The role of proximity in less-favoured regions : smart experimentation between triple helix actors

Author(s): Mäenpää, Antti; Virkkala, Seija

Title: The role of proximity in less-favoured regions : smart experimentation between triple helix actors

Year: 2018

Version: Accepted manuscript

This is an Accepted Manuscript of a book chapter 11 published by Routledge in *Strategic Approaches to Regional Development: Smart Experimentation in Less-Favoured Regions* on 20.12.2018, available online: http://www.routledge.com/9781138084353

The Role Of Proximity In Less-Favoured Regions: Smart Experimentation Between Triple Helix Actors

Antti Mäenpää & Seija Virkkala

11.1 Introduction

Smart specialisation (Foray et al. 2012) is an academic concept that has been implemented in practice as the EU's latest research and innovation strategy for smart specialisation (RIS3). One of its central concepts is the entrepreneurial discovery process (EDP), the main idea of which is to define regional assets and utilise them for maximum effect to improve economic prosperity (Foray et al. 2012). The EDP is a challenging process, which demands a broad partnership of entrepreneurial agents, like relevant public and private stakeholders. The stakeholders should form a public–private partnership to make entrepreneurial discoveries and to prepare regional strategies based on these discoveries. However, in a less-favoured region (LFR), there might only be a few relevant stakeholders, who might be too distant from each other, which might lead to a partnership that is weak or short on interaction.

Less-favoured or peripheral regions have traditionally been defined as areas with low levels of accessibility to large-scale (national, continental, and global) interaction centres offering access to markets, production factors, private and public services, cultural facilities, sources of innovation systems, and to economic and political power (Lorentzen 2012: 16–17). They have high travel and transport costs and are remote from centres of economic activity. They also suffer from the absence of agglomeration advantages, which manifests as low rates of entrepreneurship and innovation. The category of LFR is a relative category, which should be studied in relation to the more-favoured regions. In a knowledge-based economy, accessibility to transport for physical goods has become less important, and other forms of accessibility, such as to business air travel and ICT, have become more important (Crone 2012).

The innovation systems in an LFR can often be characterised by a low level of interaction between knowledge producers and knowledge users, a lack of a critical mass of innovative firms, a weak connection with key organisations (e.g. universities, companies, and public actors), and by a low level

of clustering (Tödtling and Trippl 2005). These characteristics can make the RIS3 process challenging in LFRs. A less-developed regional innovation system (RIS) has a weak capacity to support the renewal of the regional economy over time, which is important in the RIS3 targeting initiating regional transformation via the EDP (Blažek et al. 2014: 5). Moreover, the stakeholders in the LFRs might lack knowledge of innovation and might also have a low absorption capacity in terms of acquiring key knowledge.

This chapter discusses two challenges associated with the EDP: the low connectivity between stakeholders and the lack of a role for stakeholders/entrepreneurial agents, or a weak role for them. The chapter approaches the innovation system in LFRs by analysing the innovation cooperation between the triple helix (TH) actors and companies in particular. The chapter presents an analysis adopting two approaches: the proximity approach and the knowledge typology approach developed by Lundvall and Johnson (1994), which focuses on the role of codified and tacit knowledge. The chapter aims to advance understanding regarding networking preconditions, behaviour, and knowledge acquisition regarding companies in LFRs, and also to analyse the role of different proximities in their cooperation for innovation. This is also crucial for the EDP because companies are usually the main implementers or beneficiaries of the innovation strategies and because new ideas leading to domains might emerge from these relationships and interactions. This also contributes to the proximity discussion from the perspective of the LFRs, and to that on how to overcome institutional barriers in peripheral regions.

The chapter aims to respond to the following research questions: what is the relationship between geographical and non-spatial proximity in companies in LFRs? What could be undertaken in LFRs to increase proximity between stakeholders?

These research questions are approached via the findings of a Finnish case study from the region of Ostrobothnia on various proximities and aspects of knowledge creation through innovation cooperation between TH actors. The Finnish region of Ostrobothnia and the country in general have managed to at least partly overcome the less-favoured conditions of being on the northern periphery of Europe. The innovation scoreboard of the EU ranks Finland as an innovation forerunner. This study also introduces a new way to measure social and cognitive proximity, and thus provides detailed information regarding the institutional, social, cognitive, and geographical proximities required for innovation cooperation among the various actors.

11.2 Conceptual background

11.2.1 Regional innovation system (RIS) and triple-helix models

Innovation is becoming an evermore complex, interactive, and open phenomenon, and different types of knowledge are combined in innovation processes. Strambach and Klement (2012) introduce the concept of the *combinatorial microdynamics of knowledge*, in which innovation relies on the combination of different types of knowledge. Within innovation processes, relevant knowledge is distributed, as a result of different actors in different places having elements of the necessary knowledge. Collaboration in formal and informal networks is one way for firms to acquire knowledge for innovation, and this chapter concentrates on that form. Other forms supporting knowledge acquisition include labour mobility, market links, monitoring, and knowledge spillovers.

Territorial innovation models, for example, RIS theories, emphasise the importance of regional knowledge for innovation. The RIS approach underlines the importance of interactive learning (i.e. networks): innovations are the outcome of interactive learning within and between two subsystems – knowledge generation (universities) and knowledge application (firms) – located in the region. The exchange of tacit knowledge is facilitated by geographical proximity and regional cultural contexts, that is, geographical and social proximity. However, external knowledge links are also important (Bathelt et al. 2004) and often complement regional knowledge. The combination of knowledge acquired from different spatial scales is the key to innovation. The term *local buzz* refers to free and automatic participation in often unintended knowledge circulation of actors in the same location. *Global pipelines* are seen as planned connections to distant partners and knowledge sources, which can provide new technologies and markets (Grillitsch and Trippl 2014).

LFRs usually have relatively few actors and limited local knowledge flows, only a few knowledge and support organisations, and no, or only weak, clusters. Isaksen and Trippl (2014) call them “organizationally thin regions”. Regions with thin RISs are far less dynamic. They generally have fewer innovative new firms than thicker RIS regions, and the role of support organisations and extra-regional knowledge links might be more important to the EDP than in thick regions with their dense organisational network and rich local knowledge flows.

Jensen et al. (2007) introduce two modes of innovation: science, technology, and innovation (STI) and doing, using, and interacting (DUI). The STI mode of learning and innovation is based on the production and use of codified scientific and technical knowledge, whereas the DUI mode is an experience-based mode of learning that relies on informal processes. The STI mode prioritises the

production of know-why, while the DUI mode typically prioritises know-how and know-who (Jensen et al. 2007). Know-how and know-who are typically tacit, while innovations focus mainly on incremental changes in existing products and processes. In the DUI mode, crucial knowledge of innovation processes is formed through a combination of the employees' training and working-life experience. The knowledge base is developed through in-house problem-solving by individuals and teams of workers, and this becomes evident, for example, when firms cooperate with customers who are facing new problems and when suppliers engage in innovation activity (Jensen et al. 2007; Virkkala 2013). The DUI mode is based on synthetic and symbolic knowledge (that is market/user-driven), emphasising competence-building and organisational innovations, but analytical knowledge is more important in the STI mode of innovation. The DUI mode depends more on implicit and local knowledge where know-how and know-who play an important role, but the STI mode of innovation is based on explicit and global knowledge, and emphasises know-why and know-what.

The TH model has been used as a framework of knowledge-based societies, and universities are at the core of the model. According to the model, universities, industry, and government are the key institutes whose interaction is necessary for innovations (Etzkowitz and Leydesdorff 2000). The TH approach has been criticised for conceptualising only three groups of actors (Carayannis and Campell 2012) and neglecting the absorptive capacity of companies and government to engage with universities. Responses to the criticism include attempts to incorporate a wider set of actors and institutions, as in the *quadruple helix* that includes non-governmental knowledge production, utilisation, and renewal entities as well as other civil society entities, institutions, and stakeholders (Carayannis and Campell 2012).

The concept of the TH has been applied in smart specialisation to form the basis for connectivity within regions. A connected region is a norm or vision where the three helices work in harmony, thereby mutually reinforcing each other (Goddard et al. 2013). The collaboration between TH actors in different helices is especially beneficial for many reasons, but usually the idea of different types of people, schools of thought, and varying overall objectives adds value to the innovation process (Ranga and Etzkowitz 2013). The public sector focuses on the public good, companies add market knowledge, and universities link the region to global research networks. This collaboration also provides a solid framework for the EDP, as various ideas intermingle.

In a disconnected region, there are no boundary spanners, the partnerships are ineffective or non-existent, and there is a lack of understanding about the required changes. Entrepreneurs are locked out of regional planning (Goddard et al., 2013), and the EDP cannot emerge properly. This applies

especially to an LFR lacking important actors; however, RIS3 is based on the idea that if a region lacks some actors, it may use its existing knowledge to compensate for that lack; so, for example, if there are few companies, then universities and local development agencies may prove to be sources of market knowledge. Therefore, one can state that one important precondition for regional innovation is optimal proximity between the actors, and this can vary depending on whether the region contains all the necessary actors.

11.2.2 Proximity as a precondition of a relationship

The proximity approach was introduced by Boschma (2005) and by Torre and Rallet (2005) and is used mostly to understand which type of proximity produces innovation, and to what degree. The approach primarily focuses on dyadic relationships. Proximity is required to connect actors and to enable interactive learning and innovation. Geographical proximity promotes unique local competencies, skills, and new knowledge, which can diffuse spontaneously through personal contacts via the local buzz (Bathelt et al. 2004). However, geographical proximity alone is not sufficient to foster knowledge creation, but it does facilitate non-spatial forms of proximities and the sharing of tacit knowledge. In addition to geographical proximity, Boschma (2005) suggests four non-spatial dimensions of proximity: social, institutional, organisational, and cognitive proximity. Geographical proximity refers to physical distance measured in kilometres or time. Institutional proximity indicates shared formal and informal rules. Cognitive proximity refers to the similarity of the knowledge bases of the partners, and social proximity refers to the personal or professional relationships between partners. Organisational proximity refers to the same relational framework or share of common knowledge and capacities (Torre and Gilly 1999).

When actors get closer in one dimension, they also get closer in other dimensions. This means that the dimensions have somewhat overlapping boundaries. Geographical proximity tends to create an overlap between geographical and other (non-spatial) forms of proximity (Malmberg and Maskell 2006). For instance, geographical proximity stimulates the emergence of trustful relations through the possibility of the frequency of relationship, resulting in higher social proximity. Geographical proximity may also stimulate territorial specialisation and cluster formation, which may then turn into cognitive proximity as people work closely on related fields. The overlap of geographical and cognitive proximities depends on the degree of regional specialisation (Hansen 2015). In addition to the effect of overlap, the proximity literature emphasises the possibility of substitution of non-spatial proximities for geographical proximity. According to Boschma (2005), geographical proximity is neither a necessary nor a sufficient condition for learning. The lack of one proximity can be

compensated for by the presence of another form of proximity. This is a very important statement as a precondition of innovation development in LFRs, since their actors might need to cooperate with partners in other regions to deliver innovation.

However, proximity between agents in networks does not always increase their innovative performance, and may even harm it; this is the so-called proximity paradox (Boschma and Frenken 2013). If two actors have a similar knowledge base, the cognitive distance between them is short, and their collaboration might not improve innovation performance because new ideas may require somewhat different views, and some level of recombination is usually central to innovation. Instead, the collaboration might even give rise to what are termed lock-ins (Boschma and Frenken 2013), where collaboration among actors is so strong that other partners cannot 'fit in'. Moreover, the strength of social ties between two actors can vary. Proximity may also hinder extra-regional collaboration and sometimes even local learning. This is especially true for institutional proximity, which in this chapter is operationalised as the proximity inside helices (companies, universities, or government), as high levels of institutional proximity mean less cross-sectoral knowledge transfer. In addition, geographical proximity can become a hindrance if collaboration occurs only on the local level. High social proximity might mean that new actors are not easily accepted. Optimal proximity varies region by region, and therefore should be studied in association with its regional background.

Innovation cooperation can also be dynamic: interaction between actors can contribute to various forms of proximity that can cut across organisational, institutional, and spatial boundaries. During interactions in the innovation process, the partners learn from each other, their knowledge bases will change, and their shared mental models will be adjusted, which leads to a reduction in their cognitive distance, which enhances the learning effects (Menzel 2016). The interaction can also create a common social context in which personal relations develop despite organisational, geographical, or institutional backgrounds or knowledge bases (Balland et al. 2015). In a similar way, it is possible to see the EDP as a process in which the different proximities are changing and new relationships will be created. In order to better understand social and cognitive proximity, in this chapter the proximity approach is linked to the knowledge typology.

11.3 Research design

11.3.1 Knowledge taxonomy as proximity

The literature review provided a framework on TH and proximity as theoretical concepts, but they can be operationalised in different ways. The authors think that the idea of institutional differentiation (as in the TH model) can offer a good point of departure for an empirical study. Whereas most firms specialise mainly in the exploitation of knowledge for economically useful purposes, universities are involved mainly in knowledge creation through research, followed by its dissemination through education. The TH concept provides ready-made empirical categories for studying relationships between different actors. Accordingly, data were collected on the basis of the described institutional spheres: companies, universities, and public government.

Geographical proximity normally refers to physical distance measured in kilometres or time, but in this chapter the concept refers to intra-regional vs. extra-regional proximity. Institutional proximity indicates the joint formal and informal rules, and, in this chapter, refers to the helices: universities, as scientific systems, communicate and function in accordance with the code of true/false, companies in accordance with the code of profit/loss, and the public sector in accordance with the code of right/wrong. Cognitive proximity refers to the similarity of the knowledge bases of the partners, and social proximity refers to the personal or professional relationships between partners (Virkkala et al. 2017). Our empirical analysis is based on the data on geographical, institutional, social, and cognitive proximities. There were insufficient data available on organisational proximity to be able to include it.

The authors illuminate the relationships between actors with the help of a knowledge taxonomy that takes account of the division between codified and tacit knowledge. Codified knowledge consists of information that can be written in an explicit form. Tacit knowledge is acquired through experience, demonstration, and practice, requiring personal physical interactions. The knowledge typology of Lundvall and Johnson (1994; Jensen et al. 2007) mixes codified and tacit elements and specifies functional types of knowledge with the help of four categories: *know-what* is knowledge about facts on regions, inhabitants, and industrial structure, and describes what is going on; *know-why* is knowledge that explains why things are done in a certain way (or theories on the reasons for development), the principles and laws of nature, in the human mind, and of society; *know-how* defines how things happen in practice (or how to perform skills), and is often tacit by nature; and *know-who* identifies the actors and partners, and also who is authorised to make decisions. It is knowledge regarding who knows what (Lundvall and Johnson 1994).

Knowledge taxonomy has been used in a survey to define the depth of the relationship with regard to a respondent's knowledge of his/her partner. The deeper the relationship, the more dimensions are covered by the respondent's knowledge about his/her partner's activities connected to innovation. Table 11.1. combines the knowledge taxonomy with the proximity dimensions. *Know-what* and *know-why* refer to cognitive proximity, *know-who* and *know-how* to social proximity.

Table 11.1. Knowledge taxonomy and proximity dimensions explaining the network relations between triple helix actors (Source: authors' own analysis*).*

Knowledge taxonomy	Content	Proximity dimension
Know-what	knowledge about facts (often codified knowledge)	Cognitive
Know-why	Knowledge that explains why things are done in certain ways	Cognitive
Know-how	Practical knowledge how to perform skills (often tacit knowledge)	Social
Know-who	Knowledge regarding who knows what: the actors and partners	Social

11.3.2 The region of Ostrobothnia: data and methods

Ostrobothnia is a region in western Finland with a population of 181 000 people. The national capital, Helsinki, is situated over 400 kilometres away, and the largest regional city, Vaasa, has 67 000 inhabitants. The region is known for its industrial sector, which consists of the energy technology cluster in and around the regional capital Vaasa, a boat building cluster, and fur farming businesses in the surrounding countryside. Over 80% of the value of energy technology production was exported in 2017, and Ostrobothnia has been characterised as a globalised innovation system. Among the Ostrobothnian workforce in 2014, 6% earned their living from agriculture, 29% from industry, and 64% from the service sector (EnergyVaasa 2018; Regional Council of Ostrobothnia 2018).

The case study region has some characteristics of an LFR, in that it is relatively small and the agglomerative advantages are limited. In addition, its location is unfavourable relative to the main national and European centres of population and economic activity, which results in increased travel and transport costs. However, the case study region and Finland in general have managed to at least partly overcome the less-favoured conditions of Europe's northern periphery. In the innovation scoreboard of the EU, Finland has been classified as an innovation forerunner.

The Finnish innovation system is centralised and many important policy domains such as science, technology, innovation, and university policies are coordinated at the national level, with weak regional approaches. Regional Councils are responsible for regional development, including RIS3. This background has obviously affected the authors' view on regional innovation and needs to be addressed here. In Ostrobothnia, a 'connected region' was selected as a vision for RIS3, and a policy model was developed according to that vision.

The data used in this chapter were gathered during 2013 as part of an earlier study on overall regional connectivity (Mäenpää 2014). In total, there were 53 respondents representing various expert and leading positions in companies (21), the public sector (17), and universities (15); the group represents the three most important export sectors of the region: the energy technology cluster, boat building, and the fur industry. The actual data gathering was undertaken via surveys, but, due to the wide range of questions, was complemented by an interviewer helping the respondents to complete the survey sheets. The cooperation between the TH actors was studied via nine relations. First, there were the three types of organisations: universities, public organisations, and companies. Second, there were also three geographical levels: regional, national, and international. This created the nine connections that were focused upon. The respondents reported the number of partners and their importance by utilising simple tables into which they entered the (exact) number of partners and, in another table, their importance on a scale from 1 to 10 (from lowest to highest, and using 0 to denote no connection).

Different knowledge types were analysed by asking about experiences of cooperation according to the different aspects of knowledge typology (also on a scale from 1 to 10, and 0 if there was no connection) (Table 11.1). The questions were designed to elicit the extent to which the respondents knew the staff of their partners, or the ways in which their partners work (social aspects), or what their partners were working on, or why they were doing so (cognitive aspects). Questions were asked about the innovation partner, and there was a general description (actual dialogue, not just purchasing activities) for it, as the aim was to let the respondents themselves decide what they considered important aspects of collaboration. The method offered a route to identifying possible development challenges.

The same question sets were answered three times within a single helix, according to the chosen geographical division: first for the region, then for the other parts of Finland, and lastly for the international connections. The only exceptions were public organisations, as their connections to companies outside the region were not studied at all. This was because, in Finland, several of the public actors are regional entities, and they have no jurisdiction to act in other areas.

This chapter presents a new analysis investigating how different non-spatial (institutional, social, and cognitive) proximities substitute for and/or facilitate geographical proximity. The idea is to analyse data regarding the importance and number of different partners for the respondents and regarding a respondent's knowledge of their partners' innovation activities. The authors then evaluate how proximity affects the emergence and functioning of the innovation network among the TH actors.

11.4 Analysis and results

11.4.1 Geographical and institutional proximity

Taking account of the total number of partners (657) mentioned in the 53 interviews, only 38% of the relations are directed towards the respondents' own helices and 62% are directed towards the other helices. These figures can be interpreted as signifying quite low institutional proximity. However, low institutional proximity also implies high connectivity between the helices. Comparing the geographical proximity (67%) figure to this indication, it is clear that, overall, the region of Ostrobothnia has a good number of connections between helices, but they are mostly regionally embedded (Table 11.2).

Table 11.2. Geographical and institutional proximity in Ostrobothnia (Virkkala et al. 2014a: 120).

Helix of respondents	Geographical proximity: Ostrobothnia vs. other regions	Institutional proximity: own helix vs. other helices
Companies	High (70 %; 119/171)	High (87 %; 148/171)
Universities	Average (51 %; 91/179)	Low (17 %; 31/179)
Public sector	High (75 %; 231/307)	Low (22 %; 68/307)
All	Average (67 %; 441/657)	Average (38 %; 247/657)
Low proximity: less than 30 % of the number of partners in the helix or in the region. Average proximity: 30–70 % of the number the partners in the helix or in the region. High proximity: More than 70 % of the number of the partners in the helix or in the region.		

With regard to the companies, most of their partners (70%) are based in Ostrobothnia, which indicates high geographical proximity. The institutional proximity of the companies is, however, even higher (87%), suggesting that they largely cooperate with other companies instead of the other two helices. The university sector has an average rate of geographical proximity (51%) and a low /average rate of institutional proximity (17%). However, in this case the low institutional proximity might mean that universities are not living in a closed academic world, but instead are open to other parts

of society, and that they cooperate particularly with firms in Ostrobothnia. Public organisations display a high rate of geographical proximity (75%) and a low rate of institutional proximity (22%), meaning that their networks are mostly in the region of Ostrobothnia (as the legislation establishes) and also consist mainly of companies.

The data on the importance of partners (Table 11.3) reflect similar results, as regional companies are valued above all others in importance. This is especially relevant as the question was related to the innovation and actual collaboration of all respondents. Thus, simply buying products was not sufficient to justify the connection, which had to include innovation-related dialogue.

Table 11.3. Importance of partners across spatial scales and helices for all respondents (Source: authors' own analysis).

How important are these partners? (avg)	Companies (n=21)	Public organisations (n=17)	Universities (n= 15)
Regional level	8.5	7.7	7.2
National level	7.4	7.0	6.9
International level	6.1	5.0	5.8

The data regarding the number and importance of partners highlight the fact that the Ostrobothnian region is business-oriented. The majority of respondents thought that their most important partners are regional companies, but the list of most important partners also includes national and international companies. It seems fair to say that the innovation system in Ostrobothnia is business-driven. The analysis of the structure of Ostrobothnia's innovation network helps to examine the social and cognitive aspects of companies' relationships to determine the degree to which they are embedded in the region. This analysis is also important owing to the significant role of companies in the EDP as custodians of market knowledge.

11.4.2 Social and cognitive proximity

The role of geographical proximity is especially relevant regarding LFRs. Might there be a scenario involving overlapping proximities so that when geographical proximity is high (i.e. the innovation partners of Ostrobothnian companies are located in the region of Ostrobothnia), social and/or cognitive proximities are also high? The scenario of overlapping proximities means that geographical proximity might facilitate either social or cognitive proximity or both. The second possibility is that the companies compensate for the absence or weak supply of innovation partners in the region

(especially in an LFR) by cooperating with extra-regional (national and international) partners. In that case, firms might have developed high social and cognitive proximities with the extra-regional partners. It is also interesting to see if there are differences across the helices in the social and cognitive proximities of the innovation partners of Ostrobothnian companies.

An inspection of the relationships between companies and public organisations (Table 11.4) reveals that both social (know-how/who) and cognitive (know-what/why) proximities are lower from the companies' view of cooperation at the regional level. Companies have weaker experiences of cooperation with public organisations overall on all spatial levels. The experiences are lowest for both companies and public organisations regarding their knowledge of their partners' reasons for their activity, and on the theories underpinning their activity (the know-why typology), as it requires a wealth of knowledge of the actual processes within the companies/public actors. Our analysis offers results only on the intra-regional connection from the public actors' side, as their legal status requires that they operate on a regional level only.

Table 11.4. Social and cognitive proximities in relations between companies and public organisations (Source: authors' own analysis).

Regional level					
Proximity type	Companies, Experiences (avg)	n	⟷	n	Public organisations, Experiences (avg)
Cognitive	7.1	15	Knows our work (know what)	11	8.9
Cognitive	5.5	15	Helps us with our difficult problems (know-why)	10	7
Social	7.1	14	Contacts us (know-how)	12	8.4
Social	5.6	15	Knows our staff (know-who)	10	8.2
National level *					
Proximity type	Companies, Experiences (avg)	n	⟷	n	Public organisations, Experiences (avg)
Cognitive	6.3	12	Knows our work (know what)	x	X
Cognitive	5.8	12	Helps us with our difficult problems (know-why)	x	X
Social	6.7	11	Contacts us (know-how)	x	X
Social	5.4	11	Knows our staff (know-who)	x	X
International level *					
Proximity type	Companies, Experiences (avg)	n	⟷	n	Public organisations, Experiences (avg)
Cognitive	5.8	4	Knows our work (know what)	x	X
Cognitive	5.8	4	Helps us with our difficult problems (know-why)	x	X
Social	7.0	4	Contacts us (know-how)	x	X
Social	6.3	4	Knows our staff (know-who)	x	X
* Interviewed public actors only have jurisdiction on local level					

An examination of the relationships between companies and universities (Table 11.5) reveals that both social (know-how/who) proximity and cognitive (know-what/why) proximity are lower from the companies' than from the universities' perspective. Companies have weaker experiences regarding cooperation with universities on all scales. Universities seem to have quite strong experiences of cooperation with companies regarding social and cognitive proximities. This is interesting because companies' institutional proximity is high (Table 11.2.), so the knowledge residing within universities does not seem to be of interest to local companies. Indeed, institutional and geographical proximity seem to correlate, and it is probable that the explanation lies with the regional innovation structure.

Companies' experiences of cooperation with regional universities with regard to analytical knowledge that improves the innovation process (know-why) are lower than those with national and international university partners. This indicates that companies might substitute the knowledge production of regional universities with extra-regional cooperation. It also reflects the fact that innovations are complex and the knowledge necessary for production is often dispersed in different locations and on different scales (Strambach and Klement 2012). To acquire knowledge, companies must cooperate in innovation networks even with geographically distant university partners. According to our case study, this seems to be the situation for companies in the LFRs too. However, to acquire the distributed knowledge might be more challenging than to cooperate with the regional universities, and could also demand a higher absorptive capacity of the companies.

Table 11.5. Social and cognitive proximities in relations between companies and universities (Source: authors' own analysis).

Regional level					
Proximity type	Companies, Experiences (avg)	n	⟷	n	Universities, Experiences (avg)
Cognitive	6.0	14	We know our most important partner's work (know what)	12	8.4
Cognitive	5.5	14	Improves our innovation process (know-why)	12	8.2
Social	6.1	14	We know our most important partner's research and development methods (know-how)	12	7.5
Social	6.1	13	We know our most important partner's staff working in our field (know-who)	12	7,9
National level					
Proximity type	Companies, Experiences (avg)	n	⟷	n	Universities, Experiences (avg)
Cognitive	6.1	8	We know our most important partner's work (know what)	9	7.7
Cognitive	6.9	7	Improves our innovation process (know-why)	9	7.3
Social	6.8	8	We know our most important partner's research and development methods (know-how)	9	6.8
Social	4.7	7	We know our most important partner's staff working in our field (know-who)	9	7.0
International level					
Proximity type	Companies, Experiences (avg)	n	⟷	n	Universities, Experiences (avg)
Cognitive	6.2	6	We know our most important partner's work (know what)	5	7.6
Cognitive	6.2	6	Improves our innovation process (know-why)	4	7.8
Social	6.5	6	We know our most important partner's research and development methods (know-how)	4	7.0
Social	5.0	5	We know our most important partner's staff working in our field (know-who)	4	7.0

The Ostrobothnian companies knew the staff (know-who) of their regional partner universities better than the staff of their national and international partners. Even if the overall social proximity regarding innovation cooperation is higher on the regional level, the knowledge of partners' research and development methods (know-how) is higher at the national and international levels. On national and global levels, one can already see indications that companies do not know research staff (know-

who), as these are the lowest figures. One explanation is also institutional proximity, as some previous results indicate that, for Ostrobothnian companies, other companies on any spatial scale are more preferable partners than universities (Table 11.2).

Social proximity (know-how and know-who) between the Ostrobothnian companies and their university partners seems to be little higher at the regional level than on the other spatial scales, which suggests that geographical proximity is facilitating social proximity. Spatial collocation increases the likelihood of accidental encounters, and trustful relations can emerge when the exchanges are regular and the people know each other (Storper and Venables 2004).

Companies' connections with other companies are intra-helix relationships according to the TH model, and that is the reason we have measurements from only one side regarding both social (know-how/who) and cognitive proximities (know-what/why) in Table 11.6. Both social and cognitive proximities are higher in the context of cooperation between regional companies than that between Ostrobothnian companies and extra-regional companies. However, the results still show that, on a regional level, social proximity between companies is higher than cognitive proximity, and a comparison of cognitive proximity between companies at the regional and extra-regional (i.e. national and international) levels shows that cognitive proximity is higher among regional companies. High levels of institutional proximity, as indicated by the finding that companies prefer to cooperate with other companies rather than with universities and public organisations, also affect social proximity between companies at the regional level. This is in line with the structural analysis and the fact that the RIS in Ostrobothnia is business-driven.

Table 11.6. Social and cognitive proximities between companies (Source: authors' own analysis).

Regional level			
Proximity type		n	Companies, Experiences (avg)
Cognitive	Knows the standards/concepts (know what)	13	7.8
Cognitive	Helps us with our difficult problems (know-why)	14	8.0
Social	Knows our products/services (know-how)	14	8.2
Social	Knows our key staff (know-who)	15	9.3
National level			
Proximity type		n	Companies, Experiences (avg)
Cognitive	Knows the standards/concepts (know what)	12	7.1
Cognitive	Helps us with our difficult problems (know-why)	13	7.2
Social	Knows our products/services (know-how)	13	6.8
Social	Knows our key staff (know-who)	14	6.2
International level			
Proximity type		n	Companies, Experiences (avg)
Cognitive	Knows the standards/concepts (know what)	9	7.3
Cognitive	Helps us with our difficult problems (know-why)	9	6.9
Social	Knows our products/services (know-how)	9	7.6
Social	Knows our key staff (know-who)	9	6.3

11.4.3 Summary of findings

An interesting question is whether geographical proximity explains the high rates of other proximities. If one looks at the companies' relations to universities (Table 11.5), one can see that they are generally more distant (i.e. the level of proximities is lower) than the relationships between companies, which may indicate that geographical proximity cannot totally explain the findings. Institutional proximity might be one indication, and companies are known for their focus on business-related matters (which directs cooperation with other companies), but one indicator in the company results might offer a more profound explanation. Social proximity, and especially the knowledge of partners' staff (know-who), seem to be quite high at the regional level. This result stands out in the analysis as a whole, as it is the only one near the maximum figure (9.3).

The findings of the analysis show that both social and cognitive proximities are highest at the regional level. However, the differences between cognitive proximity across spatial levels (regional, national, and international) are smaller than those of social proximity across spatial levels.

With regard to the proximities across helices, the findings indicate a clear pattern, according to which social and cognitive proximities are highest in relationships between companies at all spatial scales, but these proximities are especially high at the regional level. One can say that the findings indicate that companies' institutional, geographical, social, and cognitive proximities are overlapping, and it can also be inferred that regional proximity really does facilitate other forms of proximities (Table 11.7) However, this is verified only for innovation cooperation with other companies and public organisations because cooperation between companies and universities indicates generally higher social and cognitive proximities at the national and international levels than at the regional level.

This result is especially interesting in relation to LFRs, as they may lack intra-regional connections, and, in the case of Ostrobothnia, it would seem that regional cooperation has affected the overall TH collaboration, as the regional results for cooperation between companies and universities are low. Local companies, in particular, network among themselves, which might explain why there is high institutional proximity. Universities may not have been able to step into the business-driven networks, as the results indicate that companies' cognitive proximity with universities is lower than the other way around. This might indicate that universities are studying what companies do, but that companies have not invited universities to participate in their entrepreneurial initiatives. Or perhaps regional companies prefer extra-regional universities for collaboration more than regional ones.

Table 11.7. Geographical proximity facilitating other proximities; other proximities substituting for geographical proximity (Source: authors' own analysis).

Geographical proximity vs other proximities	Facilitating/overlapping with geographical proximity	Substituting for geographical proximity
Social proximity (know-how)	Yes (average proximities higher in the region than other scales)	Yes, (Company–university relation higher proximity at national and international levels)
Social proximity (know-who)	Yes (higher in the region than in other scales)	No
Cognitive proximity (know-what)	Yes, (company–company relationship)	Yes, slightly (company–university relation)
Cognitive proximity (know-why)	Yes (company–company relationship)	Yes, (company–university relation and company–public organisation relations)
Facilitating = The proximity between partners is higher in the region of Ostrobothnia than at other geographical scales (national, international). Substituting = The proximity between the partners is higher at other geographical scales (national, international) than in the region of Ostrobothnia.		

11.5 Conclusions

This chapter has discussed the proximity dimension of innovation cooperation from the perspective of LFRs. Based on the literature on proximities, the innovation system, and the TH, the chapter used a Finnish case study to focus particularly on the role of geographical and non-spatial proximities as they affect innovation partners in LFRs. The chapter focused on companies because they are especially important to the EDP. It is important for actors in an LFR to understand the degree to which the possible weaknesses or lack of actors and knowledge suppliers can be improved via cooperation with extra-regional innovation partners. This means the substitution of geographical proximity with non-spatial proximities. The proximities are seen as preconditions for relationships and innovation cooperation between different TH actors across different spatial scales and helices. It seems valid to ask what actions could be undertaken in LFRs to enhance proximity between stakeholders.

The analysis of the Finnish case study leads to four major conclusions. First, different proximities overlap at the regional level, and geographical proximity slightly facilitates social proximity. This might not be surprising since collocation increases the likelihood of accidental encounters, and trustful relations can emerge when people familiar with each other have regular exchanges (Storper and Venables 2004).

Second, companies operating in LFRs might substitute the insufficient knowledge production of regional universities for extra-regional cooperation. We might even suppose that the companies of the case region have managed to overcome the limitations of the LFR, such as there being few actors and tiny knowledge resources, by undertaking extra-regional networking to acquire and utilise geographically dispersed knowledge in their production processes. Regarding LFRs in general, there seem to be opportunities for high levels of cognitive proximity (i.e. knowledge exchange) even in the absence of some regional connections or key enablers. If one considers this in the EDP setting, it might indicate that the idea of utilising universities or development organisations as substitutes for a lack of market knowledge may work, as has been suggested in the RIS3 guidebook (Foray et al. 2012).

Third, in the Finnish case, the level of social proximity was relatively high between regional companies and their international company partners, which might indicate that collaboration over distance is more likely between individuals and organisations with established social relationships. This would seem to indicate that dynamic changes are in play, but the issue should be studied further.

Fourth, and as a response to the research question of how to enhance proximity between stakeholders, the authors suggest that public government should promote and establish a successful EDP partnership between relevant stakeholders. By providing a tool for measuring and improving the connections between stakeholders, the connectivity model with its proximity analysis (developed by Virkkala et al. 2017; 2014b) could broaden the scope of the discussion and provide a proper scenario for possible entrepreneurial discovery. The EDP can be seen as a search process for new business areas, but it is also a process advancing an optimal proximity between actors. This example indicates there is an opportunity for regional developers to search for optimal proximities, which is a precondition for smart experimentation.

In the Finnish case study, one notion was the fact that companies and universities do not cooperate enough, because universities "lack projects and students" (Mäenpää 2014: 62). However, this dialogue continued and, finally, during 2017, the Regional Council, in cooperation with regional technology companies and the University of Vaasa, and with the help of European Regional Development Fund funding, managed to establish a fuel and engine laboratory, VEBIC (Vaasa Energy and Business Innovation Centre), in the region, which is specifically designed to help bridge the gap between company and university knowledge. This is one example of regional collaboration not offering a direct route to new domains and innovation, but one that will nurture a stronger region. This sort of smart experimentation may very well turn into a new specialisation.

The empirical case study has limitations. The data only reflect one region, are based on structured interviews, and come from a limited number of respondents. One research avenue would be to examine the dynamic aspects of the proximities and relationships. Proximities are constantly changing during interactions between partners in the innovation process. When the partners learn from each other, their knowledge bases will change, and their shared mental models will be adjusted, which will lead to the reduction of their cognitive distance, which in turn will enhance the learning effects (Menzel 2016). The interaction can also create a common social context in which personal relations develop despite differences in organisational, geographical, or institutional backgrounds or knowledge bases (Balland et al. 2015). One way to dynamise the proximity analysis would be to employ longitudinal data (Hansen 2015), but more qualitative data with in-depth analysis would also be required. The authors have tried to capture the dynamic aspects of innovation cooperation by measuring the gaps between the expectations and experiences of relationships (Virkkala et al. 2017).

To evaluate the proximities of partners with the help of knowledge typology is only one option. There could also be other measurements, including more statistical analysis (cf. Hansen 2015), but

that would require more quantitative data. Furthermore, more case studies would illustrate how regions differ in their collaboration, and which types of proximities and balances between proximate and distant relationships are prominent in different types of LFRs, and how the proximities might be enhanced to mitigate the limitations of the peripheral regions. This knowledge could be used to develop more tools to encourage specific types of collaboration between various actors. In this way, the EDP could be enhanced and unique ideas for regional specialisation could be promoted. Regional comparison and transnational learning among LFRs would then become possible.

The actors in the LFRs may find new ideas within the region, and need not automatically be left behind in the innovation race owing to their potential lack of connections. Proximity analysis does not address all of the issues, but it does provide one viewpoint for regional analysis and serves as a discussion opener. The authors argue that sometimes it may be smart to focus on the relationships; the rest can then follow.

References

Balland, P.A., Boschma, R., & Frenken, K. (2015). Proximity and innovation: from statics to dynamics, *Regional Studies 49*(6), 907–920.

Bathelt, H., Malmberg, A., & Maskell, P. (2004). Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation, *Progress in Human Geography 28*, 31–56.

Blažek, J., Healy, A., Wilson, J., Magro, E., Trippl, M., Grillitsch, M., Hansen, T., Goddard, J., &Vallance, P. (2014). Smart Specialisation for Regional Innovation: Regions with less developed research and innovation systems, Work Package 3, Reflection Paper. Available at: https://orca.cf.ac.uk/78219/1/Regions%20with%20Less%20Developed%20Research%20and%20Innovation%20Systems.pdf.

Boschma, R. (2005). Proximity and innovation: a critical assessment, *Regional Studies 39*(1), 61–74.

Boschma, R., & Frenken, K. (2013). Technological relatedness and regional branching. In: Bathelt, H., Feldman, M.P., & Kogler, D.F. (Eds.) *Beyond territory: dynamic geographies of knowledge creation, diffusion, and innovation* (pp. 64–81). London: Routledge.

Carayannis, E., & Cambell, D. (2012). *Mode 3 knowledge production in quadruple helix innovation systems: 21st-century democracy, innovation, and entrepreneurship for development.* SpringerBriefs in Business 7. New York: Springer.

Crone, M. (2012). Rethinking peripherality in the context of knowledge-intensive service-dominated economy. In: Danson, M. & de Souza, P. (Eds.): *Regional development in northern Europe: peripherality, marginality and border issues* (pp. 49–64). Abingdon, UK: Routledge.

EnergyVaasa (2018). EnergyVaasa shortly. Available at: http://energyvaasa.vaasanseutu.fi/energyvaasa-shortly/.

Etzkowitz, H., & Leydesdorff, L. (1998). The endless transition: a “triple helix” of university–industry–government relations, *Minerva 36*(3), 203–208.

Etzkowitz, H., &Leydesdorff, L. (2000). The dynamics of innovation: from national systems and “Mode 2” to a triple helix of university–industry–government relations, *Research Policy 29*(2), 109–123.

Foray, D., Goddard, J., Beldarrain, X., Landabaso, M., McCann, P., Morgan, K., … & Ortega-Argilés, R. (2012). *Guide to research and innovation strategies for smart specialisation (RIS3)*. Brussels: European Commission.

Goddard, J., Kempton, L., & Vallance, P. (2013). Universities and smart specialisation: challenges, tensions, and opportunities for the innovation strategies of European regions, *Ekonomiaz 2*, 83–102.

Grillitsch, M., & Trippl, M. (2014). Combining knowledge from different sources, channels and geographical scales, *European Planning Studies 22*(11), 2305–2325.

Hansen, T. (2015) Substitution or overlap? The relations between geographical and non-spatial proximity dimensions in collaborative innovation projects, *Regional Studies 49*(10), 1672–1684.

Isaksen, A., & Trippl, M. (2014). Regional industrial path development in different regional innovation systems: a conceptual analysis. Papers in Innovation Studies (Report No. 2014/17). CIRCLE, University of Lund.

Jensen, M.B., Johnson, B., Lorenz, E., & Lundvall, B.-Å. (2007). Forms of knowledge and modes of innovation. *Research Policy* 36, 1993–2008.

Lorentzen, A. (2012). The development of periphery in the experience economy. In: Danson, M., & de Souza, P. (Eds.) *Regional development in northern Europe: peripherality, marginality and border issues* (pp. 16–29). Abingdon, UK: Routledge.

Lundvall, B.-Å., & Johnson, B. (1994). The learning economy, *Industry & Innovation 1*(2), 23–42.

Malmberg, A. & Maskell, P. (2006). Localized learning revisited, *Growth and Change 37*(1), 1–8.

Menzel, M.-P. (2016). Interrelating dynamic proximities by bridging, reducing and producing distances, *Regional Studies 49*(11): 1892–1907.

Mäenpää, A. (2014). Methodology and research design. In: Virkkala, S., Mäenpää, A., & Mariussen, Å. (Eds.). The Ostrobothnian model of smart specialisation. Proceedings of the University of Vaasa. Reports 196.

Ranga, M., & Etzkowitz, H. (2013). Triple helix systems: an analytical framework for innovation policy and practice in the knowledge society, *Industry & Higher Education 27*(3), 237–262.

Regional Council of Ostrobothnia (2018). 2016 Ostrobothnia in figures. Available at: http://www.pohjanmaalukuina .fi/assets/10/Uploads/Pohjanmaa-lukuina2016-valmis.pdf.

Strambach, S., & Klement, B. (2012). Cumulative and combinatorial micro-dynamics of knowledge: the role of space and place in knowledge integration, *European Planning Studies 20*(11), 1843–1866.

Storper, M., & Venables, A. (2004). Buzz: face-to-face contact and the urban economy, *Journal of Economic Geography 4*(4), 351–370.

Torre A., & Gilly, J.P. (1999). On the analytical dimension of proximity dynamics, *Regional Studies 34*(2), 169–180.

Torre, A., & Rallet, A. (2005). Proximity and localization, *Regional Studies 39*(1), 47–59.

Tödtling, F., & Trippl, M. (2005). One size fits all? Towards a differential regional innovation policy approach, *Research Policy 34*(8),1203–1219.

Virkkala, S. (2013). Geographical perspectives: regional development and transnational learning. In: Mariussen, Å., & Virkkala, S. (Eds.). *Learning Transnational Learning* (pp. 51–102). London: Routledge.

Virkkala, S., Johnson, J., & Mariussen, Å. (2014a). Summary and conclusion. In: Virkkala, S., Mäenpää, A., & Mariussen, Å. (Eds). The Ostrobothnian model of smart specialisation. Proceedings of the University of Vaasa. Reports 196.

Virkkala, S., Mäenpää, A., & Mariussen, Å. (2014b). The Ostrobothnian model of smart specialisation. Proceedings of the University of Vaasa, Reports 196.

Virkkala, S., Mäenpää, A., & Mariussen, Å. (2017). A connectivity model as a potential tool for smart specialization strategies, *European Planning Studies 25*(4), 661–679.