

Proximity and Inter-regional Innovation Systems: A look into Institutional Proximity

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Abstract

There is a tendency in assuming that proximity only means geographical distance. However, certain studies have stressed the importance of other non-spatial dimensions which are crucial for a successful innovative collaboration. Consequently, it has been broadly debated that geographical proximity can be advantageous for inter-organisational collaboration and innovation and that the possibilities of face-to-face interactions decreases coordination costs and facilitate the transfer of tacit knowledge. However, in inter-regional collaboration, transfer of tacit knowledge is often considered not to be possible from a distance. The local character and the perception of region as a locus of innovation has been emphasised in the innovation processes perceiving spatial proximity as a competitive advantage which raises the question of the possibility of collaborating at a distance.

This paper aims to answer this question by looking into institutional proximity and the substitution mechanism for geographical proximity. Even though there is a high disposition that geographical proximity cannot be substituted by institutional proximity, a study has found that it is indeed possible. However, keeping in mind that when it comes to collaborating over a distance, this substitution mechanism is considered to have low importance as the greatest barrier is the institutional differences.

When regions collaborate with different institutions across borders, the relevant norms and beliefs changes as well as the rules and regulations which changes the way they interact. Therefore, this study conceptualises that institutional gaps exist at an inter-regional collaboration level which influences the successful collaborative process. However, rather than studying what makes inter-regional collaborations successful, this research studies the barriers that occur when collaboration happens as opposed to why institutions collaborate and conceptualise that these barriers have an effect on developing an inter-regional innovation system.

With the growing need for collaboration with other regions of Europe and increasing funding allocated towards regional development, understanding the effects of institutional gaps will have implications for regional and inter-regional policy makers and/or institutions which have an intention to collaborate across their ‘traditional’ borders. This research also contributes to existing research and adds value to the study of institutional frameworks, inter-institutional and inter-regional collaboration.

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I. Introduction

Proximity, often characterised by the degree of similarity of actor characteristics, refers to the degree of closeness of actors (Fitjar, Huber and Rodriguez-Pose, 2015). Broadly, proximity has been argued to be an important factor for innovation (Knoben and Oerlemans, 2006; Hansen, 2015) highlighting that a certain form of proximity is required for successful knowledge interactions. Boschma (2005) argued that proximity between organisations facilitates knowledge interactions via facilitating coordination and reducing uncertainty. However, too much proximity reduces the scope for novelty and can also hamper innovation (Fitjar et. al., 2015). A growing literature in economic geography has acknowledged that distance does not only have geographical dimensions, but also comes in cognitive (Nooteboom, 1999; 2000), institutional (Kirat and Lung, 1999), organisational (Meisters and Werker, 2004) and social form (Bradshaw 2001). Collaboration for innovation requires a certain level of proximity in all non-geographical dimensions for successful knowledge transfer to occur but at the same time it can be harmful if there is excessive proximity (Fitjar et al, 2015).

The regional innovation system (RIS) definitions generally consider it as a number of elements (actors) and the relationships between them (Gust-Bardon, 2012). For instance, the definition by Doloreux (2003) states RIS is "*a set of interacting private and public interests, formal institutions, and other organisations that function according to organisational and institutional arrangements and relationships conducive to the generation, use, and dissemination of knowledge*" (p.70). According to Cooke (1992), a RIS consists of a knowledge producing and a knowledge exploiting system. The knowledge-producing system can include universities, colleges and other research institutions. On the other hand, stakeholders who transform knowledge into products and services form the knowledge exploiting system. The local character and a perception of region as a locus of innovation (Isaksen, 2001) has also been emphasised in the innovation processes (Gust-Bardon, 2012) perceiving spatial proximity as a competitive advantage. This raises the question of whether it is possible to successfully collaborate with other regions that are not necessarily at a close proximity.

In this study, this issue is addressed by looking at the substitution mechanism for the dimension of geographical and institutional. Subsequently, in order to develop an effective

innovative collaboration across regions at a distance, it would be beneficial to know why or why not the collaborative activities work which could impact the evolution of an inter-regional innovation system. Therefore, a conceptual framework and methods are also proposed in order to understand how or how not the institutional gaps effect the inter-regional collaboration.

In the next section, different forms of proximity are presented in brief followed by a notion of temporary geography which supports the possibility of collaboration over a geographical distance. In addition, the paper briefly presents the institutions involved in an inter-regional collaboration and a deeper look at the measurement of institutional proximity and conceptualise the differences that can affect inter-regional innovation system. A conceptual framework is proposed with methods on interpreting the results on how or how not institutional gaps have an effect on inter-regional innovation systems. The final sections present some discussion on the study and conclusive remarks.

II. Forms of proximity in brief

Boschma (2005) built up from the contributions made by the French School of Proximity Dynamics in the 1990 and presented 5 forms of proximity viz., cognitive, organisational, social, institutional and geographical proximity.

Cognitive proximity refers to the extent to which the actors are sharing a common knowledge base and expertise. The capacity to identify, understand and exploit external knowledge requires cognitive proximity (Cohen and Levinthal, 1990). According to Boschma (2005), effective learning by interaction may be accompanied by maintaining some cognitive distance while securing cognitive proximity as a not too great cognitive distance enables effective communication which leads to learning and a not too small cognitive distance avoids lock-in.

Organisational proximity has been defined and operationalised in various ways. Fitjar et al (2015) refer to organisational proximity as the extent to which the external partnerships are organised through formal arrangements. This is based on the idea of degree of control of organisational relations, which can range from 'on the spot' market to formal arrangements of different degrees. Organisational proximity is often seen to reduce uncertainty and opportunism, which is beneficial for developing innovation networks (Boschma and Frenken, 2010). Knobens and Oerlemans (2006) stressed the importance of organisational proximity for

inter-organisational collaboration (IOC). The reason behind it is that IOCs are more efficient and lead to better results when the organisational context of both interacting actors is similar due to the fact that this similarity facilitates mutual understanding. This form of proximity is thus seen as a requirement for dyadic and collective learning and in joint creation of new resources and innovation (Kirat and Lung, 1999).

Social proximity (relational proximity) refers to the strength of interpersonal links in the sense of interacting socially. This notion has been influenced by the embeddedness literature (Granovetter, 1985; Uzzi, 1997), which has stressed the importance of social context of economic action. In this tradition, it has been widely argued that trust-based ties, based on friendship or repeated interaction, can facilitate knowledge interaction for innovation (Gertler, 2004). However, Boschma (2005) argued that too much social proximity may also weaken the learning capability and have an impact on innovation.

Institutional proximity refers to the extent to which the actors' norms and values are similar. The level of similarity of formal and informal institutions (North, 1990) can influence inter-organisational relationships. Institutional proximity is associated with the institutional framework at the macro-level which is different from social proximity which is based on socially embedded relations at the macro level (Boschma, 2005). Also, the different institutional settings of university versus industry versus government actors can be a hurdle for interactions (Etzkowitz and Leydesdorff, 2000).

Geographical proximity is denoted as territorial, spatial, local or physical proximity and is the most frequently used dimension of proximity in literature (Knoben and Oerlemans, 2006). It refers to the spatial or physical distance between economic actors, both in its absolute and relative meaning (Boschma, 2005). It is also defined as the extent to which two collaborating actors can have face-to-face relations without prohibitive costs (Capello, 1999).

However, Boschma (2005) introduced a critical remark towards geographical proximity in learning and innovation processes stating that geographical proximity is neither a necessary nor a sufficient condition for interactive learning and that other forms of proximity may substitute for it. Different authors (Gallaud and Torre, 2004, 2005; Hyypia and Kautonen, 2005; Torre and Rallet, 2005) have posed a notion of temporary geography. This perception implies that activities such as meetings, short visits and temporary co-location might be sufficient for actors to build other forms of proximity which will allow collaboration over

large geographical distances (Knoben and Oerlemans, 2006). The next section will look at the context of an inter-regional collaboration.

III. Context of an inter-regional collaboration

From the most primitive tribes to modern societies, human beings have always developed ways to build human interaction. Institutions provide a set of rules of the game that (together with other constraints) define and limit the choice set (North, 1990). On a very broad level institutions can be considered as rules, norms, beliefs and procedures that structure (enable and constrain) the behaviour of organisations and individuals (Mahoney and Thelen, 2010, Scott, 2008, North, 2003).

According to North (1990), institutions are the rules of the game in a society, or more formally, they are the humanly devised constraints that shape human interaction. These constraints can be formal such as rules that human beings devise or informal such as conventions or codes of behaviour. According to Moodysson and Zukauskaite (2014), one way of moving towards a concrete framework for studying the impact of regional policy on innovation is to further specify the institutions in play. A set of institutions provides the institutional framework (Chavez, 2012) and the institutional framework fundamentally influences which organisations come into existence and how they evolve; at the same time, they influence the institutional framework from which they evolve. An institutional framework is generally understood as the system of formal laws, regulations, and procedures, and informal conventions, customs and norms that broaden, mould and restrain socio-economic activity and behaviour (Donnellan, Hanrahan and Hennessy, 2012). The institutional framework holds the formal and informal rules, the organisational set where certain actors interrelate in order to achieve specific goals, establish policies and procedures, (UNEP, 2006).

According to Scott (1995), institutions also are conceptualised as sets of rules of a regulatory, normative or cognitive character providing stability and meaning to social behaviour. Scott (2001) believed institutions guide human behaviour by the three pillars of institutions:

- (1) utility-oriented rules which may be enforced by coercion (‘regulatory’),
- (2) norm-based obligations (‘normative’) and
- (3) Immediate participation in taken-for-granted models of reality (‘cultural-cognitive’).

The interaction among the institutions (university, industry and government) is the key to innovation and growth in a knowledge-based economy (Etzkowitz, 2010). Therefore, collaboration beyond the established boundaries is an exceptional means to access new ideas, to support and boost innovation, and develop capabilities and infrastructures to make civilisations evolve. However, collaboration is never easy regardless of the increase in collaborative activities (White, 2001) especially when it is at a distance. The next section takes a deeper look at the possibility of substituting this spatial dimension in inter-regional collaboration with an institutional dimension.

IV. Inter-regional collaboration and proximity

Boschma (2005) defined institutional proximity as including “both the idea of economic actors sharing the same institutional rules of the game, as well as a set of cultural habits and rules” (p.68). Institutional proximity is measured in different ways in previous literature. Balland (2012), Broekel and Boschma (2012) and Ponds, Van Oort and Frenken (2007) looked at whether the organisations belong to different sectors (government, universities, civil society) whereas, other studies looked at whether the actors belonged in the same country (Balland, Vaan and Boschma, 2013; Hoekman, Frenken and Van Oort, 2008; Marrocu, Paci and Usai, 2013). On the other hand, Fitjar et al (2015) found that both are a very crude way of getting to Boschma’s (2005) definition and decided to measure institutional proximity as the level of similarity between the partners’ norms and values. However, this measurement did not include the rules of the game as mentioned in the definition. Therefore, this study will measure institution proximity based on Scott’s (2001) three pillars of institution which includes the rules (regulative), norms and values (normative) and shared conceptions (cultural-cognitive).

Geographical proximity among actors is regarded as an important ingredient for a successful collaboration (Cramton, 2001) even with the ongoing developments in communication technologies. Conversely, when regions at a distance try to collaborate, the transfer of tacit knowledge is not possible. However, Huber (2012) had empirically confirmed that distance in one type of proximity can be bridged by other types such as cognitive and social proximity. On the other hand, Hansen (2015) differentiated two positions on the relationship between geographical and non-geographical proximities: the overlap mechanism and substitution mechanism. Overlap mechanism is where geographical proximity facilitates non-

geographical types of proximity and the substitution mechanism is where non-geographical types of proximity substitute for geographical proximity.

Gertler (2010) posed that through the impact of localised institutions, spatial proximity has an effect on collaboration. Geographical proximity plays an important role in creation and modification of institutions as institutions underpin collective learning processes (Kirat and Lung, 1999). However, the authors also argued that even though institutions are created by actors in geographical proximity, there can also be collaboration over distance. On the other hand, the institutional environment acts as the most important barrier to long distance collaborations (Gertler, 2003). A case study by Lam (1997) which studies the Japanese organisational and British 'professional' models of the organisation of knowledge in high-level technical work had shown that low institutional proximity and low geographical proximity couldn't be overcome (Lam, 1997) despite long periods of temporary proximity (Torre and Rallett, 2005). This emphasised that an institutional proximity depends on frequent and enduring interactions (Hansen, 2015) therefore, in order to substitute geographical proximity; the degree of interactions between institutions in collaboration will have even more impact on the inter-regional collaboration.

In his study, Hansen (2015) analysed the two mechanisms' importance in collaborative innovation projects in the Danish cleantech industry looked at the possibility of substituting or overlapping with geographical proximity and other non-spatial proximity. Hansen (2015) expected an overlap between geographical and institutional proximity but expected less of a substitution effect. The author found that there is no indication of substitution mechanism between geographical and institutional proximity (See Table: 1). However, upon further analysing it qualitatively, Hansen (2015) found that it is indeed possible to substitute institutional proximity for geographical proximity. The author highlights how this is rare, partly because social proximity is an essential intermediary in these cases. This had been acknowledged by Boschma (2005), *'social, organisational and institutional forms of proximity may be strongly interconnected, because the ways intra and inter organisational relations are governed are deeply embedded in institutional settings'* (pp. 67-68).

	Substitute for geographical proximity	Overlap with geographical Proximity
Social Proximity	Yes	Yes
Institutional Proximity	No	Yes
Organisational Proximity	Yes	No
Cognitive Proximity	Yes	No

Table 1: Overview- Substitution and Overlap *Source: Hansen (2015 p.1680)*

The findings by Hansen (2015) provide a significant contribution to inter-regional collaboration for regions that trying to collaborate across traditional borders: where other forms of proximity need to overcome their spatial proximity. However, the author also mentioned how substitution mechanisms are of low importance in the relation between the geographical and institutional dimensions, supporting the suggestion of Gertler (2003) that the main challenge of long-distance collaborations is to overcome institutional differences. Van den Broek and Smulders (2014) argued that in cross border cooperation, the institutions' influence on actors on both side of the border can create institutional gaps which can hamper this co-operation. Following this concept, this study conceptualise that institutional gaps can also occur within the actors who are collaborating at a distance. The next section looks at institutional gaps in more detail.

V. Institutional gaps in inter-regional innovation systems

Institutions provide (temporary) stability by governing and conditioning social life by reducing uncertainty in everyday practice (Moodysson and Zukauskaitė, 2014; Gertler, 2004; Scott, 200; North, 1990). Institutions might consist of rules, routines, habits, conventions, customs or practices that are internalised by the majority of actors in a population (Moodysson and Zukauskaitė, 2014; Gertler, 2004). Although there is an inclination to assume that institutions facilitate interaction in regional innovation systems, institutions' influence on actors on both sides of the borders could create institutional gaps hindering cross-border cooperation (Van Den Broek and Smulders, 2014). However, this research conceptualises that institutional gaps occur on an inter-regional innovation systems basis and also uses the categorisation of the gaps into three pillars from Scott (2001): regulative, normative and cultural-cognitive. Regulative gaps refer to the barriers of cooperating among actors resulting from formal institutions such as rules and regulations. On the other hand,

normative and cultural-cognitive gaps refer to the gaps that can occur due to the limited knowledge of the values, norms and cultures.

In order to have an effective interaction for regions that are collaborating at a distance with different types of institutions, there can be a lot of hurdles to a smooth collaboration. Therefore, to overcome these differences, it is important to know what the differences between these institutions are as these institutional gaps can have an effect on the evolution of inter-regional innovation systems. The next section presents a conceptual framework and proposed methods for this study.

VI. Conceptual framework for this study

Dillenbourg's (1999) definition of collaboration divides the term into collaborative situations, interactions, and processes. According to the author, one must first specify their category of interest in order to measure the effect of collaboration. Therefore, the actors in the collaboration process will decide their cooperation topic(s). Cooperation topic(s) can further be divided into different cooperation themes. A general description of each region specifically on the cooperation themes (e.g., innovation policy, etc.) will be given which will give the insight of each regional environment around the cooperation topic. The collaborating actors will be surveyed which will give insights to the actors' perception of the collaboration. Their interaction and collaboration activities will also be attended and observed in order to examine their behaviour in their natural (collaboration) setting. The institutional gaps of the actors within the selected domains of cooperation will then be analysed to see the effect of these gaps on the inter-regional innovation system. The conceptual framework developed for this study is depicted in Figure 1.

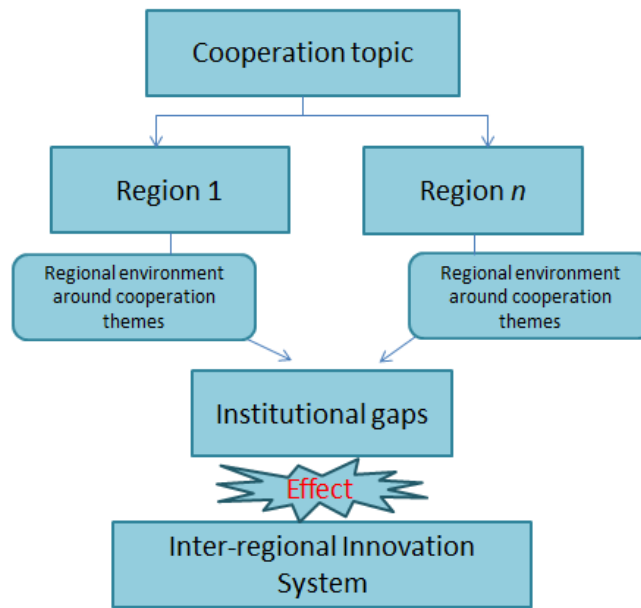


Fig. 1: Conceptual framework

VII. Methods of analysis

To understand the effect of the collaboration, it is also important to understand the nature of their collaboration, which factors drive their collaborative behaviour and then study the nature of the collaboration which will, in turn, help with interpreting the effect of the collaborative process on the inter-regional innovation system. Therefore, the following questions are developed to help better understand this relationship:

1. Which factors explain their relationship
2. Which factors explain barriers to their collaboration

The research method will be conducted on a multi-step process (see Figure 2). Actors will be selected from regional institutions which are (or intend to) to enter a collaborative process with institutions in other regions. A survey will be used to understand the perceived collaboration dynamic among the collaborating actors. Wilder Collaboration Factors Inventory (See Table 2) developed by Mattessich, Murray-Close and Monsey (2001) which include 20 research-tested success factors, will be used. This score will be used to guide the collaborative understanding of the process the actors are involved in.

History of collaboration or cooperation in the community	Development of clear roles and policy guidelines
Collaborative group seen as a legitimate leader in the community	Adaptability
Favorable political and social climate	Appropriate pace of development
Mutual respect, understanding, and trust	Open and frequent communication
Appropriate cross section of members	Established informal relationships and communication links
Members see collaboration as in their self-interest	Concrete, attainable goals and objectives
Ability to compromise	Shared vision
Members share a stake in both process and outcome	Unique purpose
Multiple layers of participation	Sufficient funds, staff, materials, and time
Flexibility	Skilled leadership

Table 2: Wilder Collaboration Factors *Source: Mattessich, Murray-Close and Monsey (2001)*

The Wilder Collaboration Factors Inventory is an online tool, which evaluates collaborative efforts through a questionnaire, which will be completed by the actors. The tool automatically calculates a score based on the responses by a group or individuals in the group and measures collaboration at different levels:

- The effectiveness of a group, including leadership, decision-making ability and ability to achieve goals
- The level of collaboration achieved within the group
- The group members belief in the credibility and image of the collaborative within the greater community

This tool will be used to understand actors' perception of their shared vision, understanding and mutual respect and so on. However, the collaboration process should also be observed as the researcher can observe their behaviour in their natural settings and draw conclusions from it without interfering in their collaboration process. Even though the study will have findings from the online questionnaires that will provide the collaborative activity, the perception of what the actors think about it could differ from the way it actually happens. Therefore, the study will employ naturalistic observation without intervention as it allows observation of behaviour as it occurs in their collaborative setting. Thus, the researcher will sit in on any meetings, call/video conferences and activities that involve the collaboration process.

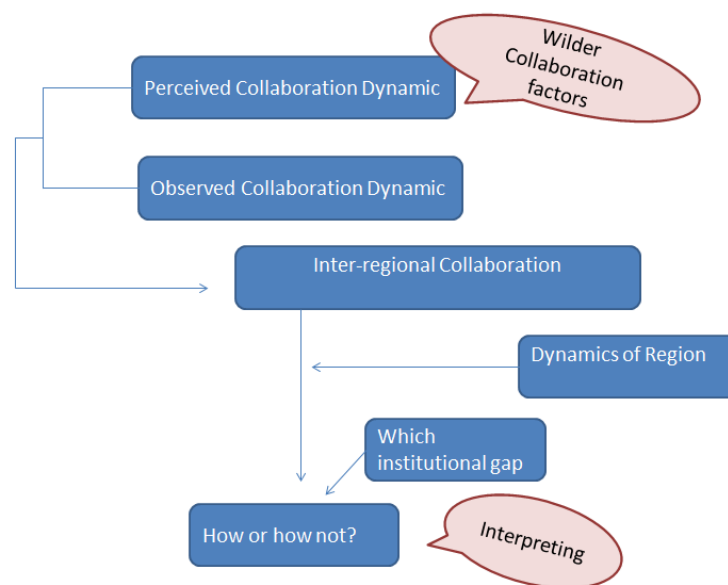


Fig. 2: Research method Process

In order to understand the behaviour of the actors better, it is necessary to first of all understand their regional dynamics and institutional gaps. This will help in understanding why or why not actors react to certain situations in the collaborative process. It is very important to understand the regional and region-specific dynamics and institutional gaps, because all regions are unique, and therefore behave and perform differently as regards their innovation capacities, capabilities and policies. The purpose of this research is to establish if region-specific differences have an effect of the interaction processes at the inter-regional level.

From the survey answers, observation and regional environment information gathered, institutional gaps will be identified. Actors in the institutions develop strategies to smooth the

collaboration process even though they might not intentionally try to bridge the institutional gaps (Van den Broke and Smulders, 2014) and this behaviour can give us insight into how or how not these affect inter-regional innovation systems.

Even though Hansen (2015) have found that substituting geographical proximity with institutional proximity is possible, the study was conducted on a single industry sector and data was collected from only Danish representative and does not include data from international partners. Therefore, this study included the data from all the partners included in the collaboration and kept in mind the possible complexity of collaborating with other nation's regional actors.

VIII. Discussion and Conclusion

This paper looked at institutional proximity and the possibility of substituting geographical proximity by reviewing previous studies. The five different proximities are explained in brief and the institutions involved in inter-regional collaborations are highlighted. Collaboration is a phenomenon of growing interest from a policy perspective (Belkhdja and Landry, 2007) and collaborating at a distance can be challenging. There is already extensive research on collaboration across a variety of organisations and abundance of “how to” literature on collaboration, but these bodies of literature generally offer positive stories of working together even though there are many failed attempts at collaboration (Bound, 2005). According to Bound (2005), what are commonly not understood are the complexities of collaboration: why some collaborative activity is successful and other collaborative activity is not. Therefore, this study posed the possibility of institutional gaps in inter-regional collaboration following the idea of Gertler (2003) that the main challenge of long-distance collaborations is to overcome institutional differences. The institutional gaps are conceptualised as regulative, normative and cultural-cognitive gaps.

The authors feel that previous studies' measurement of institutional proximity: different sector organisations, actors belonging to the same country and level of similarity between partners' norms and values does not reflect the definition by Boschma (2005). Therefore, this paper decided to measure institutional proximity based on Scott's (2001) three pillars of institutions which includes the rules, norms and values and shared conceptions of the institutions.

Even though economic geographers have emphasised the effect of geographical proximity towards innovation activity (Storper, 1997; Maskell and Malmberg, 1999), the authors took to Hansen's (2015) finding that institutional proximity can substitute geographical proximity. However, the authors also agreed that substitution mechanism is of low importance as the main challenge of long-distance is to overcome institutional differences (Gertler, 2003). Actors in the institutions develop strategies to smooth the collaboration process even though they might not intentionally try to bridge the institutional gaps (Van den Broeke and Smulders, 2014) and these can highly affect the evolution of an inter-regional innovation system.

The paper also proposed a conceptual framework and methods to perform research that will establish to if regional institutional gaps have an effect on inter-regional institutional gaps. The Wilder Collaboration Factors Inventory tool is used to gather the perceived collaboration dynamics and naturalistic observation without intervention is also proposed to observe the actors in their collaboration process. Understanding the regional dynamics in the matter of their innovative capacity and policies were also posed to be vital in understanding the behaviour of the actors and for interpreting the inter-regional collaborative behaviour.

This research, when completed, will add to existing research on institutional proximity and will have implications for regional and inter-regional policy makers and/or institutions which have an intention to collaborate across their 'traditional' borders. This research will also contribute towards inter-institutional and inter-regional collaboration and identify the 'what' and 'how' of institutional gaps that affects the evolution of an inter-regional innovation system.

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