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Proximity to innovation: Effect of proximities on cross-border innovation cooperation within Öresund Food Cluster actors

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Abstract: The perception on innovation as a territorial phenomenon is based on successful examples of various innovative territorial agglomerations, e.g. clusters. Knowledge and industry-related information is more abundant and accessible for the firms engaged in clusters. However, rapidly growing number of innovative cross-border clusters signifies that international cooperation is also advantageous for innovation and knowledge exchange processes. Cross-border clustering facilitates building of industry's critical mass, not only through branding and external visibility but extended networks, knowledge of innovation actors, experience and resources. However, innovation development also requires established political, institutional and social environments that may greatly vary on the other side of the border. Also, actors within cross-border cluster may be highly heterogenic in innovation capabilities. Represented through the concept of proximities, dissimilarities between cross-border cluster actors may stimulate synergies through developing complementarities, but also may result in obstacles complicating cooperation, thus, innovativeness. This research paper highlights the case of Öresund Food cross-border cluster and pattern of collaboration within innovation related industry actors. Research emphasis is focused on the effects of proximities and their mutual interdependence on collaboration pattern between cross-border actors within Öresund Food cluster in regard of innovation and knowledge exchange processes. The study showed that different types of proximities are able to evolve over time, influence transformation of each other and change own significance in innovation process on different stages of cooperation.

Key words: Cross-border clusters, innovativeness, proximities, innovation mode, learning food industry, Öresund region

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1. Background

The Öresund is one of the most known cross-border collaborations in European context. The region is located on the border of Southern Sweden (Scania), Danish Zealand and Capital regions, it is characterized as knowledge and innovation intensive, well-performing economically area with strong potentials for growth (Lundquist and Tripl, 2011). Besides concentration of universities and research centers located in the area, Öresund region is hosting major European food and pharmaceutical clusters (ÖresundFood.org, 2009). Öresund cluster did not appear as an accident but as a strategic joint and prioritized project between two regional governments with the focus on research, education and branding (OECD, 2013). The biggest impact on boosting cross-border cooperation through reduction of physical distance was achieved by opening of the Öresund Bridge on July 1st, 2000 (Lundquist and Tripl, 2011). Hospers (2006) summarized Öresund's success story by three key aspects: "Borders, Bridge and Branding", where branding of new spatial unit and Öresund Bridge helped to overcome main border barriers, facilitated cross border capital and goods exchange, and resulted into functional wealth-generating region (Hospers, 2006).

1.2. Aim and Research Question

Main attention of this research is dedicated to the Öresund food industry. According to the available literature, Öresund food cluster is one of the fastest-developing food clusters in EU (Lagnevik, 2008; OECD, 2013). Cooperation of large international and small regional innovative companies, concentration of academic centers in close geographical proximity together with governmental support creates an environment with potential to develop into "center of excellence in food" as both cooperating regions are dominating on their own markets and segments and occupy significant market share (Lagnevik, 2008). Öresund food cluster is relatively recent phenomenon and as a cross-border formation its development is, to large extent, triggered by infrastructure improvements, i.e. Öresund Bridge. Why Öresund Bridge is that important? Multiple territorial innovation models and empirical studies emphasized that innovation and knowledge capital are often highly dependent on or require sufficient level of spatial proximity for growth and competitiveness through transfer of knowledge and innovation processes (Moulaert & Sekia, 2003; Doloreux & Parto, 2005). Moreover, semantic meaning of the term proximity recently obtained not only geographical implications but has been widely used as a definition of level of dissimilarities between interacting actors. The concept of proximities has been implemented theoretically and empirically in economic geography in general (Ahuja, 2012; Boschma, 2005), economics (Schweiter, 2009), but more importantly it is commonly applied in analysis of territorial dynamics including regional (innovation) systems (Lundquist and Tripl, 2009), etc. As it was mentioned above, cross-border clusters are usually elements of wider regional innovation systems making application

of proximity concept in this paper completely appropriate. This research has been developed within discussion on proximities' effect on collaboration pattern between innovation related cluster actors. Following presented above viewpoints, my research question is formulated as:

How do proximities' mutual interdependence and development over time influence collaboration pattern between cross-border actors within Öresund Food cluster in regards to innovation and knowledge exchange processes?

Exploratory type of research is empirically supported by interviews conducted with food companies and intermediate innovation organizations that are located within the borders of Öresund food cluster. Additionally, extensive in-depth literature research contributed to the analysis and conclusions of this paper.

1.3. Theoretical support

The central object of this research is cross-border cluster of firms and research organizations within traditional food industry. The concepts used in this paper are outcomes from broader discussions on cross-border areas and their characteristics, organizational cooperation and integration, knowledge exchange and innovation facilitation factors.

Cross-border areas are commonly associated with adjacent territories that belong to different states and driven by initiatives to break territorial or other types of dependencies (Trippel, 2013; Mykhaylov, 2013). Creation of innovative cross-border cluster may be an option for regional development strategy as cross-border knowledge flows and created innovation space may dramatically change regional development path and facilitate achievement of global excellence in selected industries (OECD, 2013). Characteristics of interacting actors within cross-border cluster may be highly heterogenic. Despite of knowledge exchange, institutional and social regulations, differences in knowledge bases may create not only complementarities but also obstacles for cooperation. Main theoretical focus of this paper is devoted to the concept of proximities (Boschma, 2005; Lundquist and Trippel, 2011; Torre and Gilli, 2000, etc). The relation between innovation process and geographical agglomeration of firms and research facilities has been discussed in numerous concepts as regional innovation systems, innovative milieu, clusters and industrial districts. Theoretical section elaborates on the role of geographical factors on innovation and knowledge exchange processes that are quite debatable. The construction of Öresund Bridge is a major improvement in infrastructure, and it is assumed that it had impact on knowledge capacity of Öresund Food cluster. Controversy of geographical proximity importance in knowledge creation processes is illustrated by two researches: Boschma (2005), and Malmberg and Maskell (2006). Another approach complementing theoretical framework is a recent take on proximities' nature that treats proximities not as static but dimensional factor that embodies constant change or progress.

Balland, Boschma and Frenken (2014) proposed that proximities are able to create knowledge network in the short term, but in the long run perspective, it is knowledge network that is creating proximities (Balland, Boschma and Frenken, 2014). This transformation or “co-evolution of knowledge networking and proximities” is measured through process of learning, decoupling, institutionalization, integration and agglomeration (Balland, Boschma and Frenken, 2014). Additionally, modes of innovation were discussed in this paper to illustrate different mechanisms of knowledge diffusion in traditional food sector. Presented above concepts and discussed in detail in the theoretical section (Chapter 2).

1.4. Previous research and significance

There is a plethora of research on Öresund region, and literature review revealed large bodies of research on aspects such as regional development (Hospers, 2006; Jerneck, 2000; OECD, 1999, 2003, 2013), clustering and innovativeness (Garlick, Kresl and Vaessen, 2006; Coenen, Moodysson, Asheim, 2003), food industry development (Lagnevik, 2003, 2008; Hospers, 2006; Mikhaylov, 2013), cross-border integration (Hansen, 2013; Bruzelius and Holmberg, 2002; Matthiessen, 2004; Lundquist and Trippl, 2009, 2011) and a lot more. Öresund Food cluster is presented in the literature as a successful example of innovation potential realization and proper market and regional strategy (Hulsink, 2008; Lagnevik, 2003).

OECD conducted one of the studies on Öresund food cluster in 2013, within the regional development research on regions and innovations in cross-border areas. According to this research, the initial reason of food firms’ agglomeration in this area was successful example of Medicon Valey Alliance (MVA) (cross-border biotech cluster). Same as MVA, food industry actors were expected to benefit from complementarities (e.g. in knowledge assets) emerging during cross-border cooperation. Complementarities were reached after a set of institutional and organizational re-arrangements supported by governments; for instance, despite the fact that main Danish food actors were located in Jutland, Danish side of Öresund cluster prioritized food processing in order to supplement logistics and packaging processes of the Swedish side (OECD, 2013). The research also emphasized several projects, e.g. “Öresund Food Network” was a joint project between Lund University and Roskilde University on innovation and knowledge network within actors involved into food value chain. “Food plus Pharma equals Unlimited Food” that was joint initiative between MVA and Öresund Food cluster aimed to promote networking and “FoodBest Öresund” which is a current project planned to redesign and strengthen food related technologies and increase competitiveness of the industry (OECD, 2013).

Magnus Lagnevik (2003) conducted one of the major studies related to research question. In his book “The Dynamics of Innovation Clusters: A study of the Food Industry” he acknowledged the issue of fragmentation of food industry in Sweden and presented Öresund Food cross-border cluster as recent initiative to break

previous protectionist path (Lagnevik, 2003). He analyzed Öresund food cluster through Enright's (2000) cluster analysis and identified that Öresund Food cluster contains necessary "conditions for innovative dynamics" (Lagnevik, 2003:213). In particular, Öresund Food cluster has relatively balanced organizational structure. While Swedish part of Öresund Food cluster that is located in Scania contains almost half of country's total agricultural production and involves major food industry actors, majority of corporate HQs are located on the Danish side. R&D functions are fairly spread across the area (Lagnevik, 2003:211-214). Companies inside the cluster are cooperating with academia and individual research agencies in all levels of the industry (Hulsink, 2008). The presence of intensive ICT and biotech research within a region blurs the boundaries between industries and creates innovation opportunities. According to Lagnevik (2003), Öresund Food cluster obtains important value-added chain activities regarding not only innovation projects but also primary production to food services (Lagnevik, 2003:211-214). Growth potential and innovativeness within traditional industries are usually limited. However Öresund Food cluster was able to identify economically promising niches, e.g. functional, high-quality or organic food. These production directions stimulated innovations in processes like freezing and packaging, logistics, design, management, etc. But more importantly, Öresund Food cluster has favorable organizational environment where cooperation between regional authorities is well established and mutually accepted (Lagnevik, 2003: 213).

By covering central and peripheral areas, geographical location of the cluster is creating opportunities for regional development and restructuring of national systems (Hulsink, 2008). Öresund cluster was reviewed in regard of regional innovation systems (e.g. Lundquist and Trippel, 2009), however, explicit research on innovation potentials, knowledge exchange or networking in Öresund Food cluster is fragmented and weaker in comparison to the amount of conducted studies on pharmaceutical cluster located in the region. This paper is aimed to contribute not only to empirical research on Öresund Food cluster, but also implement new theoretical concept proposed by Balland, Boschma and Frenken (2014) in practice through analysis of conducted case studies.

1.5. Thesis outline

The paper is structured as follows: Chapter 2 will present in-depth literature review on the main theories related to the topic of investigation. Some concepts were considered during development of interview guides and coding schedule. Chapter 3 presents methodological structure of the research through explaining chosen research design and method, presentation of primary/secondary data and its operationalization, concluding with an abstract on research quality. Chapter 4 and 5 are devoted to empirical data representation: overview on studied region and interview results including background on interview participants. Chapter 6 presents an analytical discussion that incorporates findings received during the interviews and theoretical framework presented earlier. Last chapter (Chapter 7) reviews the whole paper and its

findings. The section of further research suggestions completes Chapter 7. Paper is concluded by conventional reference list.

2. Theoretical background

The perception of innovation as a “partly territorial phenomenon” is profoundly premised on the successful examples of various innovative territorial agglomerations (Doloreux and Parto, 2004). Concepts like innovative milieu, industrial districts, regional innovation systems (RIS) share in common not only the recognition of importance of institutional, political or social contexts for innovations but also attachment to spatial unit or system (Danson, 2003). A growing body of empirical research is proving that the processes of knowledge transfer and learning are highly localized (Maskell and Malmberg, 1999). Literature review on innovation revealed three interrelated discourse directions.

First of all, innovation requires geographical area with established political, institutional and social environment. This conception is based on the assumption that innovation is a primarily geographical process and in order to sustain innovation activity, territorial units should have common socio-economic processes and knowledge bases (Maskell and Malmberg, 1999). According to Porter (1998), global economy requires sustained competitive advantage that is usually an outcome from regional activities. The study on regional innovation systems also argued for importance of regional resources, e.g. supplier systems, labour market regulations, learning capabilities, spreading of spillover effects, supporting institutions, regulations, business and cooperation routines that could be reached in close geographical proximity (Doloreux and Parto, 2004; Asheim et al., 2003).

That brings to the second main discourse direction, namely, embeddedness of innovations in social relations. Socio-economic environment within spatial unit establishes not only rules and routines but stimulates formation of common norms, trust, regular localized interactions and understanding through “transmission of information and knowledge exchange” (Lorenzen, 1998; Doloreux and Parto, 2004). Linking these ideas to previous paragraph, Camagni (1991:7-9) argued that these processes require not only time but also limited geographical space. The author argues that intangible assets as informal knowledge flows are highly dependent on sense of belonging that is easier formed within limited space, and affects innovative capability of an area through synergic learning activities (Camagni, 1991:8).

Third direction in literature review on innovation development stresses the role of knowledge concentration, and less prioritizing importance of geographical proximity. For instance, OECD (1999) defines clusters as a diverse in its functions network of independent actors that is connected to each other by various economic activities (OECD, 1999). Composition of cluster may include private companies, public institutions (e.g. education institutions or support facilities), independent research actors, etc. Empirical research showed that clusters are typically associated

with geographic concentrations (Porter, 1998) but when it comes to knowledge intensity, borders of a cluster are more defined by reliable connections or size of a network rather than geographical closeness (Doloreux and Parto, 2004). Asheim, Coenen, Moodysson and Vand (2005) also defined boundaries of a cluster primarily by industrial sector. Innovation development is facilitated by economic activities within a cluster, benefit from knowledge spillovers and induce learning activity (Malmberg, 1997).

Clusters engage specialization, cooperation and proximity. Malmberg and Maskell (2002:432-433) argued that this kind of geographical agglomeration “creates opportunities for individual firms to get in touch with already developed actors adopted to new technology. To the advantage of firms engaged in clusters, knowledge and industry-related information is abundant and more accessible (Malmberg and Maskell, 2002:432-433). Learning and innovation processes within a cluster are initiated by competition of firms within the same industry or collaboration between related to the industry actors. The processes are accelerated in context of local industrial structure (Doloreux and Parto, 2004).

2.1. Cross-border clusters

The concept of cross-border cluster is an outcome from a broader study on cross-border integration and cooperation. Cross-border formations are commonly associated with adjacent territories that belong to different national states and motivated to incorporate in order to break through old national, resource or territorial dependencies (Tripl, 2013; Mykhaylov, 2013; Markova, 2014). Development of these border and usually peripheral areas proceeds through two forms of cross-border integration: traditional and innovation-driven. Traditional integration process is focused mainly on basic integration mechanisms as facilitation of cross-border labor mobility, market widening, and specialization, while innovation-driven growth path is benefiting from cross-border knowledge flows and formation of joint innovation and knowledge space (Tripl, 2013).

Clusters may embody both forms of cross-border development as they often go beyond national borders in attempt to reach global excellence in particular industries. In general terms, cross-border clusters are structured and operate the same way as traditional clusters do, except international environment these clusters are located in (OECD, 2013). Definitions of cross-border cluster greatly vary due to different views on degree of geographical concentration, aims of formation, size or functions. For the purpose of this thesis and in order to avoid possible misinterpretations of definitions, I apply definition of cross-border cluster formulated by Andrey Mikhaylov (2013):

“Cross-border cluster is a sustainable collaboration of a group of interconnected, interdependent and complementary actors, localized in bordering territories of

adjacent countries, operating in related or same industries, possessing sufficient level of technological development and co-creating goods and services that deliver synergy effect in development of respective territories and facilitate the diffusion of innovations among them.”

It is important to acknowledge that cross-border clusters may become elements of broader regional development plan as an element of regional innovation system. As clusters are primarily limited by specific industrial sector, regional innovation system can maintain several interrelated clusters simultaneously (Asheim, Coenen, Moodysson and Vand, 2005). Sustainability in development of cross-border clusters requires formation or enhancement of regions' business and social environments. For instance, improvement in factors representing cooperation within cluster industry (business climate, cooperation in innovation developments, etc.), support from governments (interactions with authorities, support in legal issues, level of governmental involvement and contribution, etc.), and collaboration in R&D and education related sectors (partnerships with universities and research centers, general characteristics of technological level of spatial unit) are essential initiatives affecting cross-border cluster formation and operation (Mykhaylov, 2013). From this perspective, innovation potential of cross-border cluster depends not only on its internal environment but also on interplay of three institutional spheres of the region: government, industry, and university (Smorodinskaya, 2012; Mykhaylov, 2013).

Different studies identify various reasons for cross-border clusters creation. OECD study on cross-border formations (2013) identified several distinctive motivations behind cross-border clustering: building critical mass in specific industry, branding and external visibility (OECD, 2013:124). Based on that, it is reasonable to assume that main benefits from cross-border collaboration within a cluster have effect on a region it is located in. According to OECD (2013) main benefits are: extended networks (firms, universities, customers, suppliers, etc.), knowledge of innovation actors, greater visibility of a cluster, use of not only local but 'neighboring' experience and resources for industry growth (OECD, 2013).

Growing number of empirical evidence on successful cross-border cluster initiatives verifies that benefits from successful cooperation preponderate costs and efforts that cross-border clusters' maintenance and establishment imply. Top technology Region/Eindhoven, Leuven, Aachen Triangel (TTR-ELAt) is an example of beneficial treatment of cross-border potentials for region's innovation development. TTR-ELAt is located at the intersection between the Netherlands, Germany and Belgium and contains six interrelated cross-border clusters within life science, nanotechnology and ICT. TTR-ELAt is an example of successful "escape" from old industrial lock-in to high value-added knowledge-based industrial center (Nauwelaers, Maguire, Marsan, 2013). It has been characterized as a declining region with traditional industries (steel and coal mining) but through initially traditional and later innovation-driven cooperation across the national borders, it evolved into

advanced technological European center with strong internal accessibility and knowledge flows, similar knowledge and industrial specializations, moderate social proximity within the clusters, pervasive innovation system interactions and finally strong well-balanced level of innovation development on different sides of the borders (OECD, 2013; Nauwelaers, Maguire, Marsan, 2013). TTR-ELAt includes 7 universities, high-tech SMEs, international firms with large investments in R&D sector and innovation driven clusters at the core of this innovation system. Clusters are governmentally supported through Cross-border Cluster Stimulation and Top Technology Clusters projects (Nauwelaers, Maguire, Marsan, 2013). TTR-ELAt successfully implements cross-border integration instruments for innovation and knowledge development: networking events and informal meetings (brokerage, B2B connections, socializing), strong cross-border business network and business development support, promotion of possibilities to join cross-border innovation projects (OECD, 2013).

However, cooperation between bordering territories may face a clash of dissimilar environments. Differences in economic systems (funding constraints, imbalances in private and public sectors' engagement), institutional and administration obstacles (differences in regulations in state-prioritized sectors), social barriers (business culture, language), differences in innovation development levels usually result in high transaction and maintenance costs (Houtum, 1998; OECD, 2013). For instance, Medicon Valley that is one of the most known and strongest European life science cross-border clusters. It is located in the Öresund region, on the border between Sweden and Denmark and connected with Öresund Bridge. The cluster contains over 80 biotech, 100 medtech and 25 pharmaceutical companies, 12 universities (5 of them specialize on life-science programs), large amount of international companies, 32 hospitals and 7 science parks (Achiche, Howard, Astvaldsdottir, Andersen, McAloone, 2012). Main intentions behind this cluster creation were promotion of joint Swedish-Danish strategy for life sciences advance, achievement of international recognition, attraction of labour capital and investments. But despite positive outcomes from cross-border cooperation, Medicon Valley initially experienced variety of obstacles typical not only for cross-border clusters but in general for cross-border areas. In particular, issues regarding legislations and regulations in public health sectors, poor political involvement, lack of structured long-term policy for Medicon Valley, and absence of specific tangible goals resulted in weak engagement between firms, universities and other cluster actors (OECD, 2013).

2.2. Clusters, modes of innovations and proximities

There has been a lot said about conditions required to establish and maintain innovation and knowledge exchange processes in cross-border clusters as well as about handling potential obstacles. This section is focused on the concepts that explain the spread of knowledge and innovation within the cluster through modes of

innovations and proximities. It includes discussion on the importance of geographical dimensions and dynamic nature of proximities.

2.2.1. Modes of Innovations

For the purpose of addressing the posed research question, it is important to distinguish how learning process, innovations and other forms of social capital vary, transfer and store in different types of industries. Lundvall and Johnson (1994) presented a concept of modes of innovations: Science, Technology, Innovation (STI) and Doing, Using, Interactions (DUI). The STI mode includes scientifically based knowledge created on the basis of formal model tests and analytical deliberations. Innovation activities occur mainly in internal R&D departments, or through input of research institutions or small research-intensive firms (Tripl, 2011; Johnsen and Isaksen, 2009). The intention behind these interactions is directed towards generation of fairly radical innovations. Industries, dominated by STI innovation mode, usually have highest R&D costs and represented by high-technology sectors as ICT, biotechnology, and nuclear physics (Johnsen et al, 2007). Accounting of results is made in different forms of codified (electronic) documentations. Access to and transmission of codified analytical knowledge is not obstructed, meaning that it can be easily exchanged between actors disregarding geographical distance (Moodysson, 2008). However, firms in close geographical remoteness to research and development facilities may benefit from early access to information and new technologies, as well as by having pool of highly educated labour. That may explain why firms in knowledge intensive industries usually continue to cluster close to R&D centers despite simplified knowledge exchange mechanisms (Johnsen and Isaksen, 2009).

Unlike STI approach, innovation processes in DUI mode relies on informal and experience-based learning processes. Innovations occur as incremental modifications of existing processes and products. These changes are based on acquired experiences gained through solving new challenges (Jensen et al. 2007). In other words, distinctive feature of DUI mode is implementation of existing knowledge for new challenges through new ways of combining or realizing it (Johnsen and Isaksen, 2009). Knowledge codification or transmission, in this regard, is more complex as learning process contains various tacit elements. However, according to Asheim and Gertler (2005) tacit knowledge flows spread easier through face-to-face interactions as long as actors share similar or equivalent knowledge bases (Asheim and Gertler, 2005). Interaction in DUI industries occurs not only on organizational level, but also during cooperation with suppliers and customers. Team projects, job rotations, group discussions, feedback and suggestion sessions, formal and informal social events are essential elements of DUI learning mode as these organizational social activities facilitate interactions (Tripl, 2011). From this perspective, geographical proximity between interacting actors is a basis for learning process. Firms with DUI innovation mode are usually operating in traditional industries.

Differentiation between DUI and STI innovation modes is clear, however, it does not mean that implementation of one mode implies exclusion of another one. Firms within specific industries tend to prioritize one of presented above modes but usually in combination with the elements of alternative innovation style (Trippel, 2011; Johnsen and Isaksen, 2009).

Food industry is one of the brightest examples of core traditional industries. The structure of food industry is characterized by combination of several large international companies (e.g. Coca Cola, Nestle, Mars, Unilever) and large number of (local) SMEs (Versteeg and Fryer, 2008). Research and development forces within food industry are considered to be low and innovation activities are targeting incremental innovations (Trippel, 2011). From the perspective of innovation mode, food sector is implied to be dependent on DUI mode (e.g. close relationship with suppliers and customers). Nevertheless, the nature of the industry is changing and becoming more market-driven. The change of the trends (e.g. functional food, high-nutrition quality food, food security) is pushing traditional food industry to implement research activities more intensively (e.g. through cooperation with other industries) (Robertson and Smith, 2008). This shift is revealing emerging importance of STI innovation mode. According to recent studies, external knowledge sourcing is crucial for food industry in order to benefit from innovation (Trippel, 2011; Karantinis et al, 2010). In regard of the Öresund Food cluster, which is covering both metropolitan and peripheral areas, presence of mixed innovation mode is expected (Johnsen and Isaksen, 2009).

2.3. Proximities

Literature review showed that the concept of proximities has been widely implemented theoretically and empirically in economic geography research (Ahuja, 2012; Boschma, 2005), economics (Schweiter, 2009), but more importantly it is commonly applied in analysis of territorial dynamics including regional (innovation) systems (Lundquist and Trippel, 2009), etc. One of the most recent implementations of this approach has been done in research on explanation of knowledge diffusion among various economic actors where knowledge exchange defines innovative capability (Boschma et al., 2014). As it was mentioned above, cross-border clusters are usually elements of wider regional innovation systems making application of proximity concept in this paper completely appropriate.

As a part of cross-border formation, it is logical to assume that cross-border clusters experience same driving forces and barriers as regions they are located in do. Characteristics of cross-border actors within cross-border cluster may be highly heterogenic and have differences in innovation capabilities, economic and administrative structures, cultural and business norms, etc. On the one hand, the interplay of dissimilarities between actors gathered within cross-border cluster may

stimulate synergies through developing complementarities, but on another hand, it may result in obstacles complicating cooperation and innovativeness (Lundquist and Trippel, 2013). From this perspective, creation of effective innovation space depends on the set of dimensions that could be defined as proximities and represent differences among actors within cross-border cluster. Literature review suggested various proposals of proximities grouping depending on the reasons of conducted researches. For example, Boschma (2005) separated proximities into cognitive, organizational, social, institutional and geographical groups, based on their functions, channels, internal importance and relevance to (organizational) growth (Boschma, 2005). He used proximity framework in the analysis of interactions between organizations in order to show that unbalanced interactions may be harmful for learning process, innovativeness, and growth (Boschma, 2005). For the purpose of this paper, I decided to briefly introduce three relevant groups of proximities: relational, functional and geographical in the context of cross-border clusters.

2.3.1. Relational proximities

Relational proximity could be identified as a set of non-tangible processes within a cross-border unit manifested through social, institutional, organizational, cultural, technological and cognitive differences or other forms of social actions (Boschma, 2005; Torre and Gilli, 2000). Recently, it has been growing in its importance due to discussion on significance of relational proximity elements in the process of knowledge exchange and collaboration pattern. Proximity elements are usually represented by formal institutional regulations, business and technological cultures, shared norms, trust, level of understanding, knowledge transmission mechanisms, etc (Lundquist and Trippel, 2009). Relational proximity is a key element in establishment and maintenance of cross-border (e.g. cluster) collaboration. For instance, institutional proximity implies the degree of similarities in shared norms, policies, and laws. It is strongly interrelated with social proximity as social actions are always embedded in or defined by institutional environment (Boschma, 2005). From innovation perspective, interactions are more efficient in the environment with similar institutional and administrative regulations as matching institutional “routines” and norms speed up cooperation, reduce uncertainties, decrease transaction costs and facilitate pro-active actions by lowering entry barriers (Usai et al., 2013). Cultural, social and organizational proximities, in turn, refer to nontangible aspects. For instance, cultural proximity defines the level of shared cultural practices as business culture, language or cultural acceptance. Sense of belonging, joint identity and other aspects of social embeddedness are defined by social proximity. Development of social proximity stimulates development of trust, support, understanding and, more importantly, motivation (Cappellin, 1993; Sveningsson, 2015; Balland, 2012).

Finally, cognitive proximity is highly important in efficient cooperation as this relational dimension defines appropriate level of dissimilarities in firms’ knowledge bases. Development of complementarities is a driving force to innovate and increase

competitive advantage (Lundquist and Trippl, 2009). It is important though that degree of cognitive difference should be on the edge of being close enough to collaborate efficiently, but different enough to be able to exploit complementarities and to contribute in innovation process (Trippl, 2013).

2.3.2. Functional proximity

Functional proximity can be understood as interplay of relational proximities with geographical dimension as it “deals with the degree of physical distance and accessibility” (Moodysson and Johnsson, 2007; Torre and Gilly, 2000). It refers to economies agglomeration, transportation and transaction costs. Knowledge exchange directly depends on accessibility, especially when it comes to tacit knowledge that is based on face-to-face interactions. It is important to distinguish functional proximity from geographical proximity as the latter deals with spatial elements (e.g. amount of kilometers between firms, established infrastructure) whereas functional distance refers to time, costs and efforts required for interaction (Lundquist and Trippl, 2009). Another definition of functional proximity is a degree of asymmetry in innovation potential and performance between interacting firms (Maggioni and Uberty, 2007). According to this characterization, knowledge flows easier between actors with similar innovation capabilities. Significant distance in functional dimension signifies strong asymmetry in innovation performance of firms and will affect joint development initiatives (Lundquist and Trippl, 2009).

Clustering as related to proximities is an interesting phenomenon to investigate as it allows observing and quantifying the level of various proximities between cluster actors, their roles in innovation process, and even proximities’ own evolution over time (on different stages of firms within the cluster growth). In other words, interactions inside a cluster shape its socio-economic and innovation environments (Vas, 2009) while concepts on proximities are able to explain how.

2.3.3. Geographical proximity

As it was mentioned before, the term “proximity” is associated not only with geographical factors, but it is crucial not to underestimate the role of physical distance between firms and other actors within clusters or any other territorial locale. Geographical proximity in absolute sense is a main determinant of speed and costs of interaction processes (Lundquist and Trippl, 2011). According to Boschma (2005) short distance between firms may “bring people together” and create favorable environment for mutual learning (Boschma, 2005). Cross-border clusters are located in closely adjusted territories; however, an assumption that cross-border clusters do not face issues related to geographical proximity is incorrect. Transportation, infrastructure and other politically promoted administrative set-ups may severely affect mobility of products, labour and knowledge (Lundquist and Trippl, 2011).

Geographical proximity is at the basis of cluster concept. Number of existing empirical studies on clusters that developed over time also verifies the statement that spatial closeness is strongly related to economic performance and innovativeness. According to the literature review, advantages derived from close geographical proximity between firms in a cluster are caused by two main reasons: benefits of agglomeration and knowledge spillovers (Gertler and Wolfe, 2005). Agglomeration of economies allows firms within cluster benefit from collective set of resources. According to Porter (2000) close location of firms increases productivity and innovativeness by offering cheap and easy access to specialized industry inputs, e.g. technologies, labour, machineries. Firms within cluster usually share common norms and agreements, rely on circulated codified and tacit knowledge flows. Through establishing repeated routines and transactions, firms develop collaborative vertical and horizontal interactions (e.g. with local suppliers, customers, partners). Clusters are able to attract and generate stable supply of specialized labour through its reputation or collaboration with educational institutions (Porter, 2000; Gertler and Wolfe, 2005).

Another benefit from close geographical location of firms within cluster is a shared access to knowledge. Geographical position of economic actors positively affects knowledge exchange through simplification of interaction processes through both planned/formal and informal forms of contacts (Gertler and Wolfe, 2005). Firms within cluster rely on circulated codified and tacit knowledge flows and benefit from general learning-through interactions in regard of technology development (Gertler, 1995). As it was mentioned before, spread of tacit knowledge is complex process, but according to Simmie (2003) physical proximity facilitates frequency in interactions creation of networks, social embeddedness and trust (Simmie, 2003). From the perspective of realization innovation potential, geographical clustering of firms belonging to the same or related to each other industries increases competition, effecting innovative dynamism by increasing ability of firms to learn through monitoring and observing (Malmberg and Maskell, 2002).

2.4. Controversies in importance of geography proximity

However, academic discussion on the role of geographical proximity, especially, considering facilitation of innovation and knowledge exchange is not without controversy. While some researchers argued that it is crucial for economic actors to stay in relative closeness to each other in order to stimulate interaction, others claim that it is possible to substitute geographical proximity with other forms of relational proximity. Empirical case analyses showed that sometimes firms within the same cluster experience different interaction patterns while sharing equal geographic proximity characteristics. Some firms are more involved into inter-organizational networks while others face difficulties of establishing social and economic connections (Giuliani and Bell, 2005; Boschma et al., 2014).

For instance, Ron Boschma (2005) argues that work process, innovation creation and knowledge exchange may be initiated and/or coordinated remotely within shared institutional framework and common organizational procedures (Boschma, 2005; Gust-Bardon, 2012). In particular, other forms of proximities can substitute spatial proximity, which is a key characteristic of a cluster. Relational proximities covering social, institutional, technological dimensions are able to support and sustain interactive learning process and innovativeness (Boschma, 2005). Even though Boschma's conclusion does not necessarily entirely dismiss the role of geographical proximity, but rather emphasizes that geographical proximity itself is not enough to sustain interactive learning and innovativeness, he is prioritizing relational proximities over geographical closeness (Boschma, 2005).

Another contrasting approach towards the role of proximities belongs to Malmberg and Maskell (2006). The authors accentuate spatial proximity as a driver of knowledge creation through so-called localized learning. Localized learning (that takes place along three dimensions: vertical, horizontal and social) stimulates new ideas and upgrades knowledge (Malmberg and Maskell, 2006). According to this approach, vertical integration implies cooperation of firms involved into production chain. Characterized by day-to-day interactions, experience and knowledge exchange occurs in order to satisfy demand (especially in highly demanding industries). Geographical closeness, in this case, is able to reduce effort and costs of interaction consequently support learning processes. Horizontal learning occurs among cooperating firms that operate at the same phases of production process through benchmarking and observing each other. Spatial proximity provides with possibility not only to observe competitors but also to cooperate with them, share new technologies, innovate in order to withstand market threats, etc. (Malmberg and Maskell, 2006; Terzic et al., 2014). Finally, social dimension has impact on learning through sharing experience and knowledge in formal and informal everyday interactions. So-called "local buzz" is information environment where intended and unintended information circulation cause knowledge spillovers and result in knowledge creation (Bathelt et al. 2004). Geographical proximity, in this regard, defines frequency of face-to-face interactions and enhances learning process (Malmberg and Maskell, 2006; Terzic et al., 2014).

Alternative point of view on importance of geographical proximity is accepting an assumption that spatial proximity is positively correlated with non-geographical dimensions, as geographical proximity is a main condition for establishment of other forms of relational proximities (Boschma et al., 2014). However, geographical proximity between cooperating actors should be "optimal" as too much or too little of spatial closeness may be harmful for firms' performance (Balland, 2005). It has been suggested that firms should have access both to local and non-local (international) sources of knowledge to be more innovative. Interesting to acknowledge that from this perspective, cross-border cluster is an optimal environment for knowledge and innovation creation processes as it is exploiting

potentials of local buzz and international knowledge sources (Asheim and Isaksen, 2002; Boschma et al., 2014).

2.5. Proximities: propensity of change over time

Improvement of any type of proximity requires specific amount of time and financial investment. From this perspective it is possible to categorize proximities along two dimensions: time and costs, and make them more “measurable” (Lundquist and Trippl, 2011). From the perspective of time required for development, barriers overcoming and establishment of particular type of proximity, proximities greatly vary from several months to decades (Lundquist and Trippl, 2011; Williamson, 2000). Same logic applies on financial investments necessary for proximities improvement: from large to relatively inexpensive efforts (Lundquist and Trippl, 2011).

Table 1: Proximities: time and costs

		Propensity of change over time	
		Quick	Slow
Costs	High	Geographical proximity	Functional proximity Cognitive proximity
	Low	Hard institutional proximity	Social proximity Soft institutional proximity

Source: Lundquist and Trippl, 2011.

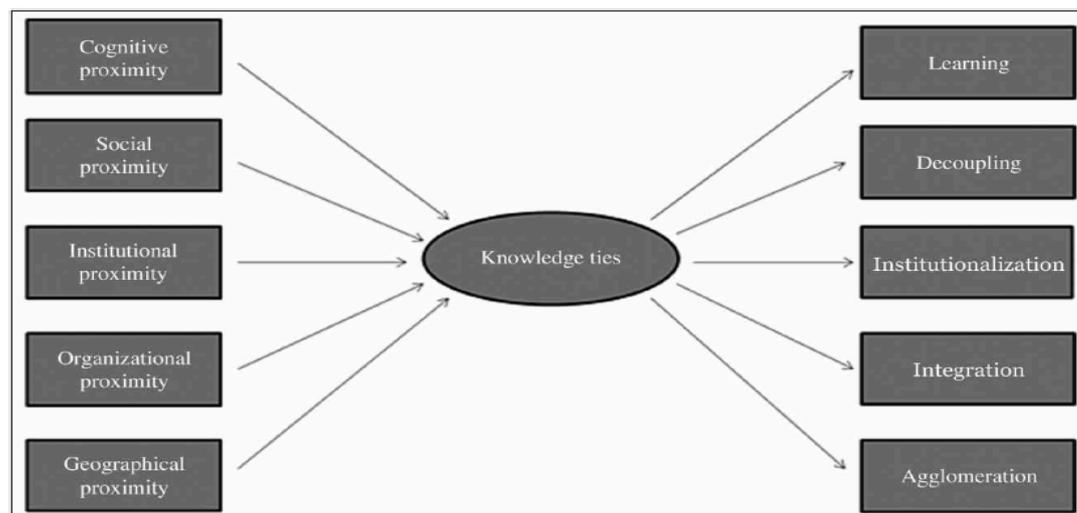
Table 1 illustrates relationships between specific types of proximities with time and costs required for reduction or removal of barriers and establishment. In this regard, geographical proximity is the easiest proximity to establish with large financial contribution. From the perspective of cluster concept where geographical closeness is one of the key elements, improvement of infrastructure (including communication) may bring actors together in relatively short period of time. Another type of differences that also require short time to merger is hard institutional proximity elements. Actions, directed towards knowledge flows facilitation, (e.g. political decisions, legislation, adaptation of common rules) are relatively low-priced compared to other investments directed towards same initiative from institutional perspective (Lundquist and Trippl, 2011). Longer timeframe will be required to stimulate the change in soft institutional proximity compared to hard institutional developments due to reflexivity (Williamson, 2000). Cultural aspects such as language, business practices, joint identity and trust require time for understanding, processing and acceptance by people. Promotion of embedded cultures, knowledge and experience exchange, and successful cooperation are able to familiarize actors with each other, however, it is reasonable to expect that transformation in perception of each other, trust, social norm or other soft institutional elements might require years to develop and establish. This process is slower in strongly heterogeneous cross-

order areas (Lundquist and Trippel, 2011; Markova, 2014). Cognitive and functional proximities occupy the most costly position in classification. Heterogeneity in innovation capacity, and level of specialization involves not only financial and time investments in R&D facilities but also takes learning capabilities of the actors into account. Due to complexity of cognitive proximity it is harder to measure level of proximity between interacting partners. That fact may also slow down the search process of favorable cooperation environment (Lundquist and Trippel, 2011).

2.6. Proximities in dynamics

It is important to mention that proximity modification may have both negative and positive direct effects on other proximity types. Complex and interrelated nature of proximities makes it difficult to estimate consequences of change (Boschma, 2005; Lundquist and Trippel, 2011). Moreover, proximities tend to change their influence over time. That is why current research examines proximities as dynamic rather than static phenomenon. For instance, Balland, Boschma and Frenken (2014) recognized proximities as dimensions that embody constant change or progress. The main assumption at the basis of this concept is that proximities change, or more precisely, evolve not only under externally emerging forces (e.g. technological and market changes) but also due to involvement in knowledge networks (Boschma et al., 2014). This transformation or “co-evolution of knowledge networking and proximities” is presented in the Table 2 and demonstrates how previously mentioned types of proximities (cognitive, social, organizational, institutional and geographical) through engagement in knowledge ties evolve into learning, decoupling, institutionalization, integration and agglomeration (Boschma et al., 2014).

Table 2: Evolution of proximities through joint dynamics with knowledge networks



Source: Pierre-Alexandre Balland, Ron Boschma & Koen Frenken (2014)

In order to treat proximity as dynamic phenomenon it is important to follow its evolution over time. For instance, Powell (2005) conducted a study with attention towards changing technological and market environment. Based on the German

biotechnological clusters, he concluded that geographical proximity lost its importance over time, while other proximities gained strength (Powell, 2005). From that perspective, proximities are seen as ultimate tools in the analysis of internal processes within cluster or any other territorial unit. In contrast, authors argued that in long time perspective, it is interactions that create proximities (Boschma et al., 2014).

2.6.1. Learning

Efficient cooperation in regard of innovativeness and knowledge exchange is based on the dissimilarities in firms' knowledge bases. Appropriate degree of cognitive difference defines interaction potentials (Boschma, 2005). However, knowledge bases are not static in their nature. Cognitive proximity stimulates learning. Firms share information (e.g. within a cluster), re-apply available knowledge and learn from best practices of other firms. Firstly, knowledge transmission advances knowledge bases of receiving firms making them similar to transmitting partners. Later, firms may benefit from interaction, knowledge creation and exchange but level of knowledge complementarities will change over time "pushing" firms to search for new partners with different backgrounds, meaning that cognitive proximity will increase (Boschma et al., 2014; Cowan et al., 2007).

2.6.2. Decoupling

Social proximity dynamics are observed through the way informal relations between employees belonging to different firms change over time. Reputation and trust gained from positive experience during joint activities set interpersonal relationships to the next level. Decoupling process refers to the cases when social linkages continue to exist outside "original context" of organization (Grossetti, 2008:631-632; Boschma et al., 2014). In the context of cross-border cluster it applies to movement of specialists across firms within a cluster that keep personal relations. Positive experience of joint work stimulates cooperation in new project even if actors are already employed in different companies. Nonetheless, the problem of "triadic closure" (friend-of-a-friends acquaintances) increases social proximity over time by limiting entry possibilities for newcomers, consequently, decreases opportunities for knowledge exchange and learning (Ter Wal 2013; Boschma et al., 2014).

2.6.3. Institutionalization

Balland, Boschma and Frenken (2014) indicate dynamics in institutional proximity by macro-scale institutionalization through integration of common values and rules that standardize collaboration pattern of interacting firms. Interpersonal activities usually support institutionalization by intensive informal relations (Boschma et al., 2014). Simplified routines of coordination and processing of innovation activities are one of the main driving forces of knowledge creation and exchange processes. However, in order to facilitate innovative activities, institutional proximity (e.g. coordination process) should be flexible to adjust to new demands. Based on this

point of view, it is possible to assume that institutional proximity is a dynamic phenomenon (Boschma et al., 2014).

2.6.4. Integration

Knowledge networks affect organizational proximity by generating the process of integration. Organizational establishments are able to change over time through the processes of mergers and acquisitions (Boschma et al., 2014). Mergers and acquisitions (M&A) basically converge separate organizations into one stimulating change in organizational proximity. M&A, though, is an excessive example, while R&D cooperation can be considered as a prerequisite to integration and characterizes initial phase of organizational change leading to M&A (Boschma et al., 2014). From another perspective, increased organizational proximity may help in “avoidance of unintended knowledge spillovers, controlling partners’ behavior and collaboration directions and choices” (Brossard and Vicente, 2010; Boschma et al., 2014).

2.6.5. Agglomeration

Finally, Balland, Boschma and Frenken (2014) acknowledged geographical proximity dynamics in firms and their subsidiaries’ through making location decisions leading to agglomeration. Location of R&D departments in proximity to universities and other research facilities, or business and customer service offices in the vicinity to major clientele groups provides with multiple economic and innovation opportunities. According to Stam (2007) the choice of location is crucial. It usually implies risks and uncertainties. Even though clusters tend to reduce these hazards by implying low geographical proximity to main economic actors (e.g. educational institutions, clients and other related to the industry firms), cross-border clusters may experience geographical barriers. Location decisions in this case would require accuracy, and will still include certain amount of risk. Agglomeration process requires time, as geographical proximity evolution is a long-term process due to inertia and mobility issues. Clusters are the embodiment of agglomeration, but cross-border clusters will be more inert due cross-border barriers (Boschma et al., 2014).

3. Methodology

This chapter will cover main methodological approaches used in this research. It starts with description on research design strategy and methods, presents overview on main data sources, discusses in detail sampling, conduction and motivation of interviews, and concludes with section on research quality and validity.

3.1. Research design

Methodological structure of this paper is designed on the basis of exploratory research type. Main reasoning behind conducting exploratory study is an unreliable amount or absence of previous studies on the chosen topic of interest. It is suitable for research topics that are currently in an initial stage of investigation and require obtainment of valuable insights for later deeper exploration (Cuthill, 2002). As a flexible type of approach, exploratory research allows deeper understanding of studied phenomenon through an opportunity to define or clarify implemented concepts, adjustment to new emerging assumptions and facts, it also determines feasibility of future research (Cuthill, 2002; Bryman, 2012). Presented research design characteristics fully correspond to my research intentions to explore the nature of proximities and their relation to innovation capacity of Öresund Food cluster. Exploratory research is usually conducted in three standard ways that might be combined: in-depth literature search, subject/expert interviews and focus group discussions (Bryman, 2012). This research has been done as a mixture of the first two techniques. Intensive literature review provided with the detailed background information on the context and identified appropriate theoretical framework that formed the basis for the second method – semi-structured subject and expert interviews. Chosen technics improved and structured data presentation and supported following analysis.

3.2. Primary data / interviews

One of the most common methods implemented in qualitative research is a conduction of interviews. This method allows collecting valuable research information directly from individuals who are either directly involved or well informed about the issue. Interviews give possibilities for researcher not only to collect information straightforwardly but request immediate feedback, interpretations, sharing of feelings or experiences. The choice of face-to-face conversations might stimulate trust building between interviewer and interviewee and result into deeper and more detailed information (Bryman, 2008:430-440). Phone interviews are also becoming common for qualitative research as it extends access possibilities for researcher (Opdenakker, 2006).

For exploratory type of research, semi-structured interviews are usually

recommended, due to sufficient degree of flexibility in their conduction. Semi-structured interviews are based on the set of key themes defined by research aim and theoretical framework, flexible questions and follow-up questions if necessary (Merriam, 2009). Semi-structured interviews provide with trustworthy comparable qualitative data. The choice of semi-structured interview method also allows holding the discussion in a smooth, consistent way, and covering beforehand-identified topics even if respondents went into specifics and unconsciously evaded from the asked questions.

I used interview guide with important research topics and key questions as interviews' structure support. It was formulated the way that interviewees were not pushed towards desirable answers, but at the same time, it helped to avoid loss of relevant information, provided with valuable unexpected details and hold open questions within chosen framework. Main interview themes reflected in the interview guide (see Appendix) were sent to each interviewer few days in advance before the meeting. The interviews were conducted in the offices of the respondents and over the phone to ensure non-stress environment and interviewee's convenience. The chosen interview language was English. All interviewees agreed on this language and felt confident speaking it. Due to ethical and validity reasons, every interviewee received and confirmed a final draft of this paper in order to approve the way provided by them information was used and interpreted.

3.3. Sampling

Collection and quality of data are crucial parts of any research as they enrich theoretical framework with empirical evidence or important explanatory details (Bernard, 2002). The strategy of collecting data will have direct effect on research quality and validity. The search for suitable interviewees has been conducted within purposive sampling approach framework. According to Tongco (2007), purposive sampling is non-random method, where researcher decides on subjects to investigate and find people who obtain required experience or knowledge (Tongco, 2007).

The sample of interviewees was drawn from the food and innovation intermediary organizations operating within Öresund region and involved into Öresund food cluster. The first step was to find bright representatives who possess sufficient experience and strong position within their field on both sides of Öresund strait. Second step was to choose innovation-related organizations operating with food industry actors across the board. Thirdly, it has been decided to involve not only food organizations but also innovation intermediaries into the sample. According to Nilsson and Ljungstrom (2013) agent or network organizations are crucially important for innovation process. The main responsibilities of innovation intermediaries are scanning, collecting and processing information, linking together and securing communication between (industry) actors, facilitating innovation process between firms through evaluation, commercialization, support and accreditation

(Nilsson and Ljungstrom, 2013). In particular, innovation intermediary organizations maintain knowledge transformation, “bridge” cognitive and cultural differences, acquaint with institutional regulations, search for innovation implementation options and help with intellectual protection (Klerkx and Leewis, 2008). The inclusion of innovation intermediary organizations allows considering wider picture on innovation cooperation within Öresund Food cluster. The representativeness of chosen for interview participants allowed keeping small number of interviews. Moreover, this paper aims to encourage following investigation on collaboration pattern in Öresund food cluster by revealing fragmentation in contemporary research.

3.4. Secondary data

In order to reach sufficient level of understanding of studied phenomenon and context it takes place in, in-depth literature search was implemented as one of the research methods that provided with necessary secondary data. Secondary data provides with knowledge gained by other researches during previous work on a topic or related subjects (Monroe College, 2011). Moreover, it serves in research gap identification, provides with latest developments in chosen area, and gives researcher a clear picture of the context. Sources of secondary data might include academic publications, annual reports of organizations, magazines, on-line databases and any other publically available materials. Main benefit of secondary data usage is suitability for resource- or time-limited projects (e.g. thesis) as it saves time, money and efforts of researcher while providing with necessary information basis (Monroe College, 2011; Bless, 2000).

Secondary data search for empirical part of this paper covered following topics: Öresund cluster formation background, Öresund Food cluster development path and characteristics (main actors, location, etc), background of interviewed organizations and experts. From the theoretical perspective, secondary data defined main theoretical frameworks, definitions, and shaped analysis of received and existed empirical data. By covering overall background on (cross-border) clusters and their importance, benefits and main obstacles, secondary data revealed large body of concepts explaining interactions inside a cluster concerning innovation and development potentials. Moreover, as it was mentioned before, secondary data shaped interview structure. Interview guide was formulated regarding specifically chosen concepts and background of Öresund Food cluster. Data search was conducted through academic search facilities as Lovisa catalogue, LUBsearch and various free access databases as Summon and Google Scholar. All the sources of secondary data were accurately selected according to both relevance to research and correspondence to source criticism criteria (Markova, 2014).

3.5. Operationalization

Gathered empirical data was analyzed through commonly used qualitative research technique – qualitative content analysis. This research method is used for

“subjective interpretation of the content through systematic classification process of coding and identifying themes or patterns” (Hsieh and Shannon, 2005). It includes three different technics: conventional, directed and summative which vary in coding schemes, codes and biases. Directed content analysis has been chosen and implemented in this research paper. According to Hsieh and Shannon (2005), directed content analysis is characterized by deductive use of theory and applies to the cases where prior research on the chosen topic is fragmented or would benefit from further investigation. The goal of this approach is to test, confirm or extend existing theory. Coding scheme is based on the existing theoretical framework and preliminary assumptions on variables and relations between them (Hsieh and Shannon, 2005). For instance, interview guide included a set of open-ended and targeted questions (both strictly theory-based). Moreover, I am aware of main direct content analysis challenges. It is usually attributed to “limitation of reality” by chosen theory. However, as a researcher I presented wide range of interconnected theories and did not try to fit my findings to the chosen theoretical framework. Instead, I strictly followed analysis plan:

- Identification of the main theoretical framework
- Formulation of the main topics based on the theoretical framework
- Examination of interview data in regard of identified themes
- Examination interview data in regard of other empirical information
- Analysis

3.6. Research quality

According to Merriam (2009) the main threat of qualitative research is a risk of bias. Primary and secondary data sources could be questioned in regards to their reliability. Interviews may imply four different types of biases that are caused by questions, respondent, interviewer and situation during interview. In order to minimize bias effect on primary data, Ziniel (n.d.) algorithm was implemented. In regards to possible bias from questions, interview questions were accurately formulated and presented to the respondent in a logical sequence. Additionally, respondents were asked to “think aloud” in order to control the understanding of questions. At the end of the discussion, interview findings were debriefed with respondent (Ziniel, n.d.). In order to avoid biases from respondents, every respondent was chosen corresponding to his/her level of competence. Moreover, ensured privacy and volunteered participation in the interviews motivated respondents to answer openly. As a researcher, during the interviews I tried to avoid biases coming from my behavior and interests by strictly following interview guide, excluding “push” questions, being friendly but professional, providing neutral explanations if such were requested, and probing (Ziniel, n.d). During phone interviews I kept my voice neutral in order not to affect respondents’ answers by my intonation. Finally, interviewers chose interview settings (e.g. office or over the phone) in order to feel confident, not be distracted by noise or interruption during the session, and ensure privacy. All the

interviews were booked in advance in order to low chances of stress.

All data used in this research was purposively controlled for internal and external validity and its reliability. Internal validity confirms that results are appropriately derived from information sources, while external validity controls research focus (Merriam, 2009). Reliability is the main criteria of research quality. It controls consistency of results across time or across the samples, meaning that following research conducted at a different time or with another sample groups will either receive same or predicted results (Yin, 2009). In order to strengthen reliability of this research, the process of data collection and analysis were kept open. Even though, due to confidentiality reasons interview transcripts are not published, they are available at request.

I am aware of epistemological issues that exploratory qualitative research based on interviews and document analysis might imply. However, the main idea of this paper is not generalization but rather challenging the theory on practice and extension of its empirical representativeness.

4. The Öresund region overview

The Öresund region that includes in itself thirty-three regional municipalities located in southern part of Sweden, Danish Zealand with adjacent islands (e.g. Greater Copenhagen), and rural areas of Bornholm, Storstrom and Vestsjælland, is nowadays one of the most dynamic cross-border regions in Europe (OECD, 2003). Around 3.7 million inhabitants populate Öresund Region and its growing rate is higher than the rest of both Denmark and Sweden (Garlick et al., 2006). It generates almost 25% of the combined Danish and Swedish GDP (Öresundsregionen.org, 2014). Natural border between two countries is Öresund strait.



Source: Öresundsbro Konsortiet (2010)

The initiative to develop science-based cross-border area belonged to governance of the regions and their political visions. Main goal of Öresund region project was development of business networks and stimulation of cooperation behavior between adjusted territories in order to increase region's specialization and innovation for development of strong agglomeration economy (OECD, 2003). Currently, Öresund region governance, due to cross-border location, operates within the framework of "governance without government" that is directed towards elimination of integration obstacles and includes set of jointly developed norms and rules, clear differentiation of assigned roles among key actors, governmental support, etc. (Megaregions, 2011; OECD, 2003). Öresund region is one of the most favorable environments in Europe for business start-up due to access to two countries' markets, well-developed infrastructure (e.g. Öresund bridge, Kastrup airport, railroads),

presence of large clusters in the fields of IT, biotechnology and food, strong academic research and encouraging governmental support (Öresundsregionen.org, 2014).

Previously known as Öresund Science Region, cross-border area maintained operation of several industries within six major regional innovation and research platforms including Öresund Food Network, Medicon Valley Academy, Öresund Environment Academy, Öresund IT Academy and Öresund Logistics and Öresund Design (in pipeline) (EMCC, 2006). The core of the cross-border regional research facilities was Öresund University that was pronounced as voluntary cooperation initiative between top local universities both on Danish and Swedish sides. Main members of cooperation are Lund University, University of Copenhagen, The Swedish University of Agricultural Science, The Royal Veterinary and Agricultural University (Denmark) and others (Langnevik, 2008; OECD, 2003). However, in 2011 the board of Vice-Chancellors of Öresund University decided on the ending support of the platforms facilitating cluster development, including Öresund Food. Some former platforms are still operating supported by other institutions (Nilsson and Sia-Ljungstrom, 2013). Remaining platforms are benefiting from complementarities and overlapping interests, e.g. former Öresund Food Network members in collaboration with Medicon Valley developed 'functional food', set of additives that enrich food products making them prophylactic to nutrition diseases. These joint initiatives resulted into new innovation development direction of the entire food industry of the region, affected companies' branding, and opened new markets potentials for growth (Traill and Grunert, 1997; EMCC, 2006). However, lack of regional (Öresund) institutional support is still strongly affecting food industry (Interview, 2015).

4.1. The Öresund Bridge

The first step on the way to integration of border territories was agreement on bridge construction in 1991 (Garlick et al., 2006). The Öresund Bridge, main fixed link and infrastructure component of the region, was opened in July 2000. It is the longest cable stayed bridge that supports rail transport and car road in the world (16 kilometers). Establishment of the bridge immediately facilitated cross-border flows of people due to significant decrease of travel time and costs. According to the OECD (2003) number of crossings of the Swedish-Danish border increased by 34% immediately after the opening (OECD, 2003). Bridge simplified the access to the airport, connected regional centers (travel time between Malmo/Lund and Copenhagen decreased approximately to 35-40 minutes) and improved international accessibility of southern part of Sweden (Garlick et al., 2006; Lundquist and Trippl, 2009).

It is important not to underestimate the role of the bridge in the reduction of physical proximity between regions. The level of interactions before 2000 was extremely low in majority of social and economic aspects. Moreover, construction of the Öresund Bridge radically transformed regional innovation systems of both Danish

and Swedish border areas and created joint cross-border innovation space (Hansen, 2011). Previously, limited physical accessibility inhibited innovation development of the region, but despite relatively new formation of fixed link, it has already improved level of innovation system integration from weakly to semi-integrated (Lundquist and Trippel, 2009). According to Lundquist and Trippel (2009), semi-integrated cross-border areas are characterized by more pronounced knowledge and innovation driven linkages rather than asymmetric cost-driven relations typical for weakly integrated regions. Science and economic structures tend to incorporate collaborative linkages in some segments, though asymmetry between areas is still present. However, this asymmetry is expected to be decreasing towards other types of beneficial interactions leading to new market opportunities and cross-border practices of learning (Lundquist and Trippel, 2009)

Still, bridge construction did not completely remove accessibility barriers that have effect on further regions' development towards fully integrated regional innovation system. According to Bruzelius and Holmberg (2002) establishment of additional "links" and lowering of tolls would improve accessibility and facilitate interaction frequency between cross-border partners (Bruzelius and Holmberg, 2002; Lundquist and Trippel, 2009).

4.2. Öresund Food Cluster

As it was mentioned before, Öresund Food cluster is highly prioritized by Swedish and Danish governments cross-border formation that is "fastest developing food cluster in Europe" (Lagnevik, 2008). Neighboring territories of Denmark and southern Sweden were seen as economically appropriate partnership for joint development of food industry due to high level of competence and experience of Danish companies in food industry and high concentration of food industry actors in the southern part of Sweden within processing, productions, logistics and packaging (Nilsson and Ljungstrom, 2013). Governmental support is covering major knowledge creation facilitating spheres of education, research and infrastructure. Typically for food industry, Öresund food cluster is represented by combination of several large international companies (e.g. Nestlé, Beauvais), large Danish and Swedish brands (e.g. Arla, Skanemejerier) and local firms (EMCC, 2006). However, high innovative level of companies, highly qualified academic centers, cooperative research facilities and large number of support organizations distinguish Öresund Food cluster from other existing food clusters (Lagnevik, 2008; EMCC, 2006). In practice, almost half of Swedish research in food production and processing is conducted in southern part of Sweden (Nilsson and Ljungstrom, 2013).

Öresund Food cluster covers all elements of production chain: primary production processes, processing, packaging, machinery, quality control and distribution (Lagnevik, 2008). Öresund Food cluster is characterized by intensive R&D activities, tight pattern of interaction, and cooperation with other actors within a

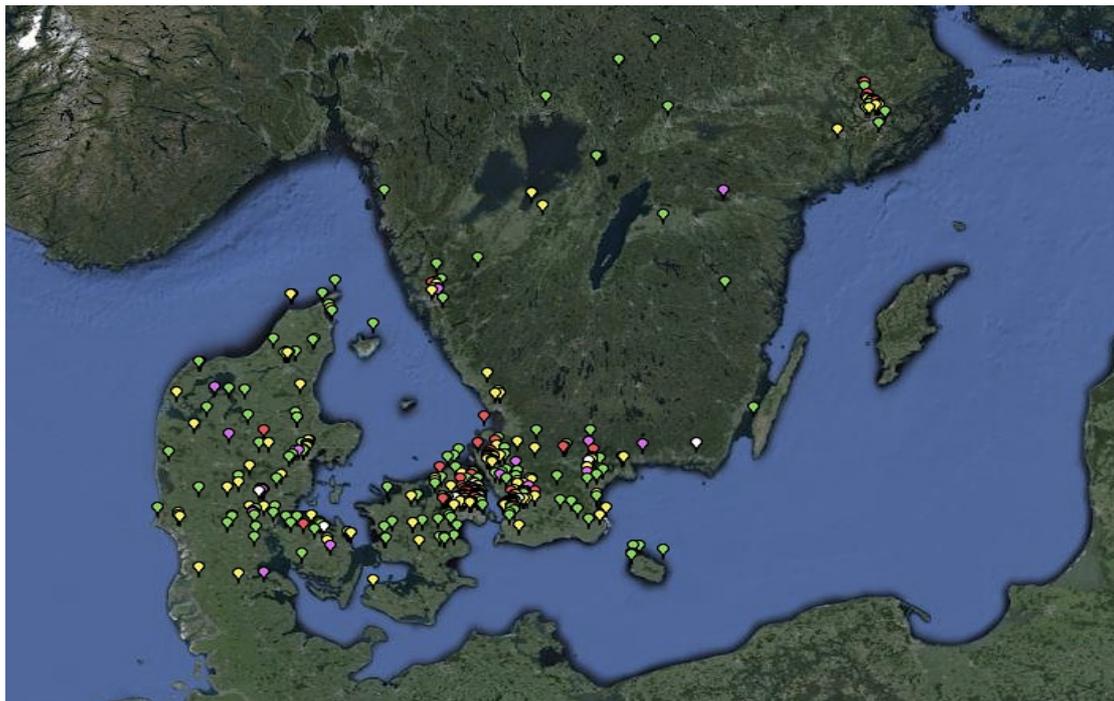
cluster. Extensive formal and informal networks have been developed not only inside the cluster but also last beyond region's border (EMCC, 2006). Main companies' headquarters and R&D facilities are located in the center of the region (Lund, Malmo, Copenhagen and Öresund costal area). During last years, Öresund Food cluster experienced decrease in number of companies specializing on traditional agriculture activities and production of generic products that previously occupied leading positions among industry actors. However, Öresund Food cluster was able to secure its leading position in European food market arena due to focus on innovations and adding extra value to products using health trend (Öresund Food, 2010).

Evolution of Öresund Food industry, from traditional to science-oriented, is mainly supported by cluster's location (EMCC, 2006). To some extend, besides governmental support and infrastructure, knowledge creation and exchange between industry partners from both sides of Öresund strain is supported by presence of companies and research facilities related to biotechnology in close geographical proximity (EMCC, 2006). According to Öresund Food project (2010) current trend on healthy life style transformed food industry of Öresund Food cluster. Öresund Food cluster contains more than 400 food and health related companies. As it was mentioned before, besides business organizations, Öresund Food cluster maintains large number of universities, research facilities and specialized science parks, e.g. Symbion (Danish biotechnology-oriented science center) or IDEON (Swedish business and research incubator leading in functional food expertise) (EMCC, 2006). The trend on healthy life style is strongly influencing regional food industry. Besides adding functional food segment, majority of traditional food producers changed their companies' profile considering health trend (e.g. change of Unilever slogan from "Meeting everyday needs of people everywhere" to "Feel good, look good and get more cut of life") (Öresund Food, 2010; Unilever, 2014).

It has been acknowledged that current research on cross-border Food cluster always accounts both food and food-related health firms and research institutions as they are strongly interconnected (Table 3) (Langnevik, 2008; Öresund Food, 2010). Öresund Food cluster is boosting due to surrounding knowledge-intensive industries that supply food manufacturing, technologies in packaging and additive ingredients. Strong knowledge base in the latter, is essential element of functional food segment development and food industry in general due to contribution to value creation (EMCC, 2006).

Table 3. Representation of food and food-related health companies and research facilities in Öresund Food cluster

Branch of industry	Number of actors
Traditional food ¹	239
Health profile ²	142
Functional food	32
Life style profile ³	37
Major research institutions	27



Color differentiation: Traditional food (green pin), health profile (yellow pin), functional food (purple pin), Life style profile (red pin), major research institutions (white pin)

Source: Öresund Food, 2010

Main strengths of Öresund Food cluster are usually associated with its attachment to regional and cross-border innovation system, favorable business environment and abundance of knowledge producing actors (EMCC, 2006). The latter aspect is crucial. Öresund region is one of the top five high-density R&D regions in the European Union (Langnevik, 2008).

¹ Food firms without an image of health-oriented manufacturers, even if product range covers health related products (Öresund Food, 2010)

² Companies with clear statement regarding health food orientation on official website, slogans, etc. (Öresund Food, 2010)

³ Companies that promote food as a part of a lifestyle (Öresund Food, 2010)

However, food industry within Öresund Food cluster is relatively fragmented, meaning that food companies still operate more within regional or national business framework, despite exploring and using opportunities within cross-border area (Langnevik, 2008; EMCC, 2006). According to Magnus Langnevik (2008) it is explained by previous historical development of food industry in the region. For instance, Swedish food industry began transformation from governmentally protected from international competition industry to internationally open and competitive food market player only in the late 1980s. The process of adaptation to emerged competition became a “shock” for the food industry that was compound with technological revolutions in Biotech and IT that crucially changed food industry’s structures, supply and demand factors, labour, branding, etc (Langnevik, 2008). These relatively recent industry transformations affected Öresund Food cluster nowadays. Companies within food cluster received alternatives to adapt to changes through innovations and high-value-added services and products or to implement structural adjustments, cut costs and pursue economy of scale (Langnevik, 2008). According to Magnus Langnevik (2008) and findings of Öresund Food project (2010) both types of food companies in food cluster experience challenges, different in their nature, but this development path divergence is fragmenting industry in general and slowing down cross-border cooperation (Langnevik, 2008).

5. Presenting the interview actors

5.1. Skånemejerier

The interviewee: Anna Oliw (R&D Chef)

Skånemejerier is a Swedish major food-processing company specialized on milk products and Bravo juices located in the Southern part of Sweden. It has over 500 dairy suppliers from all over the region. The company was founded in 1964 as a result of merger of a group of small dairy producing firms and was continuously growing through M&A (Traill and Grunert, 1997). Skånemejerier Company daily serves its products to more than a million consumers in Sweden and Nordic region. Skånemejerier historically has been more innovative than its regional and even global competitors (Interview, 2015) due to regular release of new products and products' modifications. According to Traill and Grunert (1997) annually, the share of new products is around 5 percent of total sales. For instance, one of the "sales successes" of the company is ProViva, a product line within functional food segment (Traill and Grunert, 1997). The product is a fruit drink supplemented with healthy probiotic bacterial culture (*Lactobacillus plantarum* 229v) that inhibits stomach upsets. Skånemejerier innovativeness is corresponding to consumer interests in tastes and health through close relations with suppliers, retailers and customers, but the basis of its development and growth is strong R&D network (e.g. cooperation with IDEON Agro Food and Lund University) (Traill and Grunert, 1997).

5.2. Ideon Agro Food

The interviewee: Inger Ahlden (Project coordinator);

- Former employee in Öresund Food Network⁴ (process technology and logistics)

Ideon Agro Food has been established in 1986 as a "bridging" network organization aimed to connect food industry and academic members within food research and innovative and market projects. Main working areas of the organization is Sweden and countries around the Baltic Sea (Ideon Agro Food, 2013). The range of clientele of Agro Food varies from medium businesses and individual entrepreneurs to large international food corporations. The main purpose of the organization is to "promote scientific knowledge-building" in the food sector through managing projects, consulting and marketing (Ideon Agro Food, 2013). Agro Food is working on projects that involves firms and research facilities in the fields of biotechnology,

⁴ *Öresund Food Network* is a food network project established in 1999 in order to increase communication and cooperation between academia, institutional authorities and food industry actors. Later evolved into joint with Copenhagen *Öresund Food* organization that supported Food Excellence plan for Öresund region. The main goals of the organization were promotion of innovations and unique skills within regional food industry and consulting of international companies and investors. Closed in 2010 (Nilsson and Sia-Ljungstrom, 2013).

medicine, food technology, packaging and many others that might contribute to innovativeness of the food industry (Ideon Agro Food, 2013).

5.3. FoodBest (DK/S)

The interviewee: Jenny Bergsten (Head of Secretariat)

- Former Project Leader in Öresund Food (strategic gastronomy and sensation area, innovation and international collaborations)

FoodBest DK/S is regional division of European innovation-driven intermediary food organization. FoodBest is a European association working to establish strong knowledge and innovation community (KIC) by prioritizing innovation development path in food industry all over the Europe (FoodBest, 2014). FoodBest Council DK/S is maintained by a secretariat, located in Copenhagen (Denmark) and Lund (Sweden). It is a strong collaboration platform for Swedish and Danish universities, regional authorities and large international companies. Main areas of FoodBest's expertise are food industry related start-up support, entrepreneurial trainings, consultancy in regulations and laws, patenting, and networking (FoodBest, 2014).

5.4. ARLA

The interviewee: Eva Strömbon (Director FDP Innovation, specializes on Swedish-Danish cooperation)

Arla Foods is an international farmers' cooperative organization appeared as a result of merger between Danish and Swedish companies (Arla and MD Foods) in 2000 with head office and strategic innovation center located in Denmark. It is one of largest producers of dairy products in Europe and the world. The main research and manufacture focuses of the company is development of nutritional and functional milk-based ingredients (milk proteins), minerals, bioactive bacteria, lactose, etc. Nowadays, Arla Foods is strongly cooperating with European countries (e.g. Germany) and well represented in the Central and Northern part of Sweden. (Arla Foods, 2007).

5.5. Interview data presentation

As it was stated in the methodological section, conducted in-depth interviews have been transformed into the transcripts (available at request) and codified. Identified themes were used in analysis of role of proximities in collaboration pattern within Öresund Food cluster. Presented below categories have been formulated on the basis of theoretical framework presented in the Chapter 2. It has been decided not to exclude additional information that interviewees brought up during the interview sessions. That guaranteed not only avoidance of information omission but also revealed empirical aspects that might stimulate further research. Table 5 presented below demonstrates codified interview results distributed within 6 categories and 10 subcategories. Each theme and interviewees' responses are presented below.

Table 5: Codified interview results

	Geographical proximity	Institutional proximity		Social proximity			Cultural proximity		Functional proximity	Cognitive proximity
	Establishment of the bridge	Policies	Legislation and rules	Trust	Informal and formal interactions	Motivation	Business culture	Language	Accessibility and representation	Knowledge bases
Skaneemejerier			✓	✓	✓	✓	✓	✓		✓
AgroFood	✓	✓	✓	✓	✓	✓	✓		✓	✓
FoodBest	✓	✓	✓	✓	✓	✓	✓		✓	✓
Arla		✓	✓		✓	✓	✓			✓

Plus sign (✓) indicates that discussed factor was intentionally emphasized as important contributor to the innovation process
 Red field signify the presence of strong barriers/problems within proximity aspect

Clarifications: Interviews were structured the way so all presented in the table topics would be covered during the session. Topics emphasized with the sign (✓) were highlighted by interviewees themselves, without direct or “pushing” questions, as important factors in innovation cross-border cooperation. Identified barriers were also stressed by participants, based on their experience in the industry and subjective opinion on current cooperation pattern.

5.5.1. Foundation of the Öresund Bridge

The opinion on the influence of the Öresund Bridge (as a major infrastructure improvement of the region) on innovation collaboration is either neutral (according to the companies) or strongly positive (according to intermediary food organizations). Companies were collaborating with actors on another side of the bridge before bridge establishment driven by necessary resources or complementary services. Improved infrastructure simplified the interaction and lowered costs of previous linkages but did not motivate interviewed companies for more active interaction. For instance, Skånemejerier had strong close collaboration before and after bridge opening with Chr. Hansen, global supplier of bioscience-based components to the food (including animal feed) and health industries, with headquarters and research facilities located in Denmark. Other interactions, e.g. with Copenhagen University, were described as insignificant, were and still are very small in quantity.

However, according to intermediary food organizations, Öresund Bridge became crucial point in food industry operation. According to them, bridge and new cooperation opportunities such as market opportunities, extended labour pool (scientists, engineers, managers), knowledge exchange, created general euphoria, “joint excitement” about cooperation stimulating small and big actors within food sector to search for collaboration.

“Our CEO was purposively searching for specialists on the different sides of the border to boost cooperation”

A lot of joint projects, organizations and academic agreements were established after the bridge, one of the major organizations was Öresund Food Network that was “uniting” innovative actors within food industry together and supported innovation development path for regional food industry. Öresund Bridge had symbolic meaning that unified different parts of cross-border cluster during early years after opening. However, all interviewees admitted that it did not last long due to various factors (discussed below).

5.5.2. Policies

It was interesting to acknowledge that “political reasons” were frequently mentioned both as main obstacle and stimulator for innovation cooperation. One of the aspects behind this barrier is unstable environment of Öresund region where political focus changes very rapidly. As it was said before, according to the interviewees, the climate of food industry in a region was more innovative after bridge opening (and even before – according to Inger Ahlden) but later it changed. Respondents see national economic prioritization as the reason behind this change. Food

“Without “push from above” it is really hard to establish linkages and deal with institutional barriers”

industry is a core economic sphere in Denmark, while Sweden has more profitable and larger industries, e.g. automotive. That is why political focus and support is not directed towards innovating food sector. Moreover, cooperation among universities (e.g. Öresund University) was also interrupted due to change of universities' strategies reacting on policy trends. In the middle of 2000s companies were interested in owning development organizations and projects rather on cooperation and joint activities. A lot of projects were either closed or changed ownership. Surviving cross-border organizations experienced problems with funding, as regional authorities became more interested in supporting regional projects.

5.5.3. Legislation and rules

Legislation issues were identified as one of the core existing barriers for innovation and knowledge cooperation, and according to the interviewees institutional framework did not change since before-the-bridge period and is getting “more and more difficult and complicated” both within the region and on the European Union level. For instance, the process of getting funding, the basis of any innovation related activity, is highly different in both sides of the border. In Denmark, funding period is usually three years that is considered to be “short-term” for Swedish partners. After three years the project goes again through free funding competition that creates certain level of risks. Funding system on the Swedish side is different. None of the funding systems were called best or worst as interviewees emphasized the clash of differences in planning routines that creates uncertainties. Regarding funding process for joint projects, interviewees used words as “shaky”, “risky”, and “unstable”.

Another example of institutional barriers is employment regulations. Previously mentioned cross-border labour exchange is inhibited due to taxes and working agreements from institutional perspective. Some companies or research facilities have restrictions on the employment of people “across the board.” Regulations regarding property rights differ a lot in Denmark and Sweden. For example, in Sweden you might sell or use an idea as a researcher, while in Denmark it is university or research facility that hired researcher have property rights on new innovation. These details overcomplicate cooperation process, forcing the sides to cooperate within own borders where actors share similar standards and institutional routines.

Skånemejerier mentioned that recent EU regulations had impact on innovativeness of the company by restricting content of the text placed on the package of functional food products. Due to that, the segment of functional food is harder to promote, thus, harder to stimulate further development in this direction.

5.5.4. Trust

The word “trust” was also frequently used during interviews. All interviewees agreed that trust in quality, expertise and experience is stimulating repeated interactions. However trust, as a general feeling about partners, is able to sustain and

“We do not trust them as much as we trust people on our side of the border”

“Everything is about trust!”

“There will be no trust if there is a chance for competition”

secure this interaction channel. The lack of the latter, according to the interviewees, severely inhibits interactions, thus collaboration process. The reasons behind lack of trust were named as differences in language, business culture, fear of competition, institutional settings (e.g. short-term funding, short-term project agreements), insufficient frequency in interactions, etc.

5.5.5. Interactions (formal/informal) add on importance for trust

Personal interactions were acknowledged as not only a way to share information and increase innovativeness, but also learn more about culture and overcome trust issues. One of the mechanisms to do so is employment of people from another side of the border. According to the interviews with food companies, people from different environment “open up doors” for interactions. For instance, Skånemejerier reviewed how people, previously employed in Denmark (majority worked in Arla Foods before), shared previous research and business connections and explained differences in institutional routines. Process of learning from them was noticed to be more efficient when Danish employees occupied high managerial positions within organization or research facilities. Intermediary food organizations see interactions as a basis of innovation network building, and from this perspective, trust and interactions are strongly interrelated. Trust facilitates interactions, however successful interactions create trust. The role of the intermediary food organizations is to provide with some kind of guarantee of connection quality.

“You always have ideas of what you can do – but you have to do a lot of steps to reach your goal – and possibilities to meet others are important. Networks, trustful connections, may open doors for you”

Informal and formal meetings of food industry players are a common practice initiated mostly by companies to attract potential partners for cooperation. However, they are seen as very selective. Among governmental companies, aimed to promote innovations within food sector, VINNOVA⁵ (The Swedish Governmental Agency for Innovation Systems) was mentioned.

⁵ VINNOVA – Swedish state authority promoting prosperity and growth throughout Sweden (VINNOVA, 2010)

5.5.6. Motivation

Main motivating factors for cross-border interactions were identified as development of ideas, funding, expertise, connections and advice.

“It is important to have people who are burning for mutual ideas and regional identity!”

According to the interviewees, personal and/or political motivation is a key to intensive interactions, thus to knowledge exchange, cooperation and innovativeness. However, motivation is highly uneven among cross-border actors. On one hand, Denmark, due to importance of food industry for national economy, is strongly interested in new products, quality, and technological improvements, while “neighboring” part of Sweden due to regional scale of food industry and different national view on economic development is not pushing or promoting innovativeness of food industry enough to correspond “to Danish ambitions and changing trends.” On other hand, different business culture, trust issues, institutional obstacles do not encourage Swedish actors to search for cross-border cooperation.

5.5.7. Business culture

All interviewees admitted importance of the merger of business cultures in Öresund cross-border food cluster that are very different in nature national. According to interviewees, differences in business culture negatively affect knowledge exchange and cooperation. As it was mentioned before, due to prioritization and support of food industry by Danish government, Danish partners are more active, more involved and more controlling in joint projects (“Food is historically, economically and even socially prioritized by Danish people”). If funding is coming from Denmark, Danish partners will more likely reorganize project organization (according to Danish standards of accounting, funding and results reporting). Most of previously joint Öresund projects and organizations now operate under Danish control.

But difference in business cultures is revealing itself on initial stages of cooperation – negotiations. “Consensus culture” is very strong in Sweden. The rule or compromise and solid joint decision is deep in culture. In Denmark it is a common practice that chief is responsible for final decision even if employees disagree with it. During negotiations, Swedish partners “feel like they step over a lot, not heard or not taken into consideration.” Misunderstandings spread wrong perceptions, e.g. that Swedish partners are “too slow” or Danish partners “try to run on their own.” These perceptions are strong and by undermining trust, motivation, and bringing doubts constrain interactions. More over, Danish partners are seen as more “mature” players within food industry, while Swedish partners are less business-oriented, proactive, and have “provincial thinking.” These differences stimulate Denmark to search for other partners around Baltic Sea rather cooperating with “neighbors.”

5.5.8. Language

Besides Skånemejerier, none of interviewees emphasized common language as a necessary condition for interactions and cooperation. Scientific and business societies commonly communicate in English all over the world.

“When you go cross the board, everyone speaks English. So, if the project is important for partners they will find a way to communicate”

5.5.9. Representation

Öresund region is seen as “small area, where border is not really a border.” However, another highly emphasized topic during interviews was importance of accessibility and balanced representation of actors within cross-border food cluster. More precisely, the issues related to institutional proximity and motivations were associated with “unbalanced” representation of food industry actors and authorities in a region. Danish part of cross-border cluster is represented by capital (core) area, meaning that food-related activities, initiated near by, have better support, as headquarters and top authorities are located in close geographical proximity, etc. Swedish side of cross-border cluster is “responding” with research facilities, but decisive authorities are mostly located in Stockholm. These issues strongly inhibit interaction process and joint activities on the initial stage. The accessibility in this regard is seen as a density of industry related actors and their distribution. Innovative landscape is not even; so-called “innovative islands” might be still geographically far from each other (depending on the project and actors involved).

“The entire Öresund region will be completely different if Sweden would have Stockholm area here, because now people are coming from different organizational levels with different motivations and authorities”

“That was a problem, when large projects were started, Danish partners would send companies’ head representatives, while Swedish partners would send secretaries. Not balanced and restrain speed of decision-making process”

“Scientists in Lund have problems with funding. If it would be around Stockholm it would be easier”

5.5.10. Knowledge bases

Knowledge bases of cross-border partners received a lot of positive comments. All interviewees expressed an idea that intensive cooperation with existing level of knowledge and expertise in specific, complementing each other areas would boost development of food sector in a region. Interviewed companies admitted that with elimination of some social and institutional barriers they would be more active in

cooperation. The only interviewee who criticized knowledge aspects was Arla Foods' representative. According to the respondent, Swedish side of the Öresund Food cluster focused its research around operation process or nutrition production technology. However, dairy research and development is very small compared to Denmark or some other European countries.

"They (Danish food actors) are really good – it would be nice to find a way to cooperate with them"

"...for example, scientists in Lund – are brilliant, the best..."

"Lund University and Ideon are very innovative, Denmark has strong ingredients industry – two sides are, actually, complementing each other"

6. Discussion

This section will present an analytical discussion that incorporates findings received during the interviews and theoretical framework presented earlier in Chapter 2. The discussion is following the structure of theoretical part focusing on cross-border cluster formation, innovation modes, proximities, and dynamism.

6.1. Cross-border cluster: Öresund Food cluster

Öresund Food cluster fits chosen definition of cross-border cluster for this research. Despite that both border areas of the cluster greatly vary in geographical characteristics, economic and social aspects, gathered data acknowledged the presence interconnected and occasionally complementary connections among food industry related actors located in the border region. Both sides are searching for economic benefits from cooperation through innovation-driven growth development path. Governmental joint cross-border activities definitely accounted for regions' heterogeneity-based capacities, competition and knowledge development perspectives.

However, Öresund Food cluster is a case where heterogeneity offered not only development perspectives but also resulted into strong cooperation barriers that influence innovation cooperation pattern. One of the main heterogeneity-related obstacles on the way to sustainable knowledge exchange and creation cooperation identified by interviewees is a position of actors in their own national systems. It has been highlighting by interviewees as a basic aspect that “can not be changed” thus having direct impact on following obstacles. Öresund Food cluster contains part of Denmark represented by capital region and well-developed but peripheral Swedish area. Misbalance in representation of necessary industrial facilities and level of research assistance might be seen in this regard as indicators of functional proximity barriers. Theoretically, jointly identified barriers together with governmental support may “equalize” positions of cooperating actors (e.g. through regional policies, funding, relocation of headquarters and research institutions, promotion of joint identity, etc.). In other words, improvement of institutional proximity may affect functional and social proximities. Öresund Food cluster received necessary support after bridge establishment. Though, interviews with food industry actors showed that currently Danish side is stronger in Swedish-Danish cross-border food industry related relations. It has been prioritizing, even appropriating joint projects and avoiding association with Öresund region. *“They do not see us together anymore, more like Copenhagen and Malmo or Lund”*. This may signify underestimated differences of two environments, insufficiency of implemented institutional actions, early cooperation development stage, as social proximity establishment requires time, or all of the above.

6.2. Modes of innovations

According to the theory, innovation capacity of food industry firms is dependent on close relations with customers and suppliers, ability to advance existing usually incremental innovations and capability to adopt it to changing food trends. Based on the collected empirical data, investigated food industry actors also operate through or prioritize DUI mode of learning that is typical for traditional industries. Interviewed companies are strongly connected with local suppliers and customers. The latter is explained by location of production facilities and awareness of existing competition in different market zones of Sweden and Denmark and adjusted companies' sales strategies. Table with codified results also shows the importance of interactions for innovativeness of the industry. Companies agreed that some knowledge was gained through observing competitors but mainly through employment of workers previously working on another side of the border who are bringing new knowledge and previously established network. In these regards, DUI mode is strongly interconnected with social and geographical proximities.

Despite the fact that chosen firms did not accentuated STI mode characteristics, interviewed innovation-driven intermediary food organizations confirmed that their entire existence would be unnecessary if DUI mode was exclusively implemented within Öresund Food cluster. According to the received data, food firms within cluster source knowledge from universities and independent research centers. However, active pattern of STI mode is usually observed within the borders of Sweden or Denmark. Cross-border interaction, in this regard, will be lower compared to internal interaction frequency. Aspects of institutional, social and partly cultural proximities such as funding constraints, legislations and regulations, business culture are accompanied by trust issue strongly influence spread of STI innovation mode cross the border.

6.3. Geographical proximity: Bridge establishment

Foundation of the Öresund Bridge as a major improvement of geographical proximity definitely had an impact on innovation and knowledge exchange collaboration pattern within Öresund Food cluster. Nevertheless, it is important to emphasize that intensive cross-border interactions took place during first years after bridge establishment and did not show outstanding expansion lately. According to some interviewees this process was even "regressing."

According to the theory, close geographical proximity is a basis of cluster concept. It brings standardization of institutional routines and unification feeling to the participating in the interaction actors. Öresund Food cluster, based on the acquired information, used to experience these benefits in the initial stage of cooperation after bridge opening. Political support, funding and new opportunities stimulated horizontal and vertical learning between Swedish and Danish food industry actors.

Connection of two sides of the food cluster by the bridge positively affected knowledge exchange through labour exchange and formal joint projects and research organizations (e.g. Öresund University or Öresund Food Network). Collective sets of resources, new knowledge and technologies, agglomeration benefits were inspirational for food industry actors on both sides of the border. At this stage, majority of food companies that were affected and benefited from complementing each other knowledge basis and reliable circulated knowledge flows experienced feeling of unity or at least trust to cooperating partners. In this regard, bridge might be seen not only as a geographical, but also as a social proximity instrument by obtaining symbolic characteristics.

However, close geographical location and simplified access across the border were not able to maintain initially established connections on the same level as after bridge opening. In other words, after some period of time geographical proximity lost its importance without sufficient support from relational dimensions. Table with codified interview results showed that food industry actors from both sides of the border underline importance of institutional, social and cultural proximities' dimensions in current innovation and knowledge exchange collaboration. Identified by respondents barriers within the same categories additionally confirmed importance of motivation, business culture, legislation and trust aspects for sustainable innovation-driven cooperation. At this point of discussion, it is possible to assume that geographical proximity is important but not sufficient condition for sustainable knowledge exchange and innovativeness, though, it is important to mention that without this initial condition other relational and functional proximities would not be able to mature the same way as they currently do. Consequently, it is also possible to suggest that from this perspective, geographical proximity is still affecting other forms of proximities but in indirect way, meaning that it did not completely lose its importance and influence on collaboration pattern between food cluster actors.

6.4. Relational proximities

This research revealed importance and influence of social, institutional and cultural proximities elements on the pattern of cross-border collaboration between Swedish and Danish food industry actors. Based on the theoretical framework on propensity of proximities' change over time, it is reasonable to assume that identified barriers within specific relational proximity's categories are simply result of relatively early stage of development of cross-border cluster. But, highlighted by respondents trust, motivation, business culture and institutional aspects as key elements of successful cross-border collaboration and as areas with strong barriers stresses reciprocal causal relation between these aspects and collaboration. Moreover, different elements of relational proximity have more influence on collaboration during different development stages.

Large body of research highlights significance of relational proximity components in the process of knowledge exchange and collaboration pattern and interview respondents supported this statement (see Table 5). Relational proximity elements are seen as key elements in *establishment and maintenance* of cross-border interactions. For instance, presence of trust, understanding, motivation or sense of belonging will affect willingness to interact. Same as simplified institutional and administrative routines will encourage knowledge sources search “cross the border”. Interviewees were asked for solution suggestions if initial, according to the theory; mechanisms stimulating interactions (e.g. trust, motivation, business culture, joint identity) are inefficient, what has to be done to change it. The common answer was to interact more through the help coming “from the top to the bottom”: through regional and national policies. Interactions and connections established and supported initially from “the top” will provide with experience and time required to develop mutual trust, motivation and understanding. That may indicate, that for Öresund Food cluster, (hard) institutional aspects are more important during formation stage. Other relational elements are expected to gain its importance later during maintenance of cross-border innovation cooperation. For the studied case, insufficient (hard) institutional support resulted into barriers within relational proximity aspects and by that negatively affect innovation collaboration pattern inhibiting its sustainability.

Finally, the importance of appropriate level of dissimilarities in cross-border partners’ knowledge bases in efficient cooperation was clearly stated. Knowledge bases of partners within Öresund food cluster obtain complementary characteristics that according to the theory should facilitate innovativeness and competitive advantage. However, the impression on the current level of cognitive differences between cross-border actors within food cluster is misbalanced. Due to historical and economic reasons, prioritization of food industry in Denmark, and the fact that capital region represents Danish part of food cluster, innovation intensity and demand for new technologies and practices is higher than on Swedish side. Observed tendency showed that Danish partners are “more mature” in food industry. The opportunities to exploit knowledge complementarities attract Swedish partners; though, Swedish contribution to Danish innovation process seems less promising. That explains Danish cooperation and search for partners in other European countries or areas outside of Southern Sweden.

The analysis of the proximities’ effect on innovation cooperation pattern between cross-border actors within Öresund Food cluster showed strong interconnection between proximities. In particular, it has been observed that transformation of one type of proximity or even its’ element might affect other proximities and create both barriers and opportunities. Improvement of geographical proximity with the help of construction of the Öresund Bridge establishment opened opportunities for innovation and knowledge exchange, effected functional proximity, but at the same time without sufficient institutional support, geographic characteristics of interacting sides and industry specific features, interactions faced social and

cultural barriers in innovation process. Interdependence is also seen in cause and effect examination. For instance, mutual trust in studied context may be seen as an outcome of close institutional or cultural proximities and at the same time as a cause that stimulates transformation of mentioned proximity groups. These proximity characteristics together with detailed study of context should be taken into consideration during micro level interactions between cross-border actors, and also for policy development targeting food sector in Öresund area.

6.5. Dynamism in proximities

As it has been mentioned in the theoretical section, following dynamism in proximities development require time. Dynamic approach was not a central theoretical concept of this paper. However, answers of respondents with long experience of working within Öresund Food cluster allowed seeing some elements related to the concept. For instance, it is possible to assume that cognitive proximity differences between cross-border partners after bridge opening adopted to each other, but due to different complementarity level, Danish side moved towards search of new partners. Denmark currently does not learn enough from joint cooperation with Southern Sweden to keep up the level of industry ambitions. Also, social proximity between two bordering regions is obtaining elements of decoupling. Labour movement across the border is widening network of informal and formal connections (e.g. employee's network taken to another company). Intermediary organizations providing their services are aware of cases when positive experience after first interactions stimulate further cooperation already without their involvement based purely on previous dealings. Dynamism in other types of proximities hasn't been acknowledged due to research question. However, it may be appropriate basis for following research.

7. Conclusion

Formation of cross-border clusters is triggered by motivations to archive critical mass in the industry, increase external visibility, branding, etc. Moreover, increased attention to innovation-driven growth path and additional benefits from cross-border knowledge flows and formation of joint innovation and knowledge spaces opened new opportunities for traditional low-innovative industries, for instance, for food industry. Change of industry and taste trends is pushing traditional food sector to implement research facilities more intensively and search for knowledge sources within and across national borders (Robertson and Smith, 2008; Trippel, 2011). The focus of this paper has been done on cross-border food cluster covering adjacent territories of Denmark and southern part of Sweden. As a part of larger cross-border formation (Öresund region), Öresund Food cluster is characterized by heterogeneity of “neighboring” territories. Institutional and social regulations, differences in knowledge bases, and in connection to knowledge exchange, these differences (presented in this research through the concept of proximities) create complementarities in learning process on one side but also pose obstacles for cooperation. The reference point for this study initiation was the fact of Öresund Bridge establishment in 2000, as a major geographical proximity improvement and theoretically potential (innovation) interaction facilitator.

This paper explored different forms of proximities existing between Öresund cross-border food industry cluster actors and their effect on cross-border collaboration pattern. Research results were achieved through conduction of the interviews with different representatives of the industry from both sides of the border and analysis of received data through the lenses of theoretical framework on cross-border clusters, innovation modes, and proximities.

Summarized main research findings are presented below:

- Main strengths of Öresund Food cluster are strong knowledge bases of cooperating cross-border partners, presence of all food industry actors and research facilities, geographical closeness to customers, suppliers, research universities, developed innovative market players, international business and academic acknowledgement.
- Cross-border cooperation between Öresund Food cluster partners exists and obtains complementary characteristics. Partners on the Danish side are seen as more experienced (“matured”) industry experts and offer more learning opportunities for Swedish partners.

- Geographical proximity improvement had effect on innovativeness of the food industry within Öresund Food cluster. Intensive cross-border interactions took place during first years after bridge establishment. Improvement of geographical proximity had a strong impact on functional, institutional and social proximities. New regional and national policies targeting joint food industry cooperation were promoted and supported based on decreased travelling time and costs to cross the border, and increased cross-border flows of people. Bridge obtained symbolic meanings and endorsed feeling of belonging, trust and motivation to collaborate. However, recent level of cross-border interactions and identified barriers in cultural, social and institutional aspects signifies that geographical proximity improvement stimulated but was not able to sustain interactions. It might be argued that geographical proximity lost its importance overtime. Nevertheless, it should be acknowledged that without this initial step, other proximities would never develop and affect cooperation pattern the way they do now. Based on this assumption, it is possible to conclude that geographical proximity still has significant indirect impact on innovation cooperation pattern between cross-border food industry actors within Öresund Food cluster.

- Relational proximities (cultural, social and institutional) are having strongest effect on innovation cooperation pattern within Öresund Food cluster partners. In particular, these elements were identified as main interaction and cooperation maintenance instruments. Difference between legal and administrative practices between Sweden and Denmark impede interactions as knowledge flows, labour exchange, and network establishment. Differences in legislation accompanied with insufficient regional policies targeting joint industry area and its funding inhibit initiatives to search for knowledge sources and innovation realization opportunities across the border, illustrating by that impact of institutional proximity on social proximity aspects. Difference in business culture, language and business priorities is affecting key aspect (defined by respondents) of interaction sustainability – trust. Trust element was also affected by institutional proximity, as short-term projects limited by institutional regulations (e.g. funding) do not allow establishment of time-consuming social attitudes.

- Relationship between the core (Danish part of Öresund region) and periphery (Southern part of Sweden) misbalance priorities and expectations from cooperation affecting institutional, social, cultural proximities and the pattern of cross-border innovation cooperation. Inaccessibility to headquarters and executive representatives, passive business culture within food industry, impaired national prioritization of innovation food sector related activities discourage Danish partners to cooperate with Southern part of Sweden disregarding geographical proximity.

- Based on the empirical findings, it is possible to assume that Öresund Food cluster cross-border cooperation is dominated by DUI innovation mode.
- Despite existing strong knowledge bases (promising level of cognitive differences) of cooperating partners on both sides of the border, institutional, social, cultural and functional proximities barriers negatively influence cross-border cooperation pattern.

8. Further research

The hierarchy of the thesis suggests guidance for the further research based on the conducted study. One of the initial goals of any exploratory research is to determine research gaps in existing research on the topic and endorse further investigation. This research paper was an attempt to contribute to the larger body of theoretical and empirical research on innovative clusters, cross-border formations and internal interactions, and proximities concept through investigating the influence of different types of proximities on innovation collaboration pattern in Öresund Food cluster. This paper might be a starting point for following research on the chosen topic, where next development step would be enlargement of the sample, involvement of all supply chain representatives and differentiation of the results on this basis.

Despite large body of studies on Öresund region, research on Öresund Food cluster mostly obtains descriptive characteristics. Moreover, due to the presence of strong biotech cluster within the same regional borders, academic focus is shifted away from the regional food industry. Investigations of internal processes, regional innovation development and cluster operation are based on the example of Öresund biotech cluster. However, it is important to distinguish research on Öresund Food cluster from adjacent biotechnological cluster. Innovation characteristics, capacity and development perspectives of traditional industry greatly vary from high-technologically intensive industries as biotechnology.

From the empirical perspective, this study also identified the need to investigate Swedish regional and national policies targeting innovation development of food sector on the Southern part of the country. It is possible to assume that peripheral location of the food cluster away negatively affects innovativeness of the industry by the insufficient political attention and involvement. Further exploration on this topic may not only contribute to empirical evidence but also improve theoretical research. The concept of cross-border formations and integration may benefit from examination of the role of the position within national systems of integrating cross-border actors. According to the existing theories, level of dissimilarities in institutional, cultural, and other proximities' aspects are dynamic and with sufficient time and financial investments are able to equalize. The process of balancing positions in the national systems is less dynamic process, extremely costly, crucial for integration, and should be accounted before any policy implementation. Another suggestion for following research is longitudinal study of Öresund Food cluster and implementation of proximity dynamic approach by Balland, Boschma and Frenken (2014). This paper showed that cross-border cooperation within Öresund Food cluster expresses some characteristics of proximities' dynamism. Observation of this process will test and contribute to the theory development providing with valuable empirical evidence.

I believe that my research paper may contribute to existing analysis on presented topic, theoretical frameworks and potential regional policy corrections. Also it may be valuable supporting information for future innovation development and cross-border cooperation studies.

Appendix

Interview guide

Interview guide provides with general questions that framed the discussion during interview session. Following specifying questions were based on the responses of interviewees on general question though not reflected in the general guide. All the questions were purposively based on the theoretical concepts used in this paper.

1. General presentation and practical information:

- Presentation of myself and project purposes
- Presentation of publication requirements, recording rules and ethical considerations
- Explaining the structure of the interview session

2. Questions about organization and interviewed representative:

- Occupation within food industry and main activities
- Operation experience in food industry

3. General questions:

- Do you consider food industry within Oresund region innovative?
- How would you characterize collaboration pattern before 2001?
- How was your company affected by the Oresund bridge opening?
- Discussion of partners (firms, research institutions, universities), number of connections, frequency of interactions, etc.
- How would you characterize current pattern of collaboration with cross-border partners?
- Obstacles and/or driving forces of cross-border cooperation
- Informal and formal interactions: where, with whom, how often, initiated by whom?
- Joint R&D projects, acquisitions, mergers
- What aspects of cross-border cooperation should be improved? Why?

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