/10.1177/0149206320901565*, *46*(6), 965–1001. https://doi.org/10.1177/0149206320901565
9. Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, *35*(1), 128. https://doi.org/10.2307/2393553
10. Davenport, S., Davies, J., & Grimes, C. (1998). Collaborative research programmes: building trust from difference. *Technovation*, *19*(1), 31–40. https://doi.org/10.1016/S0166-4972(98)00083-2

11. de Jong, J. P. J., & Freel, M. (2010). Absorptive capacity and the reach of collaboration in high technology small firms. *Research Policy*, *39*(1), 47–54. https://doi.org/10.1016/J.RESPOL.2009.10.003
12. de Wit-de Vries, E., Dolfsma, W. A., van der Windt, H. J., & Gerkema, M. P. (2019). Knowledge transfer in university–industry research partnerships: a review. *Journal of Technology Transfer*, *44*(4), 1236–1255. https://doi.org/10.1007/S10961-018-9660-X/FIGURES/3
13. *Estonian Research Council*. (n.d.). Retrieved April 13, 2022, from https://www.etag.ee/en/
14. Guerrero, M., Cunningham, J. A., & Urbano, D. (2015). Economic impact of entrepreneurial universities' activities: An exploratory study of the United Kingdom. *Research Policy*, *44*(3), 748–764. https://doi.org/10.1016/J.RESPOL.2014.10.008
15. Hagedoorn, J. (1993). Understanding the rationale of strategic technology partnering: Interorganizational modes of cooperation and sectoral differences. *Strategic Management Journal*, *14*(5), 371–385. https://doi.org/10.1002/SMJ.4250140505
16. Hambrick, D. C., & Mason, P. A. (1984). Upper Echelons: The Organization as a Reflection of Its Top Managers. *The Academy of Management Review*, *9*(2), 193. https://doi.org/10.2307/258434
17. Hobbs, K. G., Link, A. N., & Scott, J. T. (2017). Science and technology parks: an annotated and analytical literature review. *Journal of Technology Transfer*, *42*(4), 957–976. https://doi.org/10.1007/S10961-016-9522-3/FIGURES/9
18. Hoorens, V. (2012). Expectation. *Encyclopedia of Human Behavior: Second Edition*, 142–149. https://doi.org/10.1016/B978-0-12-375000-6.00163-4
19. Johnson, D., & Johnson, R. (1989). *Cooperation and competition: Theory and research.* https://psycnet.apa.org/record/1989-98552-000
20. Knockaert, M., Ucbasaran, D., Wright, M., & Clarysse, B. (2011). The Relationship Between Knowledge Transfer, Top Management Team Composition, and Performance: The Case of Science–Based Entrepreneurial Firms: *Https://Doi.Org/10.1111/j.1540-6520.2010.00405.x*, *35*(4), 777–803. https://doi.org/10.1111/J.1540-6520.2010.00405.X
21. Kuen, C. W., & Zailani, S. (2012). Critical Factors in Successful New Product Development: An Empirical Study of Malaysian Manufacturing Companies. *International Journal of Management*, *29*(2).

22. Merton, R. (1973). *The sociology of science: Theoretical and empirical investigations*. https://books.google.com/books?hl=en&lr=&id=zPvcHuUMEMwC&oi=fnd&pg=PR9&ots=x7QITjb3sS&sig=-fsr3Hg1uW2J-EJeqEcDFQKmwKs
23. Miller, K., Mcadam, M., & Mcadam, R. (2014). The changing university business model: a stakeholder perspective. *R&D Management*, *44*(3), 265–287. https://doi.org/10.1111/RADM.12064
24. Miller, K., McAdam, R., & McAdam, M. (2018). A systematic literature review of university technology transfer from a quadruple helix perspective: toward a research agenda. *R&D Management*, *48*(1), 7–24. https://doi.org/10.1111/RADM.12228
25. Moenaert, R. K., Souder, W. E., de Meyer, A., & Deschoolmeester, D. (1994). R&D-marketing integration mechanisms, communication flows, and innovation success. *Journal of Product Innovation Management*, *11*(1), 31–45. https://doi.org/10.1016/0737-6782(94)90117-1
26. Montello, D. R. (1991). The measurement of cognitive distance: Methods and construct validity. *Journal of Environmental Psychology*, *11*(2), 101–122. https://doi.org/10.1016/S0272-4944(05)80071-4
27. Nooteboom, B. (2000). Learning by Interaction: Absorptive Capacity, Cognitive Distance and Governance. *Journal of Management and Governance 2000 4:1*, *4*(1), 69–92. https://doi.org/10.1023/A:1009941416749
28. Nooteboom, B., van Haverbeke, W., Duysters, G., Gilsing, V., & van den Oord, A. (2007). Optimal cognitive distance and absorptive capacity. *Research Policy*, *36*(7), 1016–1034. https://doi.org/10.1016/J.RESPOL.2007.04.003
29. Nowell, B., & Albrecht, K. (2019). A Reviewer's Guide to Qualitative Rigor. *Journal of Public Administration Research and Theory*, *29*(2), 348–363. https://doi.org/10.1093/JOPART/MUY052
30. Paay, J., Kuys, B., & Taffe, S. (2021). Innovating product design through university-industry collaboration: Codesigning a bushfire rated skylight. *Design Studies*, *76*, 101031. https://doi.org/10.1016/J.DESTUD.2021.101031
31. Park, H. W., & Leydesdorff, L. (2010). Longitudinal trends in networks of university–industry–government relations in South Korea: The role of programmatic incentives. *Research Policy*, *39*(5), 640–649. https://doi.org/10.1016/J.RESPOL.2010.02.009
32. *Peer Review of the Estonian R&I system Final Report*. (n.d.). https://doi.org/10.2777/030204

33. Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university–industry relations. *Research Policy*, *42*(2), 423–442. https://doi.org/10.1016/J.RESPOL.2012.09.007
34. Philbin, S. (2008). Process model for university-industry research collaboration. *European Journal of Innovation Management*, *11*(4), 488–521. https://doi.org/10.1108/14601060810911138
35. Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative Science Quarterly*, *41*(1), 116–145. https://doi.org/10.2307/2393988
36. Rajalo, S., & Vadi, M. (2017). University-industry innovation collaboration: Reconceptualization. *Technovation*, *62–63*, 42–54. https://doi.org/10.1016/J.TECHNOVATION.2017.04.003
37. Rajalo, S., & Vadi, M. (2021). Collaboration potential between low-capacity SMEs and academic researchers determined by symmetry of motivation. *Technovation*, *107*, 102304. https://doi.org/10.1016/J.TECHNOVATION.2021.102304
38. *Research In Estonia*. (n.d.). Retrieved April 12, 2022, from https://researchinestonia.eu/
39. Rosenkopf, L., & Almeida, P. (2003). Overcoming Local Search Through Alliances and Mobility. *Http://Dx.Doi.Org/10.1287/Mnsc.49.6.751.16026*, *49*(6), 751–766. https://doi.org/10.1287/MNSC.49.6.751.16026
40. Schumpeter, J. (2002). New translations: Theorie der wirtschaftlichen Entwicklung. *American Journal of Economics and Sociology*, *61*(2), 405–437. https://doi.org/10.1111/1536-7150.00167
41. Shi, Y., & Herniman, J. (2022). The role of expectation in innovation evolution: Exploring hype cycles. *Technovation*, 102459. https://doi.org/10.1016/J.TECHNOVATION.2022.102459
42. Sicotte, H., & Delerue, H. (2021). Project planning, top management support and communication: A trident in search of an explanation. *Journal of Engineering and Technology Management*, *60*, 101626. https://doi.org/10.1016/J.JENGTECMAN.2021.101626
43. Siegel, D. S., Waldman, D. A., Atwater, L. E., & Link, A. N. (2003). Commercial knowledge transfers from universities to firms: improving the effectiveness of

university–industry collaboration. *The Journal of High Technology Management Research*, *14*(1), 111–133. https://doi.org/10.1016/S1047-8310(03)00007-5

44. Valentín, E. M. M. (2016). University—Industry Cooperation: A Framework of Benefits and Obstacles: *Http://Dx.Doi.Org/10.5367/000000000101295011*, *14*(3), 165–172. https://doi.org/10.5367/000000000101295011
45. van Baalen, P., Bloemhof-Ruwaard, J., & van Heck, E. (2005). Knowledge Sharing in an Emerging Network of Practice:: The Role of a Knowledge Portal. *European Management Journal*, *23*(3), 300–314. https://doi.org/10.1016/J.EMJ.2005.04.008
46. Weick, K. E. (1979). *The social psychology of organizing*. 294.
47. Wuyts, S., Colombo, M. G., Dutta, S., & Nooteboom, B. (2005). Empirical tests of optimal cognitive distance. *Journal of Economic Behavior & Organization*, *58*(2), 277–302. https://doi.org/10.1016/J.JEBO.2004.03.019
48. Yusuf, S. (2008). Intermediating knowledge exchange between universities and businesses. *Research Policy*, *37*(8), 1167–1174. https://doi.org/10.1016/J.RESPOL.2008.04.011

Resümee

TEADLASE KOGNITIIVSE DISTANTSI TAJU ÜLIKOOLI-ETTEVÕTLUSE KOOSTÖÖS

Piret Pikma

Antud uurimustöö eesmärgiks oli välja selgitada kognitiivse distantsi tajumine ja selle sisendid ülikoolide ja erasektori koostöös Eesti teadlaste perpektiivist vaadatuna. Lisaks sooviti kirjeldada kognitiivse distantsiga toimetuleku tajutavaid meetodeid, mis aitavad tagada ülikoolide ja ettevõtete vahelise koostöö õnnestumist. Seatud eesmärkide saavutamiseks intervjueeriti 11 teadlast, kes omavad ulatuslikku koostöökogemust erasektoriga. Seejärel kodeeriti ja analüüsiti süvaintervjuude transkriptsioone Nvivo progammiga.

Tulemuste põhjal leiti kolm peamist koondtaju dimensiooni, mida vaadeldi lisaks ka vastavate ootuste seisukohast. Esimese taju dimensoonina käsitleti ettevõtja nägemust teadlasest, kellega koostööd tehti. Oluliseks teguriks osutus kognitiivse distantsi teguriks teadlase tajutav roll, eelkõige tema kohtlemine alluva või avaliku teenuse pakkujana. Teise dimensioonina tuvastati ettevõtte küpsus. See hõlmas noorte ja/või väikeettevõtete oskamatust koostöö kujundamisel ja piiratud rahalisi vahendeid ning erasektori ebakompetentset juhtimist. Seejuures avaldas viimane kõige enam mõju tajutavale kognitiivsele distantsile. Kolmanda koondsisendina määratleti uurimistöö põhjalikkus ja kiirus, mis hõlmas teadlaste ja erasektori tööprotsessi olemuse erinevusi kirjeldavaid alajaotusi. Intervjueeritud teadlased tajuvad, et erasektor huvitub konkreetsest tulemusest, samas kirjeldavad teadlased end kui laiapõhjalise arusaama kujundajat oma eriala spetsiifiliselt.

Tajutud kognitiivse kauguse mõjusid vaadeldi lähtuvalt teadlaste ootustest koostööle. Teadlastel on ettevõtjast partnerile selged ootused. Nad eeldavad, et neid võetakse kui võrdväärset partnerit või teenusepakkujat, keda koheldakse lugupidavalt ja kelle arvamust võetakse arvesse ühisprojekti eesmärkide ja etappide arendamisel. Lisaks hinnatakse kõrgelt, et erasektor teadvustab enda vajadusi selgelt, eriti juhtkonna tasandil, ning projekti läbiviimiseks rahaliste vahendite olemasolu. Need ootused peegeldavad teadlase kognitiivset arusaama eduka koostöö alustest ning ühilduvad ülikooli ja erasektori koostööd kirjeldava tajutud kognitiivse distantsiga.

Uurimustöö tulemusena leiti, et kognitiivse distantsi ületamiseks ning ülikooli ja ettevõtete vahelise koostöö edu saavutamiseks tuleb partnerite vahel suurendada sisulise kommunikatsiooni ulatust igas projekti etapis. Eelnev toetab ideed, et eduka koostöö tagamiseks pole vaja kognitiivset distantsi vähendada, vaid kaht osapoolt on võimalik ühendada avatud ja selgitava suhtluse kaudu.