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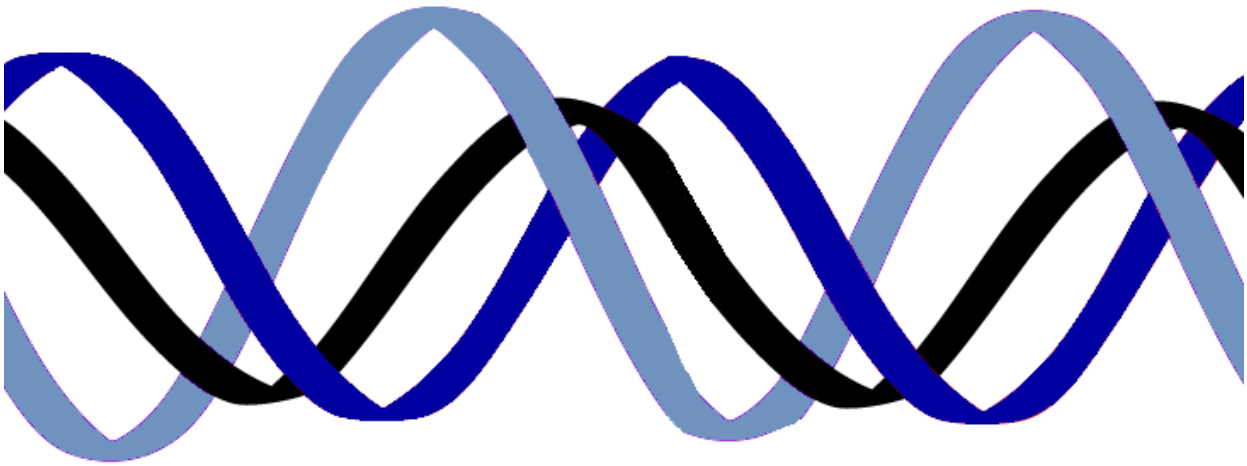
An exploratory investigation of the mechanisms behind the practical triple helix



MASTER'S THESIS

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Abstract

It is repetitively acknowledged that firms, but also public and other institutions need to innovate in order to achieve long term survival and be able to mitigate future societal challenges. However, these challenges are increasingly becoming too grand for the single organisation to approach, leading to the increase of cross-organisational collaborations. One example of such formations is the triple helix, which gather the three sectors of academia, public sector and industry to work collaboratively. This study aimed to investigate how the triple helix context can constitute an environment that is beneficial for innovation, and which factors that may influence the effect of this. Two "triple helix organisations" in the southern region of Sweden were explored to understand these contingencies; Skåne Food Innovation Network and Packbridge. The investigation was based on qualitative data, where twelve people with various relations to the case organisations were interviewed. The main implication of the study is that actors involved in cross-sector interactions need to realise cognitive as well as interpersonal contingencies to allow for a more successful triple helix. Moreover, it was concluded that the triple helix organisations ought to understand the nature of each sphere to better be able to provide examples and knowledge about how to align differences and make these productive.

Key words: Triple helix, cross-sector collaboration, innovation, knowledge integration, trust, diversity

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1. Introduction

This chapter introduces the topic, focusing on the increased importance of regional development and collaborative work for innovation. In addition, the introduction will outline the background to the problem. A relevance discussion as well as delimitation is also described, leading to the research question. Finally the outline of the thesis will be clarified.

1. 1. Background

Today's society is characterised by unpredictable events and rapid changes, and complexity is considered to be the most common and persistent challenge for business managers (Maznevski, Steger & Amann, 2007; Teece, Pisano & Shuen, 1997). A higher degree of diversity, interdependence between organisations, ambiguous and unclear information and a last factor - flux, contribute to the complex business environment and thereby also the occurrence of a new set of grand challenges (Maznevski et al., 2007). These problems that are ill-defined and that include more factors as well as stakeholders with different values are sometimes referred to as wicked problems (Churchman, 1967). In this new era, knowledge has become a core commodity to alleviate the complexities (Bettis & Hitt, 1995) and organisations increasingly rely on external knowledge sources in their innovation processes (Chesbrough, 2011; Laursen & Salter, 2006).

One may see two aspects stemming from a more complex environment. The first one relates to innovation, as the current dynamics have resulted in a need for organisations to produce knowledge and innovation both rapidly and flexibly (Bettis & Hitt, 1995; Teece et al., 1997). When managing innovation, one needs to make sense of complexity and uncertainty (Tidd, 2006). The need to be innovative in turn relates to the second aspect; collaboration. Firms that successfully operate in a complex world are also characterised by the ability to develop their dynamic capabilities, i.e. being able to redesign internal and external competences according to the changing business environment (Teece et al., 1997). Tidd (2006) also addresses the benefits of networking as an approach to develop innovations and The European Commission (2014) states that access to specialised knowledge and research is not sufficient to become a high-performing and innovative region: interaction between the various stakeholders and organisations is a necessity. Accordingly, cross-sector collaboration is understood as a necessary strategy to address complex challenges (Agranoff & McGuire, 2001). This view of collaboration

as a means to innovate is reflected by the growth in number of inter-organisational collaborations (Hagedoorn, 2002). Thus, collaborating as a means to achieve innovation and growth is now acknowledged from several standpoints.

Subsequently, innovation is no longer an internal process at a single firm but rather one that occurs at the intersection of different knowledge-producing institutions. Due to interdependence and diversity, the complex challenges and the importance of production of knowledge and innovation are not limited to the private business sector. As an effect, universities are becoming a more important contributor to innovation in knowledge-based societies (Etzkowitz & Zhou, 2006). Furthermore, regions and cities have in many cases become key actors for knowledge transfer and innovation (European Commission, 2014).

One collaboration mode that is stated to play an important role for innovation and that also acknowledges the less rigid boundaries between different institutional actors is the triple helix thesis (Etzkowitz, 2003). The shift to a knowledge-based society is the basic principle behind the triple helix model (Etzkowitz & Klofsten, 2005). The triple helix model builds on collaboration and interaction between actors from university, industry and government or other public actors, where the intertwining spirals from the three sectors reinforce each others' performance and where conditions for innovation are enhanced (Etzkowitz, 2003; Etzkowitz & Klofsten, 2005). The development of the triple helix appear as a metaphorical image to the DNA chain, where the three helices intertwine and are restructured based on the regional development (Etzkowitz & Leydesdorff, 2000). This model is considered appropriate to describe society and the complex network interactions among the three spheres (Etzkowitz, 2003).

1. 2. Problem discussion and introduction to the study

In a triple helix setting, the university, government and firm move beyond their traditional roles and begin to take the role of the other, creating hybrid organisations (Etzkowitz, 2003). By involving more actors in the same development projects, the innovation processes will in effect become more and more complex, and the capacities required to manage a network of actors differ from those needed to manage a single firm (Agranoff & McGuire, 2001). The increased complexity stems from unclear and ambiguous goals, diffuse power relations and accountabilities as well as a variety in culture (ibid). This creates particular challenges for the

triple helix organisations that aim to create a productive arena for every actor involved where the different needs are balanced (Etzkowitz, 2003).

The existing research on the triple helix phenomenon is often put in relation to regional development or takes the prevalent economic structure as a starting point (Gebhardt & Pohlmann, 2013; Henning, Moodysson & Nilsson, 2010). Further, current research has focused on the (innovative) outcome as well as the role of intermediaries in triple helices (Frykfors & Jönsson, 2010; Johnson, 2008). However, the lack of practical focus on innovation in a triple helix context is raised by Lundberg (2013). Hence, what seems to be missing in current research is a collected viewpoint from the various stakeholders in a triple helix context. Moreover, which contingencies and dynamics that are present in this context and how these can be handled also seem to be lacking, leading to the locus of this study.

Revisiting the role of regions as contributors to innovation, one region that has managed to become an "innovation leader" in Europe is the southern region of Sweden, Region Skåne (European Commission, 2014). This region will also constitute the broad delimitation of this thesis. The dynamics of the region is interesting to study not solely because of its innovative performance, but also for the reason that Region Skåne has instigated six triple helix organisations as a means to create long term, innovation-based growth in the region (Region Skåne, 2015). These organisations are by Region Skåne mostly referred to as cluster initiatives; however for the sake of the purpose of this thesis and to avoid conceptual confusion, they are here considered triple helix organisations. The organisations are neutral, not-for-profit agencies and are referred to as "triple helix organisations" because they gather member organisations from academia, industry and public sector to their network (Region Skåne, 2015). To clarify, a distinction is thus made between the triple helix organisations as such and their member organisations.

This thesis explores the settings in two different triple helix organisations in Region Skåne. These organisations share the same overarching goal, namely to create added value to all actors involved by encouraging knowledge exchange and collaborations, in order to generate new products and growth (Region Skåne, 2015). The organisations that are studied are Skåne Food Innovation Network (from now on referred to as SFIN), with a broad focus on developing the

food industry in southern Sweden, and Packbridge, an international packaging and logistics cluster (Livsmedelsakademin, n.d.a.; Packbridge, n.d.a). The rationale behind choosing to analyse these particular two organisations among the potential six lies in that the researcher wished to combine two cases that were similar in their background. Both SFIN and Packbridge are collecting traditional industries and they also gather a relatively high number of member organisations. In addition, the current CEOs have both had their position for the last five (in Packbridge) and eight (in SFIN) years, making them experienced of the triple helix context. Lastly, the two cluster organisations have a shared platform for open innovation (Open Up, n.d.), meaning they have a common practical experience of forming beneficial conditions for innovation.

1. 3. Purpose and research question

Relating to the choice of investigating two organisations with similar backgrounds was to avoid the path of comparison. The purpose was not to compare but more to get a better understanding of how innovation occurs in these triple helix organisations and thus use the two organisations as exemplifying cases. In addition, the purpose was to identify the main challenges they are facing, and if one organisation would be in modern technology and the other in traditional packaging, it was reasonable to believe they would be facing different obstacles and thereby leading the thesis into a more comparative nature.

This thesis aims to enhance the knowledge of how the triple helix thesis stimulates innovation in practice and which organisational elements that may influence this, taking a multi-sided perspective to reach a comprehensive view. Adding to this is the purpose to investigate which barriers or paradoxes that emerge between the actors that are active in these settings. If the dynamics of innovation do not function optimally between the "three spirals", the outcome will be unsatisfactory for all. Thus, it is believed that close interaction and understanding of diverse interests and goals are crucial factors for innovation to prosper within a triple helix context.

As such, the thesis sets out to answer the following research question:

- *How can a triple helix organisation ensure innovativeness within the network and create an environment conducive for innovation?*

In this case, the collaborating actors refer to the member organisations that are representing the three spheres. In order to answer this research question, knowledge about the nature of a triple helix needs to be attained. Also, the thesis explores existing literature on mechanisms that appear to influence a collaborative and innovative context such as the triple helix. Further, to answer the research question, challenges and paradoxes present in the specific triple helix contexts needed to be comprehended. This in order to attempt to illustrate factors that may affect the development of a conducive environment for innovation, and in effect understand how to mitigate these. Moreover, the question is answered from a rather managerial perspective, focusing primarily on developing an outline of organisational contingencies that require awareness. The research question guides the rest of the thesis, and is answered by analysing the two cases. The researcher's reasoning concerning the research question and the answer to it will be returned to later in this thesis, in the discussion and conclusion chapters.

1. 4. Delimitations

This study is "model-specific", focusing on the practical inherent dynamics in a triple helix context. As the purpose of this thesis is to illuminate inherent structural or cultural challenges in triple helix from a multi-stakeholder perspective and due to a limited project time, only two organisations will be subjects for the study. The focus will not be outcome-based, as that easily will lead to unintended attention towards how to measure the value of innovation.

1. 5. Outline of the thesis

Theoretical framework

In this chapter, the reader is introduced to the theoretical background of the triple helix and relating concepts of e.g. innovation, organisational flexibility and organisational context that appear influential on network contexts. The section is concluded by critique against the triple helix model and a discussion about multiple helix.

Methodology

In this chapter, the methodological choices behind the study is explained. The researcher aimed to give clear motivation and reasoning behind the chosen approach and strategy. A short introduction to each of the respondents is also presented, to provide the reader with a background of the empirical results.

Analysis

This chapter analyses the empirical findings of the case study and identifies certain issues or problems that appear to be present in the case organisations or in collaborative situations. The empirical analysis was consciously distinguished and separated from the theoretical framework. This in order to separate clearly between previous findings and the current findings. Moreover, this allowed for compliance with the inductive approach, since a separate analysis made room for a less ambiguous theory building where the two stands (theory and case) could be strategically combined in the following chapter, the discussion:

Discussion

The discussion chapter combines the theoretical background with the analysis and outlines discrepancies or similarities between the two. Thus, in this chapter, theory and case findings are merged and this is also where the research question is concretely revisited again. Based on the discussion, a number of propositions is suggested as concluding marks of the current study.

Conclusions

Finally, the conclusions describe the clear findings of the thesis, and an answer to the research question is formulated. Contributions to research, limitations of the study and suggestions for further research is also explained.

1. 6. Key terms

In order to give the reader an introduction to the themes present in the following chapters, a short list of key terms is presented below. First, certain terms that are particular for the cases are explained. Second, a few theoretical concepts are described. The main reason behind this is to provide the reader with a basic understanding of the viewpoints from which the concepts are applied.

> **Triple helix organisation** - The term triple helix organisation refers to the particular focal organisations Skåne Food Innovation Network, SFIN, and Packbridge. This since these organisations are gathering representatives from the entire triple helix.

Member organisation - Analogous to the previous definition is member organisation, or sometimes referred to as member, which refers to those organisations from academia, industry and public sector that are formal members of SFIN and/or Packbridge.

Innovation is subject to a number of definitions. Quite commonly, one regards innovation as an invention or idea with the added element of commercialisation (e.g. Trott, 2005) or use it as a performance measure. However in this thesis, two stands of how to develop innovations will be applied. The first relates to innovation through cross sector interaction, which is considered particularly relevant in the triple helix setting. The second explains innovation as a consequence of an allowing environment. This definition proved relevant in the cases due to the many organisational settings that all need to be conducive for innovation. These two innovation concepts will be further elaborated in the theoretical section (see 2. 3. 1. and 2. 4. 1.).

Collaboration is often used interchangeably with cooperation, which can be understood by the definitions by Oxford Dictionary (2015a; 2015b). Collaboration is "the action of working with someone to produce something" whereas cooperation is defined as "The action or process of working together to the same end". Thus, it appears that both terms could be applied in the current setting. However in order to keep consistency, collaboration was preferred.

Inter-sector collaboration then refers to collaborations that occur across sectors. Particularly in this case, it is collaboration between academia, industry and public sector.

2. Theoretical framework

In this chapter, the literature on triple helix and concepts relating to collaboration and innovation are outlined. First, the background of the triple helix thesis and its provided value is put forward. This is followed by sections of organisational factors and contextual or relational factors that are believed to influence the triple helix setting. Within these factors, conditions or challenges to optimise the factors are outlined. Lastly, the supposed deficiencies of the triple helix are explained.

2. 1. The emergence of the triple helix concept

To give the reader a basic comprehension of the theoretical stances that preceded the "triple helix", this section gives a short historical background. This is relevant to include also when put in relation to the establishment of triple helix as a policy tool, which will be described in the analysis.

The concept of triple helix was first analysed as a phenomenon in the 1930s' (Etzkowitz & Klofsten, 2005). Sábato and Botana followed in 1968 and argued for increased interaction and coordination between university (i.e. science & technology), government, and firms (i.e. productive sector) in order to achieve prosperity. In 1983, Clark described what is sometimes viewed the predecessor to the triple helix thesis: a static triangular model of coordination between academic oligarchy, state authority and market.

Certain societal and industrial dynamics made room for the development of the recent triple helix model. The tendency to include feedback loops in the innovation process and later to include networks and involve external actors reflected the transformation towards a more open business environment and more collaborations (Ivanova, 2014; Rothwell, 1994). In addition, knowledge and information became increasingly acknowledged as the driver of production and growth, and many societies started to be referred to as knowledge-based economies (Organization for Economic Co-operation and Development [OECD], 1996). In effect, innovation has become more knowledge intense and includes elements of collaboration and networks (Ivanova, 2014). Correspondingly, with the increased emergence of "wicked problems" or complex problems that no single organisation can handle, inter-organisational collaboration is necessary (Getha-Taylor, 2008). However, one may consider whether the

problems actually are more complex in current days, or if its rather another type of complexity that can be seen. In conclusion, inter-organisational collaboration is acknowledged as a necessary complement to the internal innovation processes (Hagedoorn, 2002), and the interactive institutional spheres in the triple helix can serve as an example for this (Etzkowitz, 2003).

Since the middle of 1990s, Henry Etzkowitz and Loet Leydesdorff have been the two main contributors to the theory building of the triple helix model (Leydesdorff, 2006). In essence, the researchers recognise a trilateral relationship among university, industry and government as a means to encourage knowledge-based economic development and innovation (Etzkowitz, 2003; Etzkowitz & Leydesdorff, 1997; 2000). The trilateral relationships are illustrated as three intertwining spirals or helices, which are supposed to strengthen the other actors' performances (see Figure 1.). The increased interaction will consequently enhance a creative basis for innovation. For instance, new social arrangements are developed, knowledge creation is transformed in symbiosis with financial capital, and reorganisation across institutions all add to this creative basis (Etzkowitz, 2003). It is argued that the convergence between academia, industry and government will enhance the conditions for innovations. Exemplifying, the pooled resources and different views on quality will give rise to new solutions (Lundberg, 2013).

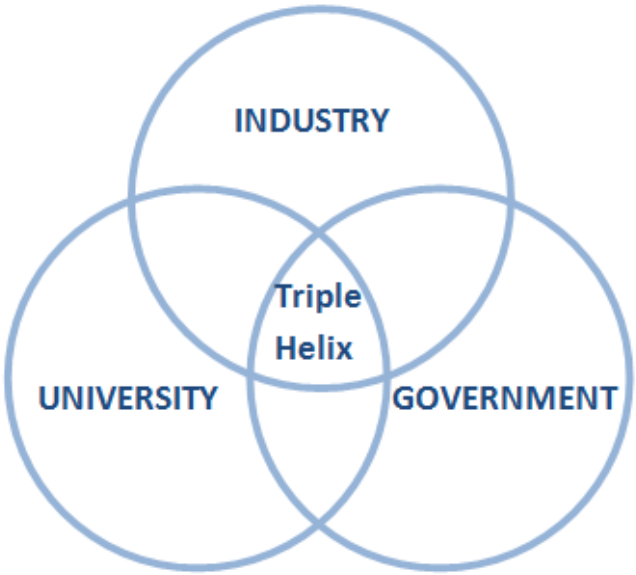

Figure 1.The trilateral network of a triple helix. Adapted from Etzkowitz (2003).

2. 2. The value of a triple helix

Between the spheres in a triple helix are trilateral networks of cooperative interaction, which strengthen the links and provide opportunities for inter-organisation collaboration (Etzkowitz, 2003). Many would thereby describe the conception as a network (Powell & Grodal, 2005). A triple helix system can be described with regards to its components (the institutional spheres of university, government and industry), its relationships (the links among the spheres) and its functions (the results of the activities) (Ivanova & Leydesdorff, 2014). Due to the involvement of several sectors, it is expected to access a broader knowledge base, thereby enabling better problem solving and a higher legitimacy of the outcomes (Lundberg, 2013). The inclusion of networks was considered important as network appeared to be a concept broadly applied in the cases studied when discussing the triple helix context.

2. 2. 1. Network and the three spheres

Due to the described historical development of the triple helix, it seems probable that cross-sector interaction has existed in many variants earlier. As was noted above, cross-sectoral interaction occurred already several centuries ago. Thus, one may question whether the triple helix exists naturally or if it is mainly an analytical concept that has been applied to regional development activities to explain something that already is established.

In the theoretical triple helix it is often assumed that a network of relationships exists, even though this is seldom the case in practice (Lundberg, 2013). It is argued that interaction within the triple helix relationships facilitates knowledge dissemination, making the member organisations more dynamic and innovative than the organisations outside the networks (Leydesdorff & Meyer, 2006).

In the present form of the triple helix, each institutional sphere (academia, state and university) keeps its traditional features and identity but incorporates new features that conventionally belonged to another sphere (Etzkowitz, 2003). Illustrating the shifting roles of the three actors, the public organisation would be considered as more participating and interactive in its role and sometimes with an added element of venture capitalism (Etzkowitz, 2003; Etzkowitz & Klofsten, 2005). With an active and productive local government, the potential for effective knowledge transfer and thereby the prospects for an entrepreneurial region can be improved

(Sysko-Romanczuk & Platonoff, 2005). Exemplifying the role of universities, their role has changed from sole concentration on research- and knowledge production to also include an entrepreneurial element of technology transfer and firm formation. Furthermore they are also concerned about capitalisation of knowledge and business development (Etzkowitx, 2003; Etzkowitz & Leydesdorff, 2001). Traditionally, the industry has taken the role as a producer and been focusing on exploitation of knowledge (Brown & O'Brien, 1981; Etzkowitz, 2003). However recently, industry is consisting of not only large corporations but increasingly small start-ups and university spinoffs. The industry is thus more prone to explore and also provides training to a larger extent, thus becoming more academic in its nature (Etzkowitz, 2003). Even though the three actors are emulating, they are still considered complementary in their functions and their differences may allow for productive linkages to grow (Brown & O'Brien, 1981).

2. 3. Organisational factors

Naturally, there will be factors that influence the triple helix context, either positively or negatively. Since the setting to a large degree is the internal organisation and the network organisation, that will be the focus of the following section. Previous literature does not highlight the organisational context, which is why it was interesting to investigate this in the cases. Therefore, this section will focus on different aspects of boundaries and the alignment of these as well as how the organisational structure may influence the collaborative innovation processes.

2. 3. 1. Innovation through cross-sector integration

As will be seen in the analysis, the cases showed a tendency to praise cross-sectoral combinations as a key to innovation, and was therefore considered an interesting element to address theoretically as well. The cases studied showed that cross-sectoral interactions however seemed to require effective knowledge integration, which is why different angles of knowledge was added to the theory section. In terms of innovation and triple helix, being able to combine resources as well as managing cooperative discussions is what encourages innovation in a triple helix (Lundberg, 2013). Thus, innovation is produced by relations and interrelations between the three institutional spheres (Etzkowitz & Leydesdorff, 2000), which is why finding the origin of insight is difficult to localise (Johansson, 2004). This explains the tripe helix becoming a platform for institution formation, where new organisational arrangements such as research

centres, incubators and new forms of venture capital allow for opportunities of innovation (Etzkowitz, 2003; 2008). Hence, the concern is to create an infrastructure for innovation through a triple helix (ibid).

Great innovations often occur at the intersection of fields, at the boundaries between different mind sets rather than within a single knowledge and skill base (Johansson, 2004; Leonard-Barton, 1995; Leydersdorff, 2006). Examples are the mixture of mathematics and gaming, leading to a new type of interactive game, another is where the logics of engineering in of physiology converged and lead to the discovery of a kidney function, and of course the example of geologist Charles Darwin and ornithologist John Gould's joined forces, leading to huge development in natural science (Johansson, 2004). Hence, innovation is stimulated by combining knowledge and experiences across contexts, fields, disciplines or cultures. This argument is often referred to as the Medici effect, referencing to the outburst of creativity that was enabled by the Medici family during the renaissance in Italy where artists, scientists and merchants joined forces (Johansson, 2004). In support, it appears important to encourage interaction between people with different experiences and perspectives in order to extend the traditional perspectives and challenge habitual thinking patterns and in effect enhance creativity (Karlsson, Backman & Djupenström, 2010). Intersectional innovations tend to encourage new directions and open up new business fields but also increase the chances for unusual combinations to occur (Johansson, 2004). In addition, in industries where the knowledge base is complex and where the knowledge sources are dispersed, innovation is more likely to happen in networks than in single organisations (Powell, Koput & Smith-Doerr, 1996). This is especially so in communities that are fluid and evolving, indicating that these types of networks are attractive (ibid).

Knowledge, both codified and tacit, is important in the innovation process (Tödtling & Kaufmann, 1999), and especially so in the collaborative process since the basis is to exchange competence (Powell & Grodal, 2005). Since knowledge increasingly is distributed across many organisations and individuals, being able to assemble and organise internal as well as external knowledge resources is important for firms that wish to be innovative (Chesbrough 2003; von Hippel, 1988). Arguing that one advantage of the triple helix is the complementary knowledge (Brown & O'Brien, 1981; Etzkowitz, 2003), effectively integrating the specialist knowledge

becomes important in order to enhance organisational capability (Grant, 1996). The integration of knowledge is therefore important, and will allow for complementary assets to be combined and for novel recombination of existing knowledge (Powell & Grodal, 2005).

Knowledge resides within the individual and consequently, the task of the organisation is to stimulate the application and integration of knowledge rather than the creation of it (Grant, 1996). Succeeding in this task is especially important when working in groups as the knowledge needs to be integrated at a collective level in order to actualise the value (Okhuysen & Eisenhardt, 2002). Sharing knowledge and ensuring access to information among parties becomes more complex in inter-organisational arrangements than in the single firm, albeit it also becomes more critical (Child, Faulkner & Tallman, 2005).

Knowledge integration

Knowledge transfer across organisational or functional boundaries requires absorptive capacity, described as the ability to identify, assimilate, and exploit knowledge from the environment (Cohen and Levinthal, 1990). For instance, firms need to incorporate input and trends from e.g. suppliers, customers as well as competitors. Organisations ought to master the balancing act of integrating internal and external knowledge bases and are to combine exploration (of new possibilities) and exploitation (of old certainties) (March, 1991).

Logically, there are certain barriers to an effective knowledge integration across organisations. Among these are unfamiliarity, disparities in cognition and language, and physical distance (Okhuysen & Eisenhardt, 2002). On an individual level, innovative knowledge can become sticky and difficult to transfer due to so-called in-group and out-group dynamics, creating reluctance to share knowledge with people from other entities (Foss, Husted & Michailova, 2010). In groups where members are familiar to each other, knowledge and information will be more effectively integrated (Gruenfeld, Mannix, Williams & Neale, 1996). This is supported by the finding that cultural differences seem to lead to deficiencies in knowledge sharing, at least between projects (Wiewiora, 2011). Therefore, ensuring open forums and informal communication channels are essential elements to create a productive innovation network (Tsai & Ghoshal, 1998).

Lu (2008) on the other hand highlights the importance of a coordination mechanism in a triple helix setting in order to achieve effective information and knowledge sharing between agencies. Further, knowledge integration in groups can be improved by formal interventions. These can contribute to a more structured group discussion, which increases knowledge revelation and make more effective the combination of knowledge. Interventions endorse attention switches from the main task of the collaboration to the knowledge integration process, which make group members collectively reflect on the knowledge integration process and develop ideas on how to improve it (Okhuysen & Eisenhardt, 2002). Exemplifying, network or collaboration activities would benefit from interventions that encourage e.g. information sharing and questioning between actors (ibid).

Carlile (2002) describes three types of knowledge boundaries, or three levels of communication complexity; syntactic, semantic and pragmatic which illustrate the challenging boundaries in new product development. Carlile's (2004) framework is illustrated in figure 2 below, where the three white fields illustrate the type of boundaries and boundary capabilities. Each of these boundaries requires a complex process in order to facilitate communication and innovation between units with different knowledge bases (in the figure referred to as Actor X and Actor Y). At the syntactic boundary, a common language or syntax exists, and the main concern is the *transfer* of knowledge (Carlile, 2004). As novelty increases and the current language reaches its limits, this concern becomes more challenging. At the next level of complexity is the semantic boundary, which recognises the problem of interpretation since individual knowledge is developed in different context and/or as individuals interpret the things differently. At the semantic boundary there is no common language, and instead one needs to *translate* knowledge in order to create shared meanings.

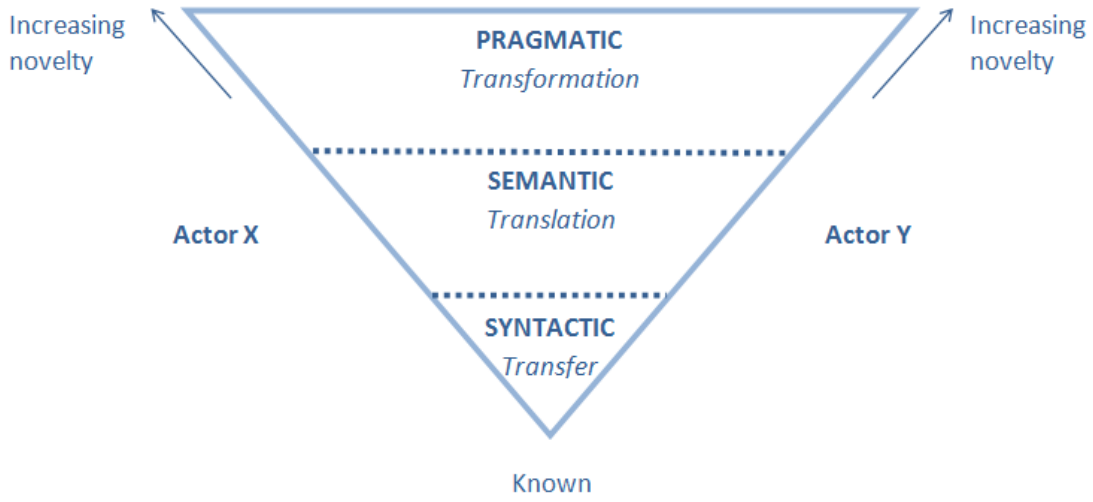

Figure 2. Carlile's (2004) framework of managing knowledge across boundaries.

As complexity and interdependence increase, another view of knowledge is required. In Carlile's (2002) pragmatic view of knowledge, knowledge is localised, embedded and invested in the tasks, methods and outcomes of a certain practice. These characteristics are positive within functions, but becomes challenging when working across practices, i.e. between units with different knowledge bases (Carlile, 2002). The pragmatic approach to crossing a boundary thereby recognises that managing knowledge across boundaries requires not only that new knowledge has to be created but also that current knowledge needs to be *transformed*. In such a process, the units identify the differences and dependencies which are later collectively negotiated and transformed (Carlile, 2004).

2. 3. 2. Organising as a triple helix

As will be shown in the empirical analysis, combining differences was considered one advantage of the triple helix. However, it was apparent in both cases that the alignment of spheres is deficient, which is why this challenge will be addressed in the following section. Interorganisational cooperation enables value creation that goes beyond what individual organisations can accomplish (van Fenema & Loebbecke, 2014). The contemporary benefit of it is that inter-organisational networks are a means in which organisations can integrate and exchange resources and together develop new skills (Powell & Grodal, 2005). However, in order for interorganisational networks to be beneficiary for innovation, the partners should be

heterogeneous and thereby complementary (Faems, Van Looy & Debackere, 2005; Osborn & Hagedoorn, 1997). Synergy in value creation is achieved when organisations get access to each other's markets, complementary resources, learn across organisations and when transaction costs are reduced (van Fenema & Loebbecke, 2014).

Creating suitable linkages between university, industry and government and coordinating these effectively is a means to develop an effective innovation process (Brown & O'Brien, 1981). Bryson, Crosby and Stone (2006) mention trust, along with initial agreement about the task and mission, building leadership and legitimacy as important process components to increase the likelihood of succeeding in the collaboration. In contexts where several actors are to collaborate, compromises are an expected element (Feldman, 1993), and it is similarly also argued that innovative solutions emerge in the compromise situations that occur in between the three institutional spheres in a triple helix (Lundberg, 2013). Compromises have however a two-fold effect of innovation; positive where decision making includes many functions but negative when it undermines commitment to goals (Feldman, 1993).

Misalignment of competences

As stated, the combination of diversities and competences is of value. However, that the diversities are combined to a dynamic and well functioning network should be regarded as something that requires work and energy. Quite often one can assume that the competences are misaligned. Thus, relating to the issue of knowledge integration is the difficulty to align the different logics of the spheres and consequently, optimise the inherent competences. When different cultures are to work in new organisational arrangements, issues of cooperation is likely to surface (Child et al., 2005; Linnarsson & Werr, 2004). Organisations that share similar objectives and practices are more likely to reach a cultural fit and hence, interaction among different institutions may become a difficult challenge to mitigate (Cameron & Lart, 2003). Competing institutional logics is an often recurring theme in research on cross-collaborative barriers (e.g. Bryson et al., 2006; Lundberg, 2013, van Fenema & Loebbecke, 2014). The differences in logics may extensively influence how the collaborating actors can concede on elements of process, structure, management and wanted outcomes (Bryson et al., 2006).

Specifically concerning a triple helix context, it is reported that there is a risk of clash between university and commercial culture. Issues that are repeatedly mentioned are debates over knowledge dissemination and commercialisation approaches (Fisher & Atkinson-Grosjean, 2002). Similarly, Perkmann and Salter (2012) identify challenges relating to openness (i.e. willingness to publish vs. protect knowledge) and time logics (long term research vs. short technology life cycles) in university- industry collaborations. Bruneel, D'Este and Salter (2010) also acknowledge the different incentives and control systems in universities and firms as obstacles in collaborations that should be put in relation to their competitive advantage.

Even though the intersecting three parties have different cultures and goals, good management can moderate the potential culture clashes and make way for innovation (Child et al., 2005). However, it should be noted that only destructive differences need to be mitigated. Some conflict is desirable because it enhances motivation among parties (Trott, 2005). Also, becoming too similar would mean more redundant knowledge bases and perspectives, thus losing the valuable diversity (Gruenfeld et al., 1996). The tensions between university and industry can be moderated if the collaborations are pursued strategically rather than in an ad hoc manner. Managers need to consider the nature of the collaborating partner and then carefully create an appropriate relationship with regards to openness and time horizon (Perkmann & Salter, 2012).

These propositions are however not limited to university-industry interactions. In any network management, one first needs to identify the right participants and stakeholders and establish the rules of the collaboration (Agranoff & McGuire, 2001). By initially agreeing on the problem definition, i.e. establishing a common objective, one will better encourage a successful cross-sector collaboration (Agranoff & McGuire, 2001; Bryson et al., 2006). By identifying the premises and conditions that are underlying university-industry-government relations, an effective triple helix model will easier be developed (Lu, 2008).

Similarly, to improve the chance of effective collaboration, the very basis of the agreement should be outlined already initially to ensure mutual understanding and acceptance of the cooperation (Child et al., 2005). Having clear responsibilities and employing realistic goals that are accepted by all actors will improve the success rate of collaborative work (Cameron & Lart, 2003) as it will facilitate knowledge transfer (Brundin et al., 2008; Neu Morén & Hård af

Segerstad, 2010). By uniting in common interests and cooperate in activities, the contrasting logics of the spheres can be overcome (Lundberg, 2013). Being able to lower one's associative barriers, i.e. chains of associations related to experience, will induce broader and more creative thinking (Johansson, 2004).

2. 3. 3. The triple helix organisation

As will be seen in the case study, the triple helix organisation was ambiguously described. To comprehend which roles or tasks that appear essential in collaborative networks, a theoretical discussion of this appeared necessary. Moreover, it was shown that the empirical setting wished for both clearer structure and more freedom, supporting the inclusion of the paradox of structure and flexibility. According to Bryson et al., (2006), having a linking mechanism in cross-sector collaborations is one way to increase probability of success. This linking mechanism may take the form as a brokering organisation or a convener, responsible for assembling people to address a certain problem (Bryson et al., 2006). Hence, the industry, academia and government need a bridging boundary spanner, an intermediate organisation or similar to unite the systems (Johnson, 2008; Lundberg, 2013). Lundberg (2013) defines a boundary spanner as the connector of disparate systems whose role is to ease communication and mediate potential disagreements and are therefore considered important agents if the triple helix system is to be put into practice.

The organisations that are located in the interfaces between the three vertexes need to be able to translate the needs and cultures of all stakeholders and master the ability to create a sense of direction and building understanding among actors (Lundberg, 2013). This is more likely achieved when the boundary spanner combines both cognitive (e.g. problem solving) and social (e.g. attention) resources. The main role is to build bridges and partnerships and thus, communication and understanding of every sphere are required skills (Fisher & Atkinson-Grosjean, 2002). Metcalfe (2010) explains the role as building bridges and serving as customs agents, controlling the streams of people and goods across these bridges. For boundary spanners such as the case examples Packbridge and SFIN, being able to build a common collaborative culture, building bridges and manage diverse interests is crucial (Getha-Taylor, 2008).

Combining structure and flexibility

On the one hand, interdisciplinary collaboration requires stability and continuity, but on the other hand, freedom, flexibility and open communication are important aspects to facilitate

innovation (Linnarsson & Werr, 2004). Similarly it is viewed that stability enables the organisation to compete today, whereas creativity is required in order to be able to compete in the future (Trott, 2005). Thus, external scanning is an important tasks in innovative organisations, however one also need to be able to act on these (ibid). For instance, one first needs to identify competitors or upcoming challenges, but this needs to be followed by a strategy how to handle the concerns.

Structure is essential since it reduces time and quality variance in tasks, thereby improving organisational efficiency (March, 1991). Institutions that establish rules, values and routines may reduce uncertainty (Tödtling & Kaufmann, 1998). In collaborations where actors are unfamiliar or where projects are temporary this would probably be considered even more essential. Lack of planning and structure can influence cooperation negatively, adding to the importance of some formalisation (Brundin et al., 2008). However at the same time, structure is criticised for hindering organisational performance as it induces rigidity and less creative thinking (Trott, 2005). Thus, it is important to have flexible processes since that will facilitate the mitigation of issues that appear in network activities, e.g. bureaucratic obstacles or political problems (Agranoff & McGuire, 2001). Creativity is the prerequisite for new and innovative ideas, and establishing autonomy is thus important in an organisation (Trott, 2005). Firms that are successful in innovation combine structure around responsibilities and tasks with freedom to improvise within projects, thereby managing to create a structure that is not too rigid that change cannot occur and simultaneously not too loose that chaos follows (Brown & Eisenhardt, 1997).

Achieving flexible structures is albeit challenging since an organisation's position is formed by the path it has trailed, hence the organisational history constrains its future behaviour (Teece et al., 1997). Further, when knowledge or certain processes prove successful, individuals are unwilling to change their knowledge since this means costs of altering their mode of working., thus explaining why individuals often are path dependent in their actions (Carlile, 2002).

Developing dynamic capabilities can however encourage new paths and positions (Teece et al., 1997). According to Eisenhardt and Martin (2000), dynamic capabilities are the drivers (processes) behind the creation, integration, recombination and release of resources into new sources of competitive advantage. Teece et al. (1997) explain that dynamic capabilities

demonstrate the ability for an organisation to create new forms of competitive advantage, providing path dependencies and market positions. Similarly, organisations need to be ambidextrous, i.e. be able to balance the management of current business demands with the adaption to changing environment to reach success (Raisch & Birkinshaw, 2008).

Repeated practice and formal procedures accelerate the routines of dynamic capabilities (Eisenhardt & Martin, 2000). Moreover, familiarity among group members and formal interventions promote flexible structures, in turn leading to better problem solving effect. This because interruptions, either induced due to social concerns in familiar groups or due to formal interventions, encourage constructive discussions. These discussions include reflection and evaluation on the progress and current strategies and allows for change in these, thus promoting flexibility (Okhuysen, 2001).

In the much cited article by March (1976), it is argued that people and organisations ought to combine their adult and rational thinking, the technology of reason, with the playful and childish technology of foolishness. This will allow exploration of different ideas and new purposes and concepts (March, 1976). With flexibility, the interacting group can redirect, adapt or abandon strategies depending on the development of the problem (Okhuysen, 2001).

2. 4. Contextual and relational factors

In many organisational studies, it is distinguished between hard (e.g. quantifiable, financial or structural) and soft (e.g. qualitative, abstract or relational) factors. Likewise, in this study of a triple helix context, it appeared that a certain organisational culture, trust between actors and personal characteristics will determine the innovative outcome. Therefore, the following literature section is structured according to these emerging themes. In order to achieve commitment from the participants, a favourable environment for productive interaction is required (Agranoff & McGuire, 2001). Succeeding in creating an open and allowing triple helix context will promote productive dialogues and set the stage for valuable exchange of ideas between stakeholders (Karlsson et al., 2010).

2. 4. 1. Innovation through an allowing environment

At least one of the cases highlighted that it requires an allowing organisational context in order for people to dare take risks and be unconventionally creative. Innovation through an allowing environment is thus essential to comprehend further. Organisations need to cultivate a creative environment which allows for the testing and development of ideas, partly by balancing stability and creativity as mentioned above (Trott, 2005). In this particular context, stability could refer to the establishment of strategies, procedures and the determination of roles whereas creativity could indicate the freedom to take initiatives or try out untraditional processes with anyone in the network. Wiewiora (2011) revealed that organisational culture influences trust and thereby the extent of knowledge sharing. Cultures characterised by a collaborative, communicative and non-competitive environment share knowledge to a higher extent. These environments combine both formal and informal knowledge sharing and are thereby utilising the knowledge potential better, as it incorporates both explicit and more tacit information (Wiewiora, 2011). Hence, encouraging collaborative creativity becomes essential, and even more so in a triple helix setting which aims to stimulate intersectional collaboration (West, 2014).

In general, to foster an innovative culture, managers should create an open environment where employees are able to question rules and procedures (Harkema, 2003). As continuous learning is important in order to keep pace with the rapidly changing environment, the organisational culture needs to encourage willingness to explore (Hueske et al., 2015). Analogous to that is the need for the organisation to be able and willing to implement ideas and changes. Reluctance to changes will otherwise suppress innovations (Trott, 2005).

A discouraging organisational environment

Organisational learning or organisational culture may constitute an innovation barrier (Hueske et al., 2015). To be able to develop great innovations, organisations need to accept failure (von Stamm, 2009). This is mainly because the strongest correlation for quality of innovations is quantity of innovations (Johansson, 2004), and since exploration and experimentations are essential elements of innovation, one should regard failure as a learning opportunity (von Stamm, 2009). The allowing and collaborative cultures proposed by Wiewiora (2011) even have a propensity to share shortcomings or failures, as these are regarded as opportunities for improvement. Mistakes and failures stimulate learning more than success does, and also add to the development of dynamic capabilities (Eisenhardt & Martin, 2000). This is explained by the

notion that success does not engage enough attention from the individual to learn from experience. Minor failures on the other hand encourage attention to the development process (ibid).

At a group level it is therefore important to be able to give and receive criticism and allow for reflection (West, 2014). Further, transformative learning is put forward as a means to accomplish a resilient process of change and innovation (ibid). Building knowledge-sharing routines is the single means to ensure effective learning in inter-firm collaboration (Cohen & Levinthal, 1990). Thus, active reflection as well as empowerment and freedom of action become important elements in change and innovation processes (Karlsson et al., 2010).

On a personal level, openness and respect towards the other agent are important aspects (Cameron & Lart, 2003). Breaking down the associative barriers which inhibit creativity and hinder intersectional innovation is promoted by e.g. being exposed to a variety in cultures, learn differently (beyond formal education) and by trying to reverse one's assumptions and see situations from a different perspective (Johansson, 2004). In conclusion, an organisational environment that tolerates mistakes should be the aim because that will encourage people to come forward with ideas (Trott, 2005) and enhance trust building (Wiewiora, 2011). By rewarding success and failure equally and by punishing inaction, the best results would be produced (Johansson, 2004).

2. 4. 2. Trust

Achieving trust among parties appeared a particular challenge in at least one of the cases but also recurred as essential in collaborations, supporting the adding of theory of trust. Creating tolerance, trust and flexibility among partners is beneficial for both innovation and learning (Karlsson et al., 2010) as well as trust is important in order to achieve productive collaboration (Vangen & Huxham, 2003). However, trust is an ongoing process and a continuous necessity for successful collaboration (Ring & Van de Ven, 1992; Vangen & Huxham, 2003). By that, having inter-personal skills and being able to cultivate trust by e.g. bridging diversity and seeking win-win situations, are competencies that need to be incorporated in leaders (Getha-Taylor, 2008). Power imbalances and conflicts over the shared purpose may be a source of distrust and in effect a peril to productive collaboration (Bryson et al., 2006).

Reliance on trust lowers the perceived risk in a cooperative relationship, thus creating a less agitated environment (Ring & Van de Ven, 1992). Not only is trust a facilitator in collaboration; costs of coordination can also be reduced due to lowered transaction costs (Child et al., 2005). Moreover, Wiewiora (2011) found that trust is positively correlated to knowledge sharing between projects, and especially so the ability trust (trust in the other's competence to perform a task) and integrity trust (trust in the other's fairness and honesty). More specifically, it was showed that ability trust contributes largely to knowledge sharing, but it is the integrity trust that reinforces it. Similarly, Tsai and Ghoshal (1998) discovered that trust influences the resource exchange between business units, which consequently contributed to product innovation. Moreover, informal social relations encourage this flow of events.

The role of actors as SFIN and Packbridge includes relationship management, being able to earn trust and respect from others but also to develop trust among involved parties (Lundberg, 2013). Managing trust includes both the ability to handle situations where trust is deficient, and the capacity build trust (Vangen & Huxham, 2003). Trust can be viewed as a cyclical process of risk, vulnerability and expectations. To initiate the cycle, the collaborating parties need to have sufficient initial trust in order to be vulnerable and take risk (ibid). Partners that have an interaction history or have had prior relationships will have less friction in collaboration and are more likely to achieve successful alliances (Vangen & Huxham, 2003) and successful cross-sector collaboration (Bryson et al., 2006). T rust between organisations will emerge when the parties have experienced previous successful transactions and when norms of equity, i.e. an equitable relationship and belief in the other's commitment, is confirmed (Ring & Van de Ven, 1992). Together with expectations of the collaboration, based on experience or formal agreements, risk and vulnerability influence trust, suggesting to begin collaboration through modest expectations and low risk to reinforce trust (Vangen & Huxham, 2003).

Sources of distrust

Power imbalances and conflicts over the shared purpose may be a source of distrust and in effect a peril to productive collaboration (Bryson et al., 2006). Bruneel et al. (2010) separate between orientation-related barriers (relates to orientation differences between the spheres) and transaction-related barriers (refers to IP and administration conflicts). They explored how three factors (trust, prior experience of interaction and breadth of interaction) may lower barriers relating to university-industry collaborations and identified that trust between the parties lowers

both types of barriers whereas prior experience of interaction only lowers the orientation-related barriers. The effect of breadth of interaction, i.e. number of interaction channels is however twofold, as it was observed that breadth mitigates orientation-related barriers but aggravates the transaction-related (Bruneel et al., 2010).

Furthermore, having clear objectives of the collaboration will enhance the trust building between the parties (Child et al, 2005). By forming expectations of the collaborative interaction, both in terms of roles and goals, trust can be initiated (Bryson et al., 2006). As an example, expectations about collaborative outcomes can be managed through agreeing on collaboration aims, and one should find ways to ensure that shared power is maximised (Vangen & Huxham, 2003).

2. 4. 3. Personal traits and diversity

Apparent in the case analysis was a view of a need to have certain personal traits in order to be innovative, and certain traits to overcome cultural distance between the spheres. Innovation barriers at an individual level is exemplified by abilities and attitudes, e.g. reluctance to incorporate unfamiliar methods to one's work (Hueske et al., 2015). In addition, it is stated that favouring of established methods and lack of management support for innovation can become a barrier for innovation (ibid). Professional differences in ideology or practice may weaken collaborative work and in some cases even lead to distrust or rivalry among professions (Cameron & Lart, 2003). Furthermore, personal differences in ideologies and fear of the unfamiliar can become cultural obstacles (ibid).

Encouraging new thinking and achieving heterogeneity in groups

It requires passion and determination to influence rigid and innovation-stifling organisational processes and focus on creating something new (Feldman, 1993). Similarly to the organisational dynamic capability (e.g. Teece, 1997), dynamic competence within the individual, i.e. the ability to learn continuously is related to higher innovativeness (West, 2014). Even though this ability often corresponds to personal traits of entrepreneurship and autonomy, diversity in group is still proclaimed as crucial in innovative environments (ibid). Hence, there seems to exist a tension between diversity to create new linkages and associations, and similarity to facilitate effective communication (Trott, 2005).

Homogeneous organisations adverse innovation since they limit the sources of creativity (Feldman, 1993). Diversity is valuable in organisations, combining experts of different fields with generalists. Diversity is also a means by which one can increase the likelihood of random combinations and increase creativity (Johansson, 2004; West, 2014). What needs to be considered however is to ensure the sharing of these different viewpoints (West, 2014). According to several researchers, innovation is a people process, and when individuals manage to take on a variety of roles, successful innovation is more likely the outcome (Trott, 2005).

2. 5. The deficiencies of a triple helix

Criticism about the triple helix concept is included because, as will be seen, both cases signalled apprehension about its theoretical focus and the lack of certain elements. Similarly, not all theorists agree on the superiority of the triple helix model. Deficiency in explaining how institutional mechanisms affect knowledge development (Benner & Sandström, 2000), its inadequacy for generalisation (Lu, 2008) and its limiting mechanic nature (Amir & Nugroho, 2013) are all critiques put forward. The triple helix is further being criticised for not providing methodological foundation and for inadequately explaining the links among the three parties as it neither describes how to create the links nor why they matter (Amir & Nugroho, 2013).

2. 5. 1. A quadruple or multiple helix?

Many are also those who propose a fourth (Brundin et al., 2008; Ivanova, 2014) or even fifth (Carayannis, Barth & Campbell, 2012) helix in order for the model to better account for current societal reality. Neu Morén and Hård af Segerstad (2010) acknowledge the increasing popularity of a multiple helix, since cooperation and collaboration seldom is limited to three actors but still there is dynamic interaction between actors from different contexts.

In a quadruple helix model, either the public (the community), scientific experts, media and culture can be viewed as a fourth element (Ivanova, 2014). However it appears that the community rather should be considered as the whole than as an additional part, which is why it becomes important to establish productive communication between the three original spheres and the consumer space (Ivanova, 2014). Brundin et al. (2008) incorporated the entrepreneur as a new element of the triple helix, who should be the driving target and force and emphasised that with an additional helix, structure and feedback loop is even more crucial. Most often,

media and culture is however viewed as a fourth helix due to present social and technological acceleration (Carayannis et al., 2012). In similar to the triple helix model, the inter-institutional interactions of Ivanova's (2014) quadruple helix will serve as selection mechanisms which may induce a new innovation environment.

The quintuple helix moves further beyond this by also incorporating the perspective of the natural environments (Carayannis et al., 2012), both in terms of society and economy (Ivanova, 2014). Further, the quintuple helix model can be applied to comprehend the link between knowledge and innovation so as to encourage sustainable development (Ivanova, 2014). In conclusion, to achieve a positive societal impact, the creation of new knowledge, know-how and innovation need to develop in balance with nature (ibid).

3. Methodology

This chapter explains the choice of methods for research design, data collection and analysis as well as the limitations and challenges of the methods chosen.

3. 1. Research philosophy

The research philosophy represents a framework that directs how the research is to be accomplished, and thereby constitutes the researcher's philosophies and assumptions of the world as well as the nature of knowledge (Collis & Hussey, 2014). One usually differentiates between four philosophies or paradigms; positivism, interpretivism, pragmatism and realism (Saunders, Lewis and Thornhill, 2009). For this thesis, positivism, or rather post-positivism, is viewed as the most appropriate alternative as the role of research is to either test theories or provide basis for development of principles (Bryman & Bell, 2003). Post-positivism argues that reality may exist, but that the researcher's observations are influenced by experience (Guba & Lincoln, 1994). It is thus believed that there is a reality that can be observed and measured approximately, either actually or probabilistically (Guba & Lincoln, 1994; Yin, 1994).

3. 2. Research approach

At this level of methodology, considerations are made between inductive and deductive research, where deduction relates to testing theory and induction concerns the building of theory (Saunders et al., 2009). However, the distinction between induction and deduction is not always clear cut, and in many studies combine the two (Bryman & Bell, 2003). With an inductive stance, generalisable inferences are drawn out of observations (Bryman & Bell, 2003). Moreover, the emphasis of the study lay on gaining a contextual understanding by collecting qualitative data, another intention by induction (Saunders et al., 2009). Inductive reasoning includes creating theoretical constructs or propositions, and is particularly suitable to employ to unfamiliar contexts (Eisenhardt, 1989). Hence, as this study took an open approach to answer the research question, induction seemed an appropriate approach.

3. 3. Research strategy

A research strategy on the other hand relates to the way of doing research, thus explaining how the author went about answering the research question (Collis & Hussey, 2014; Yin, 1994). The

main strategy for this thesis was qualitative research and more specifically exemplifying case studies, by analysing two organisational settings. Further, it took an exploratory approach as the researcher sought to learn more about a particular phenomenon and the aim was rather to create hypotheses than test them. In exploratory case studies, data collection often takes place before theories are articulated (Yin, 1994) which then appears suitable for the choice of inductive approach. The case study approach was applied since the aim was to obtain rich and nuanced data about dynamics and mechanisms that are apparent in triple helix organisations and not necessarily to reach a generalisable conclusion across any organisation (Saunders et al., 2009). Moreover, it is assumed that intermediary organisations such as SFIN and Packbridge will have unique characteristics (Metcalfe, 2010), thus adding to the applicability of a case study. Considering the time constraint for the thesis, the study was cross-sectional, seeking to describe a phenomenon at a particular time (Saunders et al., 2009).

3. 3. 1. Theory generating case study as research strategy

Since it is likely that the particular context being studied affects the internal organisational processes of innovation, applying quantitative strategies would fail to acknowledge particular variations and nuances in organisational approaches (Collis & Hussey, 2014). Qualitative methods on the other hand put emphasis on process and context (Bryman & Bell, 2003). A case study enables the investigation of contemporary complexities within organisations and is usually the chosen strategy when the boundaries between phenomenon and context are indistinct (Yin, 1994). In other words, the context is of particular importance and the case study allows for an in depth investigation. This study however applied multiple-case strategy as it analysed two organisational settings. Multiple case studies are used when the study includes several individual cases and these typically follow the same rationale as that of single case studies (Yin, 1994). Since the purpose of the multiple cases was to apply them as illustrations for the concept of triple helix rather than to compare the two, literal replication was expected (ibid).

Case studies are applied to describe, test theory or as in this case, generate theory (Eisenhardt, 1989). Inducting theory by using case studies is suitable in new topic areas, which the current study was entering. When building theory, a broadly defined research question should be formulated initially in order to delimit the research scope. Similarly, stipulating some a priori construct is helpful (ibid). Because of this, a superficial literature review was conducted by the

researcher to identify the research gap and potential constructs, but was not employed to consider potential relationships between empirics and theory.

In sum, the goal of this study was to generate an inductive case-study approach that was oriented in a (post) positivist philosophy. The purpose was to examine cases, where the result was solid empirical generalisation or theory that gave new insights to the phenomenon of triple helix that could be connected to theoretical analysis. The results or theory generation of the in-depth case study should thereby be reviewed as a starting point to further research, which in turn could take on a quantitative and naturally more generalisable approach.

3. 3. 2. Data collection

Inductive research often combine several data collection methods (Eisenhardt, 1989). The data collection methods included primary as well as secondary collection, with the former focusing mainly on semi-structured in-depth interviews, and the latter relating to e.g. reports and public records.

To more thoroughly understand the inherent mechanisms and dynamics within triple helix organisations, the research was limited to two organisations; Skåne Food Innovation Network and Packbridge. The rationale behind choosing to analyse these among the potential six mostly lay in that they are both collecting traditional industries, but also because they gather a relatively high number of member organisations. In addition, the current CEOs have both had their position for the last five (in Packbridge) and eight (in SFIN) years, making them experienced of the triple helix context. Lastly, the two cluster organisations have a shared platform for open innovation (Open Up, n.d.), meaning they have a common practical experience of forming beneficial conditions for innovation.

Primary data collection

The purpose of the interviews was to gain a comprehensive insight of the problem setting.
In order to gain relevant in-depth and contextual knowledge, semi-structured interviews were conducted. The number of interviewees added up to twelve, ranging from CEOs and project managers from SFIN and Packbridge to member representatives from the three spheres as well as external "experts" with deep knowledge and considerable experience of the triple helix concept. Which members to interview were suggested by the CEOs of the triple helix

organisations, whereas the experts were suggested by employees at Region Skåne and Lund University.

The majority of the interviews were conducted in person, at the respondent's home office. Four interviews had to be performed on phone due to long distances or logistical reasons. Each interview was recorded and transcribed and lasted between 33 to 85 minutes. Since all respondents were Swedish, the interviews were performed in Swedish in order to facilitate communication and provide an as comfortable as possible environment. A question protocol was used as a basis for the interviews, but the intention was to keep an open discussion of the issues to allow for information that otherwise would be missed. The format of the interviews was relatively conversational, giving the respondents the chance to develop their thoughts on what they considered to be eloquent in the organisational setting. The respondents were however guided by the researcher in order to stay close to the intended interview guide. The interview guides can be found in Appendix 1. Below is a list of the respondents and information about how the interview was conducted.

Respondents with relation to SFIN

- *Lotta Törner, CEO, SFIN. 2015-04-24, 40 min. In person.*
  Lotta has a managerial role at SFIN, having had the position as CEO at SFIN for eight years, since 2007. Lotta has a managerial background at Skånemejerier, working with communication and information and where she among other things was involved in developing the innovative ProViva drink.
- *Amanda Magnusson, Project manager, SFIN, 2015-04-29, 68 min. In person.*
  Amanda has an operative role at SFIN. Project leader, together with Johan Mårtensson (Packbridge), for a project in consumer driven open innovation for food packaging since 2012. As part of that, they have developed an open innovation platform called OpenUp. Amanda has a background within research aiming to integrate packaging and food.
- *Anita Broddesson, Head of food and cleaning, Municipality of Klippan (public actor). 2015-05-19, 36 min. On phone.*
  Head of food and cleaning at the municipality of Klippan for the last 25 years. The municipality of Klippan is a member of SFIN and has been especially involved in a

project of food for the elderly. Anita and the municipality has e.g. presented their work with Innovation Procurement at SFIN events.

- *Mats Lönne, Founder and CEO, Ottos barnmat,* eng. *Otto's baby food (private actor).2015-05-20, 33 min. On phone.*

  Can be described as a food entrepreneur. He is the founder and CEO of Ottos Barnmat, producing and distributing fresh organic baby food. Otto started as a project in 2010 and SFIN believed in the project and supported it by giving early project financing. Mats previously worked as Brand Manager of ProViva
- *Hans Knutsson, Assistant Professor, Department of Business Administration, Lund University (academia). 2015-05-26, 81 min. In person.*

  Hans was employed at the initiative that later become SFIN, between 2005-2012 he worked primarily towards the concept called "Joyful meals in public sector" and had a position at the management group.

Respondents with relation to Packbridge

- *Per-Stefan Gersbro, CEO, Packbridge. 2015-04-30, 85 min. In person.*

  Per-Stefan was one of the initiators to Packbridge, and has been the CEO since the organisation was established in 2010. Per-Stefan is trained chemical engineer, and before his time at Packbridge he worked mainly within the packaging industry at e.g. Åkerlund & Rausing (Later ÅR Carton).
- *Johan Mårtensson, Project manager, Packbridge. 2015-05-11, 52 min. On phone.*

  Project leader, together with Amanda Magnusson (SFIN), for a project in consumer driven open innovation for food packaging since 2012. As part of that, they have developed an open innovation platform called OpenUp. Johan has a professional history at ÅR Carton (part of ÅR Packaging group).
- *Per Nyström, CEO ÅR Packaging Group (private actor), 2015-05-13, 62 min. In person.*

  Vice president at ÅR Packaging Group and was, along with Per-Stefan and others part of the initiators to developing Packbridge. Per Nyström holds the position as chairman at the board of Packbridge. ÅR Packaging was a merger of Flextrus and ÅR Carton and has been a member of Packbridge since the start.
- *Annika Olsson, Professor, Packaging Logistics, Faculty of Engineering at Lund University (academia). 2015-05-20, 55 mi. In person.*

Annika is also Assistant Dean, focusing on Collaboration and Innovation at the Faculty of Engineering. Since 2011 Annika has been a member of the board at Packbridge. Annika worked operatively at SFIN for two years to develop the area of food packaging, and since 2015 she is also a member of the board at SFIN. She has an industrial background, working as an engineer at Alfalaval, Tetralaval and TetraPak. Lund University is a member in both Packbridge and SFIN, but for this thesis the focus was on Packbridge.

- *Jan Magnusson, Business Developer Logistics, Municipality of Helsingborg (public actor). 2015-05-26, 81 min. In person.*

  Jan is business developer at the municipality of Helsingborg and works mainly for the bigger concept "Familjen Helsingborg" (Family Helsingborg) which connects the smaller municipalities surrounding Helsingborg. Jan's focus is logistics and cluster development. Familjen Helsingborg has been a member of Packbridge since the start, 2010.

External respondents

- *Helene Vogelmann, Head of Department, LU Open Innovation Center. 2015-06-02, 67 min. In person.*

  Helene holds her position since 2011. For ten years before that she worked nationally with cluster and innovation systems, at the Swedish Agency for Economic and Regional Growth and VINNOVA, Sweden's Innovation Agency. She has also worked with policy instruments, designed national and European programs within innovation system and clusters, been involved in the building of Mobile Heights (another cluster/triple helix in the region) and been supporting Region Skåne to build the unit for innovation systems.

- *Göran Andersson, Programme manager, VINNOVA. 2015-06-13, 67 min. On phone.*

  Göran has worked at VINNOVA since the start 2001. At that time his main focus was to develop a program which encouraged triple helix cooperation, aiming to promote cooperation between industry, researcher and public agencies and create a new type of innovation environment. A part was also to extend the role of the public actor to become more than a financier. This program was called Vinnväxt, and SFIN was granted to be part of the program 2001-2011.

Secondary data collection

The foundation of the secondary data was collected from various sources. The type of data ranged from research reports made and published by Swedish state agencies to reports developed on account for Region Skåne.

3. 4. Quality of the study

Qualitative methods are often criticized for being subjective because of the interpretative nature of the researcher (Bryman & Bell, 2003). One can also imagine a risk of bias if the number of interviewees is very limited. Building on that, the study was designed to incorporate people who together were expected to give a rich and broad picture of the studied cases. Inductive and qualitative studies are criticised for sometimes providing insightful empirical generalisation, but not much theory building (Bryman & Bell, 2003). However the case study as such does not aim for statistical generalisation but rather for an analytic generalisation (Yin, 1994). Moreover, an inductive approach tries to generalise findings to theory rather than to other cases (Eisenhardt, 1989). For this thesis, issues of replication and transparency were expected to decrease through solid methodological argumentation and thoughtful elaboration of analysis.

3. 4. 1. Reliability and validity

To enhance the quality of the research findings, validity and reliability should be closely monitored (Yin, 1994). Validity is concerned with whether the conclusion actually corresponds to the reality (Saunders et al., 2009). By using various data sources construct validity is enhanced (Yin, 1994). Thus, the triangulating of interviews and secondary data of previous studies of the same organisation was considered to increase validity by achieving a more accurate view of the complexities (Yin, 1994). In addition, construct validity was assured by letting a few key informants read the report (ibid). The approach of collecting standpoints from individuals in various organisational settings was another tactic that raised validity (Yin, 1994).

Reliability then attends to the extent to which the study can be performed by another researcher or at another time or whether it is transparent enough, which was why methodical documentation was kept by the researcher (Yin, 1994). The results may be biased due to the observer's particular personal characteristics, or due to the setting in which the participants perform the interviews (Saunders et al., 2009). As the interviews were performed by the same

person, the risk of having different interpretations was minimised. In addition, recording and transcribing the interviews reduced the risk of misinterpretations and allowed for thoughtful revision of responses and enabled a more reliable documentation.

3. 5. The analytical process

Analysis takes place both throughout and after the data collection, which facilitates to shape the direction of the empirical data (Saunders et al., 2009). By overlapping data collection with data analysis to some degree, the researcher could benefit from flexible data collection (Eisenhardt, 1989). Combining data collection and analysis allowed maintained focus on the purpose of the study, while it also encouraged the researcher to be open for unexpected findings and mitigated data overload (Miles & Huberman, 1994).

Coding was applied as analysis method. The transcripts were first read and re-read to identify themes and categories. The tentative themes were compared across the cases to evaluate the fit between the data, and thereafter the constructs were sharpened (Eisenhardt, 1989). The broader themes found were among others role, challenge, innovation and value. These were thus used as more general codes to determine the overall findings. These themes were then narrowed down to reduce overlap and redundancy among them as well as they were formulated another time to appear more context-specific. As an example, innovation became innovation-border, innovation-environment and innovation-knowledge, whereas challenge was categorised into e.g. trust, logics and abstraction. As some codes appeared to not work and new ones emerged, the codes were revised during analysis (Miles & Huberman, 1994). The coding was combined with marginal remarks to add meaning and clarity to the transcripts (ibid). The identification of themes also allowed for analysis of differences or paradoxes in the respondents' saying. Eventually, a coding frame was developed that was similarly applied to all data and generated the structure of the concurrent analysis.

The verification of themes and relationships set the foundation for the developed framework, which underpinned the outline of the subsequent literature examination. Therefore, theory relating to concepts as knowledge integration, organisational culture and trust was regarded relevant to include in the thesis. Both literature conflicting and supporting the findings were examined to enhance the internal validity, generalisability and theoretical level (Eisenhardt,

1989). Upon the differences and similarities between the analytical framework and existing literature, a discussion of barriers and paradoxes in creating a conducive organisation for innovation followed, leading to seven propositions that will be examined in the discussion chapter . The figure below summarises the methodological choices of this thesis.

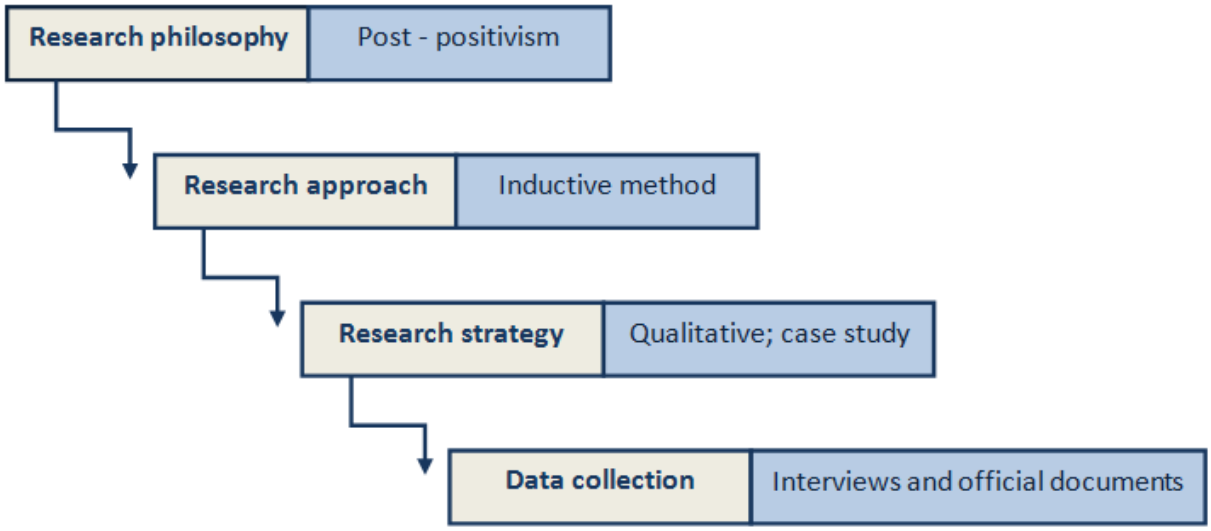

Figure 3. Outline of the methodological choices.

4. Analysis

In this chapter, the findings from interviews and secondary data are explained. The main focus is to distinguish the contingency factors that influence the potential for a conducive environment for innovation and collaboration in a triple helix setting. In addition, issues in form of paradoxes and barriers that may constitute challenging in these situations are identified.

4. 1. Empirical background

The focal organisations of the study are Skåne Food Innovation Network (SFIN) and Packbridge. Even though these gather a big number of member organisations, SFIN and Packbridge constitute the structure of the networks and hence, the focus of the study.

According to several interviewees (Andersson, Olsson, Törner, Vogelmann etc.), triple helix became a policy tool in Sweden as a result of the founding of Vinnova, Sweden's innovation agency, in 2001. However, it is reasonable to believe that the construct of combining different spheres already existed, just not in such a formalised way (Helene Vogelmann, June 2, 2015).The concept was developed by Henry Etzkowitz and was applied as a simplified model to the regional innovation system. The very basis was to find the space between university, industry and public sector and encourage learning exchange and collaborations to enhance regional development through innovation (Göran Andersson, June 13, 2015). The origination behind triple helix can be derived from a more complex society, with more complex challenges that cannot be solved by a single actor (Annika Olsson, May 20, 2015). Accordingly, one may explain the emergence of triple helix as a consequence of the need to gather the complementary forces of research, commercialisation and politics (Lotta Törner, April 24, 2015).

4. 1. 1. Skåne Food Innovation Network (SFIN)

SFIN was founded in 1994, and the main idea behind it was to create a forum for research and discussion among industry, universities and regional actors (Oxford Research, 2011). SFIN is often described as a cluster initiative that drives network innovation or open innovation and they collect around 140 members from the entire triple helix, ranging from big industry players to small entrepreneurs (ibid). The main goal for SFIN is to function as a network organisation for the food sector in Skåne. This function includes attracting students to the industry and being a meeting point for actors in the industry (Henning, Moodysson & Nilsson, 2010).

In short, SFIN creates conditions for innovation and entrepreneurship within the sectors of food, drinks and meals. More specifically, SFIN is driving projects and creating networks that are characterised by boundary crossing collaborations and open innovation and they work to increase knowledge in the industry as well as creating innovative work models. The geographical focus is southern Sweden, but the organisation operates nationally as well as internationally (Livsmedelsakademin, n.d.a.). Due to its legal form, the organisation is not supposed to operate for profit, thus the business needs to be financed by members, the region and state agencies. Internally, SFIN employs 18 people (Livsmedelsakademin, n.d.b.).

4. 1. 2. Packbridge

Packbridge is a younger cluster initiative than SFIN, founded in 2010. In common with SFIN, the initiative was also instigated from the industry side (Per-Stefan Gersbro, April 30, 2015). The cluster is a network for the packing industry and its stakeholders, with a concept to create a forum that connects industry with academia and people with people (Packbridge, n.d.a.). In the words of Per-Stefan, founder and CEO, the idea behind Packbridge was to create an ecosystem between agencies and actors, both physically and virtually and between trade partners, consumers and the whole packaging industry with suppliers, designers and producers (Per-Stefan Gersbro, April 30, 2015). It is believed that through collaboration between actors, one can create conditions that allow companies to better manage increased competitiveness and ensure long term survival (Oxford Research, 2011).

The cluster is spread internationally and gathers about 230 member organisations (Per-Stefan Gersbro, April 30, 2015). To their members, Packbridge is offering services of education, consultation, research, development and networking activities (Oxford Research, 2011). As SFIN, Packbridge is not operating for profit and hence has a similar financial ground. Packbridge currently employs six people in Skåne (Packbridge, n.d.b.).

4. 2. The value offered by triple helix organisations

The Skåne Food Innovation Network (SFIN) and Packbridge are both effects of these policy initiatives, but comprehending the value and benefits these organisations provide for their members is complicated. According to a few respondents, what constitutes the value for members in SFIN and Packbridge is debated but there seems to be consistent belief that the

organisations do provide a value, just not a measurable one (e.g. Magnusson, Lönne, Nyström). This statement is also uttered by Jan Magnusson (May 22, 2015), who believes that the result needs to be arbitrarily and personally estimated. Since it is impossible to derive a new idea or innovation to a particular event or occasion, the value is immeasurable.

4. 2. 1. The benefits of a network

"*The network activities provide an arena for discussion, which is beneficial since these allow feedback iterations of certain issues*" (Amanda Magnusson, April 29, 2015). Moreover, Per-Stefan Gersbro (April 30, 2015) states that " *The very strength of a triple helix is to gather those sectors that are important for societal development. Gathering various actors gives unexpected inspiration, as you will get perspectives from new people".* Hence, the foremost value is the network and the interactions it provides. At meetings where people from diverse backgrounds come together and discuss problems, clarification of the issues will be enhanced and new perspectives will be developed (Oxford Research, 2011).

The network offers valuable opportunities for establishing new contacts and receiving new input and development (Anita Broddesson, May 19, 2015). As an example, the municipality of Helsingborg incorporated new perspectives from their network to re-evaluate and change the concept of the city's business days and resulted in great improvement. For an entrepreneur that needs to tie new competences to a project, the network of SFIN could prove valuable (Mats Lönne, May 20, 2015). As an example, the network activities of Packbridge provided an opportunity for the firm Procordia to tie new contacts and in effect collaborate with another firm to develop a new business system (Oxford Research, 2011). Flextrus has also experienced concrete collaboration: "*We have established a collaboration with a small company working with product safety, because their product idea is great and ought to be developed further*" (Per Nyström, May 13, 2015). These comments come from several different perspectives, thus indicating that networking and social interaction is viewed a means to initiate business development. However it is assumed that new contacts almost automatically leads to value, the exception being business focused Per Nyström and entrepreneur Mats Lönne who acknowledges that "*In order to make use of others' knowledge, you need to be active yourself and establish new contacts*".

4. 2. 2. Practical outcomes from Skåne Food Innovation Network and Packbridge

There are some concrete outcomes of the triple helix organisations. Members in SFIN mention cooperation opportunities, a competent network, meeting others, skills development (Lotta Törner, April 24, 2015) and the opportunity for developing ideas into innovative products or companies as benefits (Amanda Magnusson, April 29, 2015). The development of "Ottos Barnmat" (Otto's baby food) is one such example where the idea of healthier, organic baby food stemmed from a creative and allowing organisational culture and grew into a successful entrepreneurial company thanks to a competent network (Mats Lönne, May 20, 2015). A large number of members in SFIN state that the membership has led to new networks, developed knowledge of the industry and more cooperation and collaboration (Oxford Research, 2011). To an entrepreneur, another concrete value is project financing that is allocated at a crucial point of the development process (Mats Lönne, May 20, 2015).

Similarly, collaborations, exchange of knowledge and ideas, networking and start-up companies are examples of outcomes in Packbridge (Johan Mårtensson, May 11, 2015; Per Nyström, May 13, 2015). This is further supported by the fact that members of Packbridge have experienced increased understanding of the industry, larger knowledge dispersion and new networks, together with extended collaborations with R&D agencies (Oxford Research, 2011). Access to business intelligence and information about the packaging industry that Packbridge provide are valuable for the business development in the member organisations (ibid). In common for these examples is the perceived value of interaction and meeting people. In support, the members think that the most important task for SFIN is to build innovative networks between actors and firms and to work for increased inter-actor collaborations (Oxford Research, 2011).

As the aim is to understand how to create a conducive environment, the focus is on the triple helix organisations and the network venues they provide. It seems that organisational or structural elements and soft factors such as culture are key features to create a conducive environment for innovation, which is why the following sections are organised accordingly.

4. 3. Organisational factors in a triple helix context

According to Hans Knutsson (May 26, 2015), complexity increases as the number of collaborating actors increases. Hence, knowing which role to take in the network and being

aware of structural risk factors is important in order to structure innovation processes satisfactorily. The logic of open innovation questions the traditional, linear development processes (Helene Vogelmann, June 2, 2015) and therefore SFIN and Packbridge need to recognise the logic behind the network in order to develop an intellectual infrastructure to promote these innovations (Hans Knutsson, May 26, 2015).

4. 3. 1. Innovation through cross-sector activities

The triple helix construct appears to stimulate innovation mainly through the combination of diverse perspectives, competence and opinions. Knowledge, and sharing it, is a crucial ingredient for innovation (Per-Stefan Gersbro, April 30, 2015). This is especially interesting considering the argument that a premise for innovation and new solutions is the boundary spanning activity in networks of smaller and bigger actors, with diverse sets of competence and from different conventions (Mats Lönne, May 20, 2015). It is assumed that society is improved and development encouraged when people meet across different sectors or logics (Per Nyström, May 13, 2015). *"When smart people from various types of specialisations and approaches meet, sparks will be flying and the probability of innovation will be much higher"* (Per-Stefan Gersbro, April 30, 2015). The above viewpoint of innovation indicates a consistency among the respondents of how innovation is encouraged, which is interesting to reflect on since it signals replication of current innovation literature. It is possible that the triple helix policy has become influential to the degree that people working in the context has incorporated that viewpoint fully, that they are marked and mainly are reproducing the normative aspects of the triple helix.

Correspondingly, many respondents explain that it is the boundaries between people and organisations that promote innovations (e.g. Anita Broddesson, May 19, 2015; Lotta Törner, April 24, 2015). Very rarely innovation happens as a one man show or within a single discipline - the condition is diverse perspectives (Annika Olsson, May 20, 2015). Not only is boundary meeting activities expected to promote more innovations; but they will probably also reach a higher quality. More specifically, the existing standpoints and logics are challenged and ideas are tested from other perspectives, leading to either better solutions or “death” of unqualified solutions. (Amanda Magnusson, April 29, 2015; Hans Knutsson, May 26, 2015).

Challenge of integrating knowledge

The CEO of Packbridge, Per-Stefan Gersbro (April 30, 2015) states that "*Packbridge works to increase the understanding of the whole picture or the complete value chain. The general knowledge level also needs to be enhanced in the sector and across our members (...) Therefore Packbridge focus on providing seminars and venues aiming at increasing knowledge among participants*". A deficient or narrow knowledge level thus seems to be noted from a managerial perspective. However, the subsequent knowledge integration is not addressed by the respondents, neither from an internal or external perspective. Understanding the integration of knowledge appears to be crucial to more efficiently encourage innovation.

It seems that the incorporation of new input is absent in some situations: The fact that SFIN is an organisation weighted towards industry, both strategically and in internal management, proved a barrier when including an academic perspective to the organisation. Rather than embracing the analytical view it was neglected (Hans Knutsson, May 26, 2015). This is an interesting remark, since Knutsson previously was professionally active in SFIN and has shifted from an internal towards an external however still influenced perspective. Further reflection on whether the incorporation of new input did not work in the other direction either, i.e. incorporating an industry perspective into the academic, is an interesting thought.

4. 3. 2. Organising as a triple helix

The main advantage of combining university, politics and private sector is the provision of complementary competences and contradictory opinions, or in general diverse viewpoints (Anita Broddesson, May 19, 2015; Jan Magnusson, May 22, 2015). This indicates that the strength in a triple helix lies in the close connectivity between the societal forces. It is meant to provide an arena where the actors responsible for a good society (public actors and politics) and the actors responsible for building it (private entities) connect (Per-Stefan Gersbro, April 30, 2015). From the university standpoint, the collaboration is a way to better utilise research (Hans Knutsson, May 26, 2015). Providing superior research and education is insufficient, and the university also needs to be excellent in applying it concretely (Helene Vogelmann, June 2, 2015).

"*Value is basically achieved when Packbridge manages to satisfy the needs from all three sectors simultaneously* " (Per Nyström, May 13, 2015). This quote illustrates one characteristic

of a triple helix network, that the three actors speak different languages. The facilitator role of SFIN includes translating between the various languages that are spoken internally in every sphere (Amanda Magnusson, April 29, 2015). Even though the diverse perspectives are considered the main benefit of a triple helix constellation, these also induce challenges. The three actors have different time frames and different incentives that need to work alongside (Göran Andersson, June 13, 2015). With different laws to comply to and different control systems and management, it is understandable that there will be obstacles in collaborating for change (Lotta Törner, April 24, 2015).

Triple helix contains three different types of actors, and these are expected to fulfil certain roles. The public actor is expected to raise the societal problems, taking a role as innovation driver (Anita Broddesson, May 19, 2015). Moreover, it is expected that the public actor either facilitates a platform for meetings across institutions (Jan Magnusson, May 22, 2015), or coordinates the triple helix towards a predefined direction (Annika Olsson, May 20, 2015). This is interesting since it illustrates vague and overlapping roles when both the triple helix organisations and the public actors are expected to facilitate the interactions. These parameters however mainly provides an internal perspective and do not account for the market perspective. This is why the industry, with input from the real world proves valuable (Per Nyström, May 13, 2015). Since customers do not have an integrated role in triple helix, the market perspective is a crucial ingredient for relevant output. Concerning academia, researchers mainly provide knowledge, new methods and processes (Jan Magnusson, May 22, 2015).

Misalignment of complementary competences

However, even though these roles are expected, a systemic approach of how to integrate, bridge and optimise their respective strengths seems to be lacking. Thereby, the effect of the triple helix collaborations too is weakened. This argument is supported by the fact that the majority of inter-sector collaborations that have been introduced in SFIN and Packbridge is between firms. In SFIN, interactions between firms and academia are estimated 3,3 on a scale 1-5 and the number is even lower in Packbridge where it is estimated to 2,8 (Oxford Research, 2011). In particular, collaboration activities with public actors appear to be missing, which has been stated a key collaborator in order to comprehend the societal issues (Per-Stefan Gersbro, April 30, 2015). In

other words, the complementary forces and competences are not optimised in the triple helix organisations.

"*We wish to see collaborating actors, however at the same time it is important to create the dynamics necessary for renewal and innovation. In other words, tensions need to exist and constructive conflicts need to be created*" (Göran Andersson, June 13, 2015). This saying indicates that there is a contradiction between the alignment of differences and the importance to still encourage dissimilarities. Similarly, Hans Knutsson (May 26, 2015) states that "*Differences of opinions, clashes and disagreements are means for growth and development "*. What is interesting is that these comments were made by individuals who has a theoretical or analytical perspective, who are not present in the (potentially) conflicted collaborations. However, that some value may come out of disagreements ought to be understood by those within the specific interactions.

4. 3. 3. The triple helix organisation: role and processes

Defining the roles of Packbridge and SFIN is difficult since these are perceived differently depending on the actor and his/her formal relation to the organisation. Even though many actors consider their membership in SFIN or Packbridge as valuable, companies are uncertain of how the organisations operate and which value they can get from their activities (Henning, Moodysson & Nilsson, 2010; Jan Magnusson, May 22, 2015). Furthermore, wishing for a strategically defined and focused SFIN indicates an ambiguous role (Oxford Research, 2011) which is why both SFIN and Packbridge should invest in prioritised areas rather than trying to appeal to an entire industry sector (Henning, Moodysson & Nilsson, 2010). This suggests that the organisations should develop a systemic view of their work and determine their role in a more strategic and explicit way. The organisations should discuss internally how to manage the contextual challenges and further concretise how their specific triple helix should behave and which role to take towards the industry. It seems to be confusion concerning whether the organisations are to encourage disruption or achieve incremental changes (Hans Knutsson, May 26, 2015).

"*If we do not provide our members with foresights and in that way help the industry to prepare for structural changes and transformations, the food industry risks major break downs.*

Therefore we need to identify the trends or techniques that eventually will disrupt those of today" (Lotta Törner, April 24, 2015). Similarly, Johan Mårtensson from Packbridge (May 11, 2015) states that "...*We can provide our members with a bigger picture through our situation analyses and foresight processes*". According to Henning, Moodysson and Nilsson (2010), the foresights should be highlighted as an activity to mitigate and avoid lock-ins for the food sector. These statements exemplify one role that the triple helix organisations ought to fill. What is interesting is that it is confirmed also from a member perspective. Whether that is an effect of SFIN and Packbridge's belief in this mode or if it is regarded so due to own experience could not be established. To municipalities, they increase knowledge of forthcoming societal issues (Anita Broddesson, May 19, 2015) and for academia it gives an opportunity for researchers to identify current and relevant research projects which may lead to continuous collaborations (Annika Olsson, May 20, 2015).

Having an actor as Packbridge or SFIN to provide with this is advantageous as it mitigates the risk of inward-looking in organisations, encouraging a starting point at the societal challenges instead of individual goals (Annika Olsson, May 20, 2015). In addition, the diverse perspectives that each helix provide also encourage thinking that extends one's own immediate context (Anita Broddesson, May 19, 2015). Networking events broaden the participants' mindsets and is therefore alleviating the risk of being trapped in the belief of one's own superiority (Johan Mårtensson, May 11, 2015).

Fundamentally, the strategic model of SFIN is to *identify* trends and future challenges - to *test* the solutions through pilots - and then to *spread* these pilots to be applied in other contexts (Amanda Magnusson, April 29, 2015). This indicates a long term perspective of their task and vision, which can function as a balancing factor towards the diverse perceptions of time in the three helices (ibid).

Different metaphors are used to describe SFIN. Due to the strategic model, SFIN similes a catalyst (Amanda Magnusson, April 29, 2015), but because they connect the industry to development opportunities, they are also explained as a coordinator (Anita Broddesson, May 19, 2015). The practical triple helix of Packbridge is to create arenas or venues where different organisations can meet and talk (Johan Mårtensson, May 11, 2015). They aim to be a knowledge

based event organisation and competence based matchmaker, a catalyst for innovation and business (Per-Stefan Gersbro, April 30, 2015). Packbridge is thereby considered either a catalyst to open up the information flows between actors (Per-Stefan Gersbro, April 30, 2015) or as a facilitator as they facilitate as well as stimulate interactions that promote new ways of thinking (Johan Mårtensson, May 11, 2015).

Both SFIN and Packbridge are network focused organisations with the aim to stimulate meetings. However, according to Jan Magnusson (May 22, 2015), "*There is a risk that the networks become nothing more than a breakfast gathering (...) That what is provided is abstract inspiration of lectures or presentations, but the participants return to their organisational settings without knowledge of concrete action*". Hence, what seems neglected is to encourage value creation and interaction also in between events and not restrict it to the seminars (Per Nyström, May 13, 2015). Because of this, the venues need to be innovatively organised and be challenging for the participants and include practical discussions as well (Annika Olsson, May 20, 2015). Moreover, Olsson suggests that SFIN and Packbridge should develop models or processes that can be spread and provide more practical examples and become a role model of how to work with complexities. This is supported by the thesis that SFIN provides their greatest value to their member when they manage to create models for processes that can be applied in other settings (Lotta Törner, April 24, 2015).

"*The triple helix should be illustrated more loosely coupled. The firms work in their distinct context, and we (universities) work in our distinct context. Hence we all depart from our contexts when we engage in the networks to meet others and exchange knowledge, but subsequently return to our organisations and the field of specialty*" (Annika Olsson, May 20, 2015). This is an example of how representatives from SFIN and Packbridge are wishing for more flexibility in regards to the triple helix concept. Moreover, the collaborations do not always involve three helices but may include actors from only one or two helices (Annika Olsson, May 20, 2015). Instead of formalised arrangements, issue-driven collaborations are encouraged. The sectoral involvement should be more flexible and depend on which problem that is to be solved (Göran Andersson, June 13, 2015; Jan Magnusson, May 22, 2015). By identifying sub-problems from the grand challenges, issues can be dedicatedly shared by smaller groups. Having a permanent organisational form becomes irrelevant (Helene Vogelmann, June

2, 2015). The above reasoning is interesting to connect to the theoretical view of including freedom in organisations in order to develop innovation. However, the comments are also exemplifying theoretical thoughts and not practical experience of flexible methods, which raises the question of real applicability in this already complex context.

Structure vs. flexibility

The main obstacle for inter-sector collaborations is path dependency, both organisational and individual. Path dependency explains how one's earlier decisions or habits determine future decisions, even though the future context will be of different nature and in reality require a new assessment. Regions, politicians and traditional as well as contemporary businesses that are built on open innovation need to rethink their businesses and identify which building blocks that compose path dependency and constantly be able to re-evaluate how innovation should be organised (Helene Vogelmann, June 2, 2015).

Although processes and structures facilitate order and may give clearer focus of the organisations, it is important not to get stuck in these and instead stimulate organisational agility. Perhaps not explicitly stated, the comments concerning the need for foresights indicate apprehension towards lock-ins and path dependence. If SFIN and Packbridge are to encourage broader thinking and innovation in their member organisations, they also need to re-evaluate themselves and consider their own potential path-dependent thinking (Helene Vogelmann, June 2, 2015) and mitigate possible lock-ins (Annika Olsson, May 20, 2015). As both SFIN and Packbridge are small organisations internally, rigid organisational structures are perhaps not the main obstacle. However a crucial internal characteristic within the triple helix organisations is to be open for learning and be able to reconsider existing approaches (Hans Knutsson, May 26, 2015).

Also, there seems to be a paradox between the organisational strategy to identify future needs and work with grand challenges and to organise for upcoming events or seminars, i.e. between long term and short term approaches. Facilitating an ongoing and long term interaction between the participants is requested (Per Nyström, May 13, 2015). In relation to this paradox is the aim to develop applicable models (e.g. Lotta Törner, April 24, 2015), which contrasts the tendency of abstract network activities (Jan Magnusson, May 22, 2015).

4. 4. Contextual and relational factors in a triple helix context

In order to create a dynamic collaboration and innovation climate, just putting together a network of actors is insufficient. Soft factors such as an open and allowing environment, trust and certain personal traits are important. The reasons for it will be explained further in this section.

4. 4. 1. Innovation through an allowing environment

As both SFIN and Packbridge are too small organisations to innovate themselves, their role is more to create an infrastructure that facilitates exchange of ideas and encourages innovations (Lotta Törner, April 24, 2015). Additionally, Mats Lönne (May 20, 2015) declares that "*It is dangerous for an organisation to specifically declare that they work to be innovative or that employees need to develop X number of innovations. This since having number of innovations as a performance indicator often attaches a prestigious feeling, and will conversely rather kill the creative spirit and the room for creativity than enhance it*". These comments suggests that the organisational culture is important to create the right conditions for innovation. This view is coming from an entrepreneur who has experienced the prestigious environment first hand and thus also realised the necessity of open attitude rather than performance measures.

Creating an open, unpretentious work environment should thus be the goal. Achieving this culture and reside it with people characterised by great attitude, curiosity, obstinacy and a fearless of challenges is a prerequisite of an innovation environment (Mats Lönne, May 20, 2015). The viewpoint that innovation is affected by the relational context is exemplified by the following quote by Hans Knutsson (May 26, 2015): *"The key to innovation is to dare to take risk and to learn from failures"*. Similarly, "*Innovation both can and should go wrong which is why risk aversion discourages change*" (Lotta Törner, April 24, 2015). The comments are supporting the view and conviction that there is a vast number of failed initiatives for every successful product or innovation, hence an open environment is needed to encourage risk taking and decrease the fear of failing. In other words:

Challenge of accepting change and failures

This discussion indicates that an environment aiming to stimulate innovation need to be forgiving and be able to realise the value of failures. Even though SFIN understand the necessity to take risks, this is opposed by the perception that they in practice are risk averted (Hans

Knutsson, May 26, 2015). Inherently, there is a tendency to reprimand unsuccessful initiatives rather than to criticise lack of initiatives, which would be more adequate as the latter will inhibit inventiveness. Risk taking and failures should be viewed positively, provided the organisation learns from them (Hans Knutsson, May 26, 2015). Moreover, on the one hand, SFIN appear to be able to incorporate input regarding improvements (Göran Andersson, June 13, 2015) and is viewed an open organisation that value external input (Oxford Research, 2011). On the other hand, SFIN is considered indifferent to self-evaluate and understand where things went wrong (Hans Knutsson, May 26, 2015).

"*Many big organisations, may it be public hospitals or big industry players, are resistant towards innovation and change since it threatens the general order*" (Lotta Törner, April 24, 2015). The resistance towards *open* innovation is probably even more severe (Annika Olsson, May 20, 2015). However, keeping everything firm internally will probably become self-destructive (Jan Magnusson, May 22, 2015) which is why pushing the industry to become more transparent and open is a must but also a difficult challenge (Johan Mårtensson, May 11, 2015). The resistance towards change is that incumbent actors do not have the incentives to change their business dramatically. For one, after decades of operations, incumbents have developed a firm skill set that is difficult to reverse or change, and secondly they are more concerned about marginal changes where they can keep control of the value chain. Thus, it may be that industry players participate in networks mainly to monitor other actors' behaviour (Hans Knutsson, May 26, 2015).

4. 4. 2. Trust

The basics of the cluster initiatives SFIN and Packbridge is to create trust between parties and open up between companies, academia and politics (Helene Vogelmann, June 2, 2015). Achieving a high level of trust in collaborating networks is crucial for innovation as it increases the acceptance for other people's mistakes (Göran Andersson, June 13, 2015) and facilitates cooperative knowledge development (Oxford Research, 2011). Trust towards SFIN and Packbridge is perceived high (Oxford Research, 2011), which can be perceived as an indicator for satisfaction of their work. Appearing as a neutral actor in the food and packaging industries is a key for SFIN and Packbridge. Neutrality signals trustworthiness in their work since they are unbiased towards any specific business or individual goal (Per-Stefan Gersbro, April 30, 2015).

Even though it appears that trust is high towards the organising actors Packbridge and SFIN, trust still needs to be developed between the collaborating actors. A negative aspect of different logics, etc. is occurrence of distrust and preconceptions (Lotta Törner, April 24, 2015). As an example, "*Many times academia is perceived a difficult partner to work with. The industry does not know how to utilise the academic or theoretical knowledge, or how to involve university research productively in their processes*" (Jan Magnusson, May 22, 2015). According to Lotta Törner (April 24, 2015), there have also been occasions where municipalities distrust the private industry for only being interested in sales. This implies that understanding and respect among the differences need to be raised within the member base. Amanda Magnusson (April 29, 2015) adds support to this argument by her belief that being able to communicate more clearly between the spheres is a means to mitigate misunderstandings and preconceptions.

Occurrence of distrust

Trust also needs to be developed from the triple helix organisations towards their members. The latter case appears as a shortcoming in SFIN. As an example, Hans Knutsson (May 26, 2015) describes food development project for the public sector. Entrepreneurs within the food sector were to educate employees at a number of homes for elderly in order to draw attention and demand from the facilities. The role of SFIN was mainly to facilitate the arrangement and get successful entrepreneurs and credit "in return", a benefit that would be transferrable back to other entrepreneurial initiatives. Nevertheless, scepticism from the management in SFIN towards the food entrepreneurs emerged when they were given publicity that did not explicitly involve SFIN. According to Knutsson, this cultivated distrust and a less efficient project and was a symptom of an unclear internal mission statement and ambiguous role. In this sense, it becomes questionable whether is able to encourage trust among other parties when it is lacking internally.

Apart from indicating a trust issue, this situation could also signal inability to remember the bigger picture, i.e. the grand challenges as the publicity was not viewed entirely positive within SFIN. Understanding and focusing on the bigger goal is otherwise a means to mitigate individual disagreements among collaborating actors (Amanda Magnusson, April 29, 2015).

4. 4. 3. Personal traits

The use of network logics is criticised for having an extensive focus on the organisational level when in reality, the true network consists of people. Success of collaboration depends on whether the persons involved can get along and understand one another (Hans Knutsson, May 26, 2015). Similarly, Annika Olsson (May 20, 2015) asserts that achieving successful collaboration for innovation is people dependent: "*Recruiting the right people is essential. Right people and different people. The worst mistake would be to continuously employ people with similar traits*". In particular, the actors should not be attached to any preconceptions of potential outcomes and be able to listen to and identify with a diversity of people (Johan Mårtensson, May 11, 2015). It is also mentioned that, if disagreements occur, "*the miscommunication and misunderstanding between the actors more likely derive from personal issues or inflexible individual mindsets*" (Amanda Magnusson, April 29, 2015). Concerning personal traits, open minded individuals with humbleness for diversity and ability to listen are required in order to achieve successful innovative collaborations (e.g. Lotta Törner, Amanda Magnusson, Per-Stefan). However, in order for change and action to happen, entrepreneurship and dedication is required (Per Nyström, May 13, 2015). Moreover, cross-border individuals that can move between different settings and that can facilitate the network will be increasingly important. These persons need to be open, comfortable in disorder and adaptable and humble to the dynamics (Helene Vogelmann, June 2, 2015). The above reasoning is interesting as it mirrors the traditional view of which traits that characterise innovators or creators. Since there also exist agreement of a changing organisational environment, the preconception of who is an entrepreneur or innovator perhaps also should be reconsidered.

Achieving employee diversity

Since the aim is to stimulate interactions between three diversely functioning spheres, it is important this is reflected internally as well. The internal triple helix organisations would benefit from a more heterogeneous organisation since with internal practical experience and real understanding of these actors, one would more effectively motivate and match them (Annika Olsson, May 20, 2015). The triple helix organisations need to recognise the motivational forces for each sphere to interact and their expectations from it. This constitutes another contradiction, where entrepreneurial personality constantly is recurring as a must in an innovative environment, but on the other hand the importance of diversity in personality is highlighted.

4. 5. The deficiencies of a triple helix

Until now, the advantages and values of a triple helix have been in focus. Nonetheless, the concept is still questioned because of certain perceived shortcomings. To begin with, triple helix is mainly an abstract symbol of three intersecting spheres, but is lacking the exploration of what it signifies (Hans Knutsson, May 26, 2015). As it is viewed as an image rather than a practical model, it is questioned how useful it is to apply triple helix to the logics and methods of a complex organisation (Per-Stefan Gersbro, April 30, 2015).

4. 5. 1. A quadruple or multiple helix?

Triple helix is also criticised for being unable to do justice to the current society and innovation system. For the last decade, globalisation, internet and all of its possibilities have changed the society, and in combination with the increased importance of customer input, the analytical triple helix has lost its relevance. This has in turn induced the discussion of a quadruple helix (Helene Vogelmann, June 2, 2015). Hence, apart from representing an abstract symbol, triple helix is neglecting a fourth actor, namely the customer or the community (Lotta Törner, Anita Broddesson, Per-Stefan Gersbro, Per Nyström). When describing the practical triple helix, the market and consumers are even considered as the foundation, since these constitute the reality the other three helices need to adapt to (Jan Magnusson, May 22, 2015). The external customer has become increasingly important in the innovation process after realising that the solutions may not necessarily be employed at your own organisation (Helene Vogelmann, June 2, 2015). In order to develop a product or service, the customer or the demander needs to be put in priority (Per Nyström, May 13, 2015) as any new product or innovation needs to be valued by the customer (Anita Broddesson, May 19, 2015). Involving customers in the development activities is therefore important (Mats Lönne, May 20, 2015). Hence, the organisations would benefit from complementing the horizon scans for future issues and trends with analyses of customer demands and needs. As it seems to be consensus that customers are neglected, it is interesting that neither triple helix organisation appears to actively involve them in collaboration or network activities.

4. 5. 2. Describing the triple helix as it is

Due to the reported deficiencies and adequacies of the concept of triple helix, people are sceptic that the concept will be applied in the future (Per-Stefan Gersbro, April 30, 2015). More likely,

triple helix will be simplified and explained as it is; interacting and collaborating individuals that are supposed to trust and understand each other and dare to find unconventional solutions (Göran Andersson, June 13, 2015).

Another possibility is to consider triple helix as an ecosystem or basically network logic. Due to the global transformations before mentioned, clusters and innovation system can even be considered invalid concepts (Helene Vogelmann, June 2, 2015). The collaborative modes require new ways of thinking and new logics, with another kind of leadership, where the hierarchical and linear leadership needs to be abandoned in favour for management of networks of uncontrollable organisations and more loosely connected people (Annika Olsson, May 20, 2015).

The triple helix organisation can also be viewed as an engine for the society (Annika Olsson, May 20, 2015). Packbridge and the other cluster initiatives should be the engine that generates power to Skåne's innovation system (Per-Stefan Gersbro, April 30, 2015) and that drive and challenge the establishment and the bureaucracy within the big companies and the rigid university and municipality (Annika Olsson, May 20, 2015).

The above analysis is summarised as a framework of factors influencing the triple helix setting to achieve a higher conduciveness to innovation (see Figure 4). This framework, together with the theoretical point of departure, constitutes the outset of the subsequent discussion chapter.

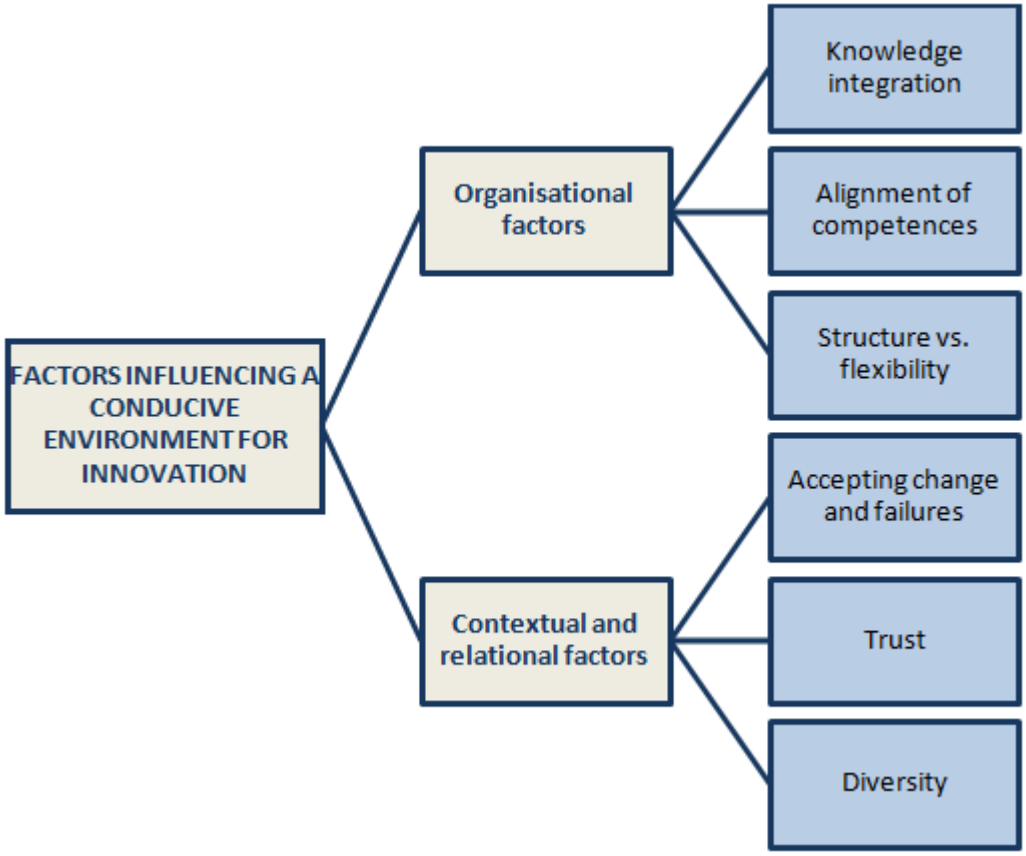

Figure 4. Framework of factors influencing the triple helix setting.

5. Discussion

This chapter discusses results from the theoretical section in combination with the analysis. Based on this discussions, propositions are developed to further concretise the findings. The discussion mirrors the structure of the above analysis in order to achieve consistency.

In essence, there are two recurring themes in the discussion of triple helix in practice. First, it is a matter of gathering, in this case three types of, actors to work collectively for development and change. Second, it is assumed that innovations are the means to achieve this development. What remains to be discussed is how the triple helix organisations can create an environment conducive for innovation and in effect increase the perceived value of their existence.

From the case studies it was found that meetings and discussions are viewed as the starting point of interaction and the following innovations, which is why the triple helix organisations are network oriented. Similarly, Trott (2005) views discussions as the predecessor to innovation, Etzkowitz (2003) argues that the interaction is the very basis of a functioning triple helix and Powell and Grodal (2005) suggest that the network provides for this interaction. Moreover, respondents wished for a more innovative meeting space in pursuance of a more valuable network. However, interaction and collaboration per se is not the main practical value. Rather the value probably are perceived in terms of what follows these activities, i.e. new products or new processes, which could explain the wish for more practically oriented network activities. Understanding the context and the underlying forces was also put forward in the case as a means to better benefit from the collaborative environment. Hence, to enhance the value creation and innovation, the first step for a triple helix organisation would be to understand how to facilitate the collaboration and interaction rather than to simply facilitate the meeting.

The cases revealed that the main advantage of the triple helix concept is the combination of different perspectives and also a factor which encourages innovation. This is consistent with Etzkowitz (2003) who claims that inter-sectoral relations stimulates innovation and e.g. Johansson (2004) who argues that it is at the intersection of fields that innovation emerges. On these premises, it can be argued that it is this Medici effect that justifies the value of a triple helix. However, neither respondents nor literature argue that it is the particular combination of

university, industry and government that provides the advantage for innovation. As it is stated that innovative outcomes might as well be the result of meeting across institutional boundaries at university and that interaction is the prerequisite, it is proposed that:

Proposition 1: Combining diverse and interacting sectors will contribute to innovation

Not only do diverse perspectives encourage innovation, including more than a single sector in an innovation process also provides a greater knowledge base according to Lundberg (2013). The found issue in the case relating to knowledge integration showed that there exists an understanding of the importance of knowledge in an innovation process, but partial deficiency in the understanding of the crucial element of integrating it. Integrating knowledge however proved a quite unattended question in the case organisations, supported again by the wish among respondents to develop the network to become more interactive.

As the analysis showed that Packbridge wish to increase the knowledge level of their members, it is suggested that the organisation takes advantage of the competences in their members to achieve this. Apart from increasing the overall knowledge level by encouraging the member organisations to share their expertise, this can also be expected to lower the associative barriers explained by Johansson (2004) and reduce the potential preconceptions between the spheres is mentioned among the respondents, since it is likely that this type of activity will increase cross sectoral understanding. From the cases it was found that interaction requires motivation to share one's experiences and knowledge but that opportunistic behaviour may hinder this. As will be returned to below, organisational and individual behaviour thus influence the potential to combine perspectives successfully. Foss et al. (2010) refer to this disinclination to share one's knowledge as in-group dynamics.

One could consider the exchange of knowledge as relatively superficial; rather it is the application of knowledge and the necessary knowledge integration that provides a deeper and higher value. Further, according to Powell and Grodal (2005), the integration of knowledge is what allows for valuable combination of diverse assets and knowledge. Thus, as it was previously stated that the main benefit of the triple helix was its combination of views, knowledge integration is a logical prerequisite to achieve this optimally. The need to share and integrate knowledge across units is further supported by Okhuysen and Eisenhardt (2002),

arguing that this is needed in the innovation process and will create value. The above reasoning leads to the second proposition:

> **Proposition 2a:** Integrating knowledge is a prerequisite for successful combination of perspectives, and in turn innovation

Moreover, including an academic perspective into an industry focused organisation proved a challenge in SFIN, exemplified by the inability to include the analytical knowledge. Relating to this, previous literature showed factors that will influence knowledge integration and thus should be taken into consideration internally in the triple helix organisations.

To begin with, being able to integrating external and internal knowledge was put forward as a necessary competence in current organisations by Cohen and Levinthal (1990), March (1991), and Raisch & Birkinshaw (2008). This ought to be particularly important in a triple helix, as the model basically assumes interaction with external actors (e.g. Etzkowitz, 2003). To achieve more effective knowledge integration, informal as well as formal contacts between members is suggested by both Tsai and Ghoshal (1998) and Okhuysen and Eisenhardt (2002).

More specifically, informal communication will enhance familiarity and understanding between parties, mitigating distrust and other barriers emerging from unfamiliarity or preconceptions (Gruenfeld et al., 1996; Johansson, 2004). Similarly, the analysis showed that contact and interaction between members should be encouraged to also take place in between seminars. That would increase the possibility to combine formal and informal contacts and in effect enhance knowledge integration. Hence, it is proposed that

> **Proposition 2b:** Familiarity and formal interventions will positively influence knowledge integration

Thus, in addition to structured meetings, ad hoc social activities should complement interaction between members in SFIN and Packbridge. Logically, the triple helix organisations may have bigger influence on formal interventions as they cannot fully control what happens at the other organisations. Therefore, they should consider developing a more effective knowledge integration by encouraging reflexion on the collaboration and innovation process (Okhuysen & Eisenhardt, 2002). However, the findings indicated that reflexion and learning were lacking

elements within SFIN and it is argued that if the organisation is to encourage reflexion among the collaborating actors, this ability need to be incorporated internally as well.

The notion of a translating role within SFIN and Packbridge suggests there is a problem of miscommunication or misunderstanding between the actors. Since the aim is to achieve productive collaborations, effective communication and knowledge exchange seems to be a key factor. Realising how to combine and integrate knowledge is key to innovativeness (Chesbrough, 2003). Thus, in order to capitalise on the diversities, the triple helix organisations should develop their own competence of integrating knowledge and in turn be able to provide this knowledge to their member. According to Carlile (2002), to achieve this it requires understanding of which type of knowledge that is to be integrated. As knowledge is localised, embedded and invested in tasks and methods, different form sof bridging will be needed. Analogous to Carlile's (2002) model, it is suggested that the next step for the triple helix organisation after identifying the knowledge is to learn how to transfer, translate or transform the knowledge. In other words, the role as translator may need to be developed into that of a transformer. This ability can be considered even more important as the findings indicated a wish for SFIN and Packbridge to develop concrete tools or models. If they are to be able to spread models throughout the network, knowing how to transform knowledge will be important. Furthermore, comprehending and discussing the differences as Carlile (2002) suggests will probably also lead to increased understanding and familiarity among the collaborating parties and in turn lower the perceived barriers in logics. This leads to the relating proposition that:

> **Proposition 2c:** Understanding the nature of knowledge is required in order to more successfully integrate knowledge.

The finding that the majority of the collaborative activities are conducted within the same sector indicates a challenge of combining the spheres optimally, or a tendency to prefer to work with those of similar character. That was another identified issue in the triple helix organisations. Again, it is stated in the cases that it is the variety of spheres that can become of great value, and the benefit of complementary competences is supported in previous literature (e.g. Brown & O'Brien, 1981; Powell & Grodal, 2005). Based on this, it is suggested that the studied triple helix organisations ought to stimulate cross-sector collaborations to a larger extent. To achieve better alignment of sectors, the cases revealed a wish for a more systematic approach within the triple helix organisations. This finding is in line with Child et al. (2005), suggesting that

strategic management will mitigate culture clashes and allow for innovation. Similarly, the findings also imply that outlining current contingencies and understand the role of the organisation will better allow for interaction and productive results. A systematic approach and clearer role could for one clarify the offering to their member organisations and secondly, be a possible means to remind the involved actors of the overarching challenges the network is to address. Focusing on the bigger picture was found as a means to mitigate differences between actors in the cases.

Thus, if the triple helix organisations are to facilitate effective interaction, outlining the basis of every project and recognise each actor's role is needed. This is supported by Agranoff and McGuire (2001) who argue that contextual understanding will enhance cross collaboration, and Brundin et al. (2008), who argue that this will enhance the knowledge transfer. Hence, understanding the premises of the collaboration is argued to make the triple helix more productive (Lu, 2008) by better aligning the spheres (Child et al., 2005). One could imagine that one reason for this is that contextual awareness will help identify the potential conflicts or allow for discussion of potential differences early on as both roles and expectations will become clearer. In support, managing expectations will also influence trust building (Vangen & Huxham, 2003), another factor that proved influential on a collaborative network. Moreover, achieving consensus regarding SFIN's and Packbridge's mission for the industry would be necessary to concurrently formulate activities and themes for the networking seminars and in effect better ensure the more innovatively organised meetings.

Reminding participating collaborators about the overall mission was found to be helpful when mitigating across sectors. This is supported by the statement made by Cameron and Lart (2003), saying that shared objectives will better align cultural differences. Hence, mitigating cultural differences is not a matter of sectors becoming more similar in perspective but rather about agreeing on goal and roles to facilitate alignment of competences. Thus, making the spheres more similar is not the goal of the alignment of competences. As was found in the empirical data, aiming for a conflict free environment would be harmful on the innovative environment as change then would be discouraged. This is supported by Trott (2005)and Gruenfeld et al. (1996), arguing that functional or productive conflict should be viewed as valuable in the innovation

process. Stipulating that the triple helix organisations managed to establish complete consensus and agreements among the spheres, the very value of diverse perspectives would disappear.

Low associative barriers were also mentioned as a means to encourage interaction between sectors. According to Johansson (2004), lowering the barriers will encourage broader and more creative thinking, but it is possible that this also can become a means to lower preconceptions about the other sectors and thus be a way to optimise the complementary competences.

Similarly to Cameron and Lart (2003), Agranoff and McGuire (2001) and Bryson et al. (2006) proposed common objectives to achieve more successful cross-sector collaboration and Child et al. (2005) acknowledged the benefit of early outlining of the agreement. It is then reasonable to argue that the result will be less redundant roles of the spheres, if the tasks are agreed initially. In turn, disagreements on roles will probably be less. Moreover, it is argued that organising the network activities to focus on certain issues will facilitate the direction towards the common goal. Accordingly, it is proposed that:

> **Proposition 3:** Common objectives and clear roles will allow for better alignment of competences.

The analysis also showed that being part of a triple helix provides the members of new perspectives. This finding should be put in relation to Johansson's (2004) view of being exposed to different logics as a method to challenge pre-existing cognitive thoughts. Hence, the diverse perspectives that the triple helix offers should be embraced as a means to challenge existing perceptions and make room for more creative thinking. Moreover, the findings implied that the network activities ought to be more creatively organised and be more practically oriented to encourage innovation. In support, Lundberg (2013) argues that stimulating discussions will have this effect. Moreover, Johansson (2004) suggests "learning differently" as another instrument to mitigate associative barriers. This supports the request of more innovatively organised seminars and workshops by SFIN and Packbridge. Departing from a classic seminar approach towards interactive learning and issue-based workshops is thus argued for. This would then enhance creative thinking.

Findings also suggest that people and organisations aiming to be innovative need to challenge path dependency and rigidity in their mind sets. Path dependency was identified as a main obstacle for the ability to include flexibility or relax structures and in effect organise for innovation more effectively. The appreciation of foresights was argued to be an indication of the need for organisational agility. This was supported by Teece et al. (1997) notion of developing dynamic capabilities and the arguments by e.g. Brown and Eisenhardt (1997) and March (1991) to combine structure with flexibility. In one way, it seems that SFIN works methodically with their strategic model which can be argued to form "stability". On the other hand, the analysis revealed that flexibility in mind set may constitute a barrier in the internal organisation . Relating to the appeared paradox between long term strategies and short term seminars, this could also indicate a need to be flexible in work modes and processes. Even though the seminars may include themes that are long term, one needs to ensure a long term strategy for the implementation and collaboration as well. It is possible that this paradox is an effect of the ambiguous role definition mentioned earlier.

As with knowledge integration, developing a flexible structure is stimulated by familiarity and formal interventions (Okhuysen, 2001). Thus, it seems that structure is required in order to become flexible. However, the cases signalled that the awareness of the risk of lock-ins appears to be limited to the to the member organisations. Analogous to earlier arguments of mastering certain knowledge internally to be able to spread it further, the internal triple helix organisation needs to be agile in order to encourage the member organisations to welcome other perspectives and alter their processes in favour for collaborative innovations.

By balancing creativity and structure, it is possible that the networking seminars can be improved as well. The findings indicated a lack of practical implications of the network activities. By developing a strategy as suggested by Eisenhardt and Martin (2000) and simultaneously allow room for unexpected things as Trott (2005) proposes, dynamic capabilities may be explored. Another suggestion, developed from the analysis, is to consider organising the seminars and network activities according to process competences as well, e.g. how to develop dynamic capabilities. This will partly satisfy the wish for practical advice found in the case. Hence, external scanning should perhaps extend the identifying of future trends to also include

identifying difficulties in innovation processes or collaborations. Concurrently, competence of how to manage these difficulties should be provided. This leads to the following suggestion:

> **Proposition 4:** Combining stability and flexibility and having dynamic capabilities will encourage the innovation process

Relating to organisational factors was also the found paradox of long term and short term focus and lack of concreteness in network activities, which also emphasises the ability to combine different focuses and actions. In essence, the organisational moderators within triple helix organisations can be summarised as first, a need to agree on a strategic role and describe their processes and second, a need to be open to alter and challenge existing mental patterns in order to be flexible for change.

Even though Packbridge and SFIN do not to stand for the innovation output, innovative thinking and creative and diverse mindsets should be reflected in the organisations. Since they aim to stimulate innovations it seems explicatory that it is important to have this culture in SFIN and Packbridge and concurrently be able to transfer this to their members. Both respondents and literature (Johansson, 2004; Wiewiora, 2011) acknowledge the need to create an atmosphere for learning and to punish inaction rather than failures. The inefficiency to incorporate learning from mistakes into the organisations may hinder creative development and was realised as an issue. Moreover, there is conformity between the cases and the literature (Feldman, 1993) that reflection is an important element in order to be able to change one's own perceptions. However, this needs to be implemented both within the triple helix organisations as well as within their members. It thus appears that SFIN and Packbridge need to reflect on their current organisational environment and contemplate on actions to encourage an allowing context. A collaborative environment is also stated to stimulate better utilisation of knowledge as well as trust (Wiewiora, 2011) which is another argument to why the environment is important in cross collaborative settings. Based on the above reasoning, it is suggested that:

> **Proposition 5:** An allowing, open organisational environment that encourages learning and accepts failure will be more conducive to innovation.

Corresponding to an open environment is the presence of trust. Trust is a recurring theme in many aspects, indicating that it is a multifaceted concept that in many ways is the basis of a successful triple helix. In the case it was argued that one task of SFIN and Packbridge is to

create trust between the three spheres, that trust increases acceptance of mistakes (Göran) and facilitates cooperation (Oxford Research, 2011). Analogously, previous research showed that trust appears to influence knowledge sharing (Wiewiora, 2011), collaboration (Ring & Van de Ven, 1992) and innovation and learning (Karlsson et al., 2010). Thus, the cases imply that trust is a necessary element when collaborating across sectors, and that SFIN and Packbridge signal trustworthiness towards their members is essential however appeared lacking in SFIN and described as an issue.

Nevertheless, SFIN and Packbridge need to incorporate a broader view of how trust is achieved. To sustain their attractiveness as member organisations, trust needs to be developed not only due to a confidence in their competence in the industry but also a confidence in how to work cross-sectorally, creatively and how to incorporate diversity. This argument is similar to Wiewiora's (2011) definition of ability trust, relating to the confidence in the other's competence. Ability trust is further found to enhance knowledge sharing, whereas integrity trust reinforces it. Thus, managing activities or interactions that may prove the other's (the other collaborating actor/s) honesty and decrease the fear of opportunistic behaviour. Moreover, Vangen and Huxham's (2002) finding that appropriate expectations of the collaboration will initiate the trust cycle adds further support to the development of clearer roles and objectives. Similar to the standpoint that common goals facilitates collaboration, common objectives will according to Vangen and Huxham (2002) also enhance trust. Thus, the agreement on objectives are important in at least two ways and is the underlying reasoning behind the following proposition:

> **Proposition 6:** Building trust among all involved actors, by stipulating the arrangement unambiguously, will contribute to a smoother collaboration

The findings further suggest that the discussion about differences and the compromises constitute one advantage of a triple helix setting. This is in line with Lundberg (2013), who argues that compromises make way for innovation, but according to Feldman (1993), one should monitor the compromises closely so that the main objective still remains. Hence, the organisations need to ensure that the main objective is not jeopardised by compromises, but at the same time encourage the challenging of ideas and suggestions, as this positively influences the outcomes.

Including diversity also in the triple helix organisations was proposed to develop a more allowing context for innovation. This was however recognised a paradox due to the quite homogeneous internal organisations and due to an inclination of wishing to include entrepreneurial spirits, thus becoming homogeneous in that aspect. Similarly, Johansson (2004) acknowledges the inclusion of different cultures as a means to lower the associative barriers that may hinder innovation. Moreover, the cases encourage a more flexible helix. Similarly, that the collaborative actions are conducted by specifically three sectors does not seem to be the success factor for innovation (Johansson, 2004; Karlsson et al., 2010). Rather, the diverse perspectives are highlighted, regardless of the diversity comes from culture, profession or background (Johansson, 2004). Based on this, the triple helix organisations may consider diversity both in personalities internally and in sectors of their member base. Thus, the organisations ought to extend the concept of diversity to include more aspects than personality or knowledge, leading to the last proposition:

> **Proposition 7:** Open and explorative traits in individuals and group diversity will positively influence collaborative innovation.

As a concluding note, being open minded and having an entrepreneurial mind set is seen as valuable characteristics in networks where the main aim is to be innovative. However, analogous to the combination of structure and flexibility, this entrepreneurial and free or creative spirit needs to be balanced by stability. In this situation, stability in contrast to entrepreneurship may be reflected in an individual who for example is analytical or organisational in his or her nature.

6. Conclusions

In this section, arguments and conclusions regarding the research question are reported. These arguments are drawn from the analysis and discussion above. The main findings are that both organisational and relational factors will influence the effect of a triple helix context. This chapter ends with contributions and practical implications, limitations as well as suggestions for further research.

6. 1. Research question revisited

This study explored the behaviour of two triple helix organisations and aimed to answer the research question *How can a triple helix organisation ensure innovativeness within the network and create an environment conducive for innovation?* One of the main conclusion is that the characteristics and competences required for the collaborating actors need to be reflected also within the triple helix organisations, in order for these to better encourage and stimulate innovative collaborative activities. This will be explained further in the following paragraphs. Also, it was explained that the studied triple helix organisations work to gather members around a specific issue, however the discussion about their role indicated a need to extend this format. In order to provide more concrete value to their members they ought to identify and spread not only trends and upcoming societal issues, but also the knowledge of how to work across sectors. As many of the member organisations already have their own established innovation processes, being able to alter these and combine these with other organisations' processes is an ability that should be encouraged, developed and prioritised to achieve a more effective triple helix. As part of that extension, SFIN and Packbridge are suggested to facilitate the exchange of concrete experiences among members and stimulate interaction also in between structured seminars.

First, it is concluded that integrating knowledge is a prerequisite to optimise the innovative environment in a triple helix. This because it is argued that the combination of perspectives and the aggregated knowledge base is the main advantage of the network (e.g. Etzkowitz, 2003), and also a basis for innovation (e.g. Tödtling & Kaufmann, 1999). Achieving knowledge integration can be facilitated by both social activities and formal interventions (Gruenfeld et al., 1996; Okhuysen & Eisenhardt, 2002), as that will induce increased awareness among the other party and become a means to keep objective focus on the process. The networking processes might thereby need reconsideration. Moreover, it is important to understand which type of knowledge

that is to be exchanged or transferred in order to apply the right approach for the knowledge integration (Carlile, 2002). This indicates a possible development of the translator role in the triple helix organisation towards e.g. a transformer. Relating to the knowledge integration is also the optimisation of the diverse perspectives, or the alignment of competences. The empirical findings and previous literature (e.g. Cameron & Lart, 2003) suggest common goals and clear role definitions for this purpose. It is reasonable to argue that clearly stated focus and tasks will help outline the competences but also the potential risk factors within a collaboration. Thus, one will be able to understand how to most effectively align the diversities where each sector's or actor's competences is taken into account, as well as one will be able to mitigate potential conflicts before they emerge. In effect, the environment for innovation will be more favourable. Nevertheless, it was also found that a certain degree of conflict is essential to create a creative and dynamic environment in order not to lose the value of new perspectives.

Second, based on the theoretical framework and the analysis, it is concluded that organisational factors are influencing the possibility to create environment conducive for innovation. As stated, the ability to alter existing processes and mindsets will be important in cross-organisational interactions. Therefore, focusing on developing dynamic capabilities (Teece et. al., 1997) and establishing an organisational format that make room for both structure and flexibility is important both internally in the triple helix organisation and in extension in their members. Enabling for creativity and innovation however also requires a certain organisational culture, which appreciates mistakes through learning from them. This perception ought to be natural in any organisation working to stimulate innovations, as it was agreed that the very basis of great innovations is a vast number of failed ideas. Similarly, judgments and preconceptions may harm the outcome of a collaborative arrangement because it creates a distance and distrust among actors.

By that, the development of trust is introduced as a third conclusion. It is argued that collaboration or interaction is the very prerequisite to the innovation in a triple helix context, as innovation is supposed to emerge by the combination of sectors. Therefore, relational aspects are of certain importance. Trust, being a multi-faceted concept that is declared essential in many situations (e.g. in knowledge sharing, in the development of an allowing environment, and in innovation and learning) is defined as a mutual exchange between parties. Thus, in order to

stimulate or require trust among member organisations, it is argued that trust also needs to be given to them from the triple helix organisations. Finally, and reconnecting to the necessity to "practice what they preach", is that exposure to diversity will lower cognitive barriers, increase creativity and increase understanding of differences and thereby an aspect that needs to be considered internally as well.

6. 2. Practical implications and contributions

Current literature found that there is a lack of and a need for research on the practical triple helix (Lundberg, 2013), as most of previous studies have focused on either the theoretical concept of triple helix (e.g. Etzkowitz, 2003; Etzkowitz & Leydesdorff, 2000) or the specific outcomes of the network (e.g. Frykfors & Jönsson, 2010). By applying a qualitative approach, focusing on internal organisational mechanisms, this gap could be somewhat diminished. This report argues that a triple helix organisation needs to "practice what they preach" in order to better allow for successful collaborative initiatives between members. As the triple helix organisations are to encourage and stimulate innovation and cross sectoral collaborations, creating an internal environment with room for creativity, mistakes and understanding about knowledge integration across diversities was found essential.

This study contributes to acknowledge the factors within the internal organisation and the relational factors that need to be understood from a managerial perspective in order to be able to transfer this competence to members. Moreover, it was found that a static triple helix model is not optimal in practice. Rather, the three spheres are to be viewed more loosely coupled, where cross collaborations are initiated according to the issue and where a fourth or fifth sector is welcome to take part whenever a problem requires another perspective. Based on that, current triple helix organisations ought to reconsider the rigid three-sector approach and move towards more issue-based collaborations.

This study aimed to fill gaps in previous research by using a case study approach to get an in depth understanding of underlying dimensions in collaborating networks. In general terms, the organisational culture, including the development of an open environment, the combination of diverse mindsets and the ability to establish reciprocal trust are aspects that need to be taken into considerations by managers and collaborators in the triple helix context.

6. 3. Limitations and directions for future research

Even though this research claims an in-depth exploration of mechanisms influencing collaborative networks, there are other potentially contributing factors that are not covered in this study. However, limiting the research scope to the particular factors enabled the researcher to keep the study feasible. The study incorporated the perspectives of both internal and external actors as well as it included an objective view in terms of experts. In some aspects this might have provided an incoherent view, but at the same time, gathering diverse perspectives were viewed essential to get a comprehensive and reasonable picture. Future studies could consider to get insights from actors involved in a specific project, to better evaluate and analyse a particular, well defined context. Including even more perspectives would possibly add complexity to the data analysis process, but it would be interesting to include e.g. more thoughts from policy makers and to add observations from the network activities in future studies.

Also, several interesting issues were mentioned during the data collection that due to limited research scope needed to be left out. For example, the financial constraints and the misleading evaluation on concrete outcomes, e.g. number of innovations or number of new job opportunities, would be interesting to investigate further. Moreover, to study the occurrence of opportunistic behaviour or other moderators for the building of trust would be intriguing to learn more about in the triple helix context. These themes could thus also constitute avenues for future research.

The conclusions drawn are also influenced by the choice of case organisations and the research design. The selection of the particular cases was previously argued to follow a logical reasoning, however to a certain extent. The selection was also dependent on geographical proximity and the accessibility of respondents. This limited the study to the southern region of Sweden. However, as the background setting was regional development, the selection eventually was not considered excessively restrictive. Expanding the research strategy to include more case organisations and move towards a quantitative method would possibly lead to other conclusions. A quantitative method could possibly provide more examples of emerging issues within collaborations and also allow for the exploration of causal relationships between these.

7. References

Aalbers, H. L., & Dolfsma, W. (2015). Bridging firm-internal boundaries for innovation: Directed communication orientation and brokering roles. *Journal of Engineering and Technology Management*.

Agranoff, R., & McGuire, M. (2001). Big questions in public network management research. *Journal of public administration research and theory*,*11*(3), 295-326.

Amir, S., & Nugroho, Y. (2013). Beyond the Triple Helix Framing STS in the Developmental Context. *Bulletin of Science, Technology & Society*, *33*(3-4), 115-126.

Benner, M., & Sandström, U. (2000). Institutionalizing the triple helix: research funding and norms in the academic system. *Research policy*, *29*(2), 291-301.

Bettis, R. A., & Hitt, M. A. (1995). The new competitive landscape. *Strategic management journal*, *16*(S1), 7-19.

Brown, S. L., & Eisenhardt, K. M. (1997). The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative science quarterly*, 1-34.

Brown, G. E., & O'Brien, T. C. (1981). University-industry links: government as blacksmith. *Technovation*, *1*(2), 85-95.

Brundin, E., Wigren, C., Isaacs, E., Friedrich, C., & Visser, K. (2008). Triple helix networks in a multicultural context: triggers and barriers for fostering growth and sustainability. *Journal of Developmental Entrepreneurship*, *13*(01), 77-98.

Bruneel, J., d'Este, P., & Salter, A. (2010). Investigating the factors that diminish the barriers to university–industry collaboration. *Research Policy*,*39*(7), 858-868.

Bryman, A., & Bell, E. (2003). *Business Research Methods.* New York: Oxford University Press

Bryson, J. M., Crosby, B. C., & Stone, M. M. (2006). The design and implementation of cross-sector collaborations: Propositions from the literature. *Public administration review*, 44-55.

Cameron, A., & Lart, R. (2003). Factors promoting and obstacles hindering joint working: a systematic review of the research evidence. *Journal of Integrated Care*, *11*(2), 9-17.

Carayannis, E. G., Barth, T. D., & Campbell, D. F. (2012). The Quintuple Helix innovation model: global warming as a challenge and driver for innovation.*Journal of Innovation and Entrepreneurship*, *1*(1), 1-12.

Carlile, P. R. (2002). A pragmatic view of knowledge and boundaries: Boundary objects in new product development. *Organization science*, *13*(4), 442-455.

Carlile, P. R. (2004). Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries. *Organization science*,*15*(5), 555-568.

Chesbrough, H. (2003). The era of open innovation. *Sloan Management Review*, Spring, 35-41.

Chesbrough, H. (2011). Open Services Innovation. Rethinking your business to grow and compete in a new era. San Fransisco: Jossey-Bass.

Child, J., Faulkner, D., & Tallman, S. (2005). *Cooperative strategy: Managing alliances, networks and joint ventures* [Ebrary Reader-version]. (2nd ed.)

Churchman, C. W. (1967). Guest editorial: Wicked problems. *Management Science, 14.* 141-142.

Clark, B. R. (1983). *The higher education system: Academic organization in cross-national perspective*. Berkeley, CA: University of California Press.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative science quarterly*, 128-152.

Collis, J., & Hussey, R. (2013). Business research. A practical guide for undergraduate & postgraduate students. New York: Palgrave Macmillan.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of management review*, *14*(4), 532-550.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: what are they?.*Strategic management journal*, *21*(10-11), 1105-1121.

Etzkowitz, H. (2003). Innovation in innovation: The triple helix of university-industry-government relations. *Social science information*, *42*(3), 293-337.

Etzkowitz, H. (2008). *The Triple Helix.* New York: Routledge

Etzkowitz, H., & Klofsten, M. (2005). The innovating region: toward a theory of knowledge-based regional development. *R&D Management*, *35*(3), 243-255.

Etzkowitz, H., & Leydesdorff, L. (1997). Introduction to special issue on science policy dimensions of the Triple Helix of university-industry-government relations. *Science and Public Policy*, *24*(1), 2-5.

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: from National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. *Research policy*, *29*(2), 109-123.

Etzkowitz, H., & Leydesdorff, L. (2001). Introduction. In Etzkowitz, H., & Leydesdorff, L. (Eds.), *Universities and global knowledge economy. A triple helix of university-industry-government* (pp. 1-8). London: Continuum

Etzkowitz, H., & Zhou, C. (2006). Triple Helix twins: innovation and sustainability. *Science and Public Policy*, *33*(1), 77-83.

European Commission. (2014). *Regional innovation.* Accessed 2015-03-04 http://ec.europa.eu/enterprise/policies/innovation/policy/regional-innovation/

Faems, D., Van Looy, B., & Debackere, K. (2005). Interorganizational collaboration and innovation: toward a portfolio approach*. *Journal of product innovation management*, *22*(3), 238-250.

Feldman, S. P. (1993). How organizational culture can affect innovation. *The psychodynamics of organizations*, 85-97.

Fisher, D., & Atkinson-Grosjean, J. (2002). Brokers on the boundary: Academy-industry liaison in Canadian universities. *Higher Education*, *44*(3-4), 449-467.

Foss, N. J., Husted, K., & Michailova, S. (2010). Governing knowledge sharing in organizations: Levels of analysis, governance mechanisms, and research directions. *Journal of Management studies*, *47*(3), 455-482.

Frykfors, C. O., & Jönsson, H. (2010). Reframing the multilevel triple helix in a regional innovation system: a case of systemic foresight and regimes in renewal of Skåne's food industry. *Technology Analysis & Strategic Management*, *22*(7), 819-829.

Gebhardt, C., & Pohlmann, M. C. (2013). Managing the organisation 2.0: Entrepreneurial spirit and general management competences as early indicators for cluster success and sustainable regional development: Findings from the German Entrepreneurial Regions Programme. *The Journal of High Technology Management Research*, *24*(2), 153-160.

Getha-Taylor, H. (2008). Identifying collaborative competencies. *Review of Public Personnel Administration*, *28*(2), 103-119.

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic management journal*, *17*(S2), 109-122.

Gruenfeld, D. H., Mannix, E. A., Williams, K. Y., & Neale, M. A. (1996). Group composition and decision making: How member familiarity and information distribution affect process and performance. *Organizational behavior and human decision processes*, *67*(1), 1-15.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Hagedoorn, J. (2002). Inter-firm R&D partnerships: an overview of major trends and patterns since 1960. *Research policy*, *31*(4), 477-492.

Harkema, S. (2003). A complex adaptive perspective on learning within innovation projects. *The Learning Organization*, *10*(6), 340-346.

Henning, M., Moodysson, J., & Nilsson, M. (2010). *Innovation and regional transformation. From clusters to new combinations.* (1:1). Malmö: Elanders

Hueske, A. K., Endrikat, J., & Guenther, E. (2015). External environment, the innovating organization, and its individuals: A multilevel model for identifying innovation barriers accounting for social uncertainties. *Journal of Engineering and Technology Management*, *35*, 45-70.

Ivanova, I. (2014). Quadruple Helix Systems and Symmetry: a Step Towards Helix Innovation System Classification. *Journal of the Knowledge Economy*,*5*(2), 357-369.

Ivanova, I. A., & Leydesdorff, L. (2014). Rotational symmetry and the transformation of innovation systems in a Triple Helix of university–industry–government relations. *Technological Forecasting and Social Change*, *86*, 143-156.

Johansson, F. (2004). *The Medici Effect. Breakthrough insights at the intersection of ideas, concepts and cultures.* Boston: Harvard Business School Press.

Johnson, W. H. (2008). Roles, resources and benefits of intermediate organizations supporting triple helix collaborative R&D: The case of Precarn.*Technovation*, *28*(8), 495-505.

Karlsson, R., Backman, M., & Djupenström, A. (2010). Sustainability consideration and triple-helix collaboration in regional innovation systems. In Sarkis, J. *Facilitating sustainable innovation through collaboration* (pp. 17-39). Springer Netherlands.

Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic management journal*, *27*(2), 131-150

Leonard-Barton, D. (1995). Wellsprings of knowledge: Building and sustaining the sources of innovation. Boston: Harvard Business School Press.

Leydesdorff, L. (2001). The new communication regime of university-industry-government relations. In Etzkowitz, H., & Leydesdorff, L. (Eds.), *Universities and global knowledge economy. A triple helix of university-industry-government* (pp. 106-117). London: Continuum

Leydesdorff, L. (2006). "While a Storm is Raging on the Open Sea": Regional Development in a Knowledge-based Economy. *The Journal of Technology Transfer*, *31*(1), 189-203.

Linnarsson, H., & Werr, A. (2004). Overcoming the innovation-alliance paradox: a case study of an explorative alliance. *European Journal of Innovation Management*, *7*(1), 45-55.

Livsmedelsakademin. (n.d.a.). *Livsmedelsakademin.* Accessed 2015-06-20 http://www.livsmedelsakademin.se/

Livsmedelsakademin. (n.d.b.) *Kontakta oss.* Accessed 2015-06-20. http://www.livsmedelsakademin.se/kontakt/

Lu, L. (2008). Creating knowledge-based innovation in China: The strategic implications of triple helix model. *Journal of Technology Management in China*,*3*(3), 249-263.

Lundberg, H. (2013). Triple Helix in practice: the key role of boundary spanners. *European Journal of Innovation Management*, *16*(2), 211-226.

March, J. G. (1976). The technology of foolishness. In March, J. B., & Olsen, J. P. (Eds.), *Ambiguity and Choice in Organizations* (pp.69-81). Oslo: Universitetsförlaget.

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science*, *2*(1), 71-87

Maznevski, M., Steger, U., & Amann, W. (2007). Managing complexity in global organizations. *Hoboken: John Wiley & Sons*.

Metcalfe, A. S. (2010). Examining the trilateral networks of the triple helix: Intermediating organizations and academy-industry-government relations.*Critical Sociology*, *36*(4), 503-519.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage Publications.

Neu Morén, E., & Hård af Segerstad, Peder. (2010). *Uppdrag Ledare. Om konsten att bli en bättre centrumföreståndare*. (Vinnova Rapport, VR 2010:18) Stockholm: Vinnova.

Okhuysen, G. A. (2001). Structuring change: Familiarity and formal interventions in problem-solving groups. *Academy of Management Journal,44*(4), 794-808.

Okhuysen, G. A., & Eisenhardt, K. M. (2002). Integrating knowledge in groups: How formal interventions enable flexibility. *Organization Science*, *13*(4), 370-386.

Open Up (n.d.). *Om OpenUp.* Accessed 2015-04-27 http://www.letsopenup.se/openup-ar-enkelt/

Organization for Economic Co-operation and Development. (1996). *The knowledge-Based Economy*. OECD, Paris. [OECD/GD(96)102]

Osborn, R. N., & Hagedoorn, J. (1997). The institutionalization and evolutionary dynamics of interorganizational alliances and networks. *Academy of Management Journal*, *40*(2), 261-278.

Oxford Dictionary. (2015a). Collaboration. Accessed 2015-08-28 http://www.oxforddictionaries.com/definition/english/collaboration

Oxford Dictionary. (2015b). Cooperation. Accessed 2015-08-28. http://www.oxforddictionaries.com/definition/english/cooperation

Oxford Research (2011). Utvärderingsmodell för skånska klusterinitiativ. En utvärdering av sex skånska klusterinitiativ 2011. Report for Region Skåne.

Packbridge. (n.d.a). *Om Packbridge.* Accessed 2015-04-27 http://www.packbridge.se/om-packbridge

Packbridge. (n.d.b). Kontakta oss. Accessed 2015-06-20. http://www.packbridge.se/kontakta-oss

Perkmann, M., & Salter, A. (2012). How to create productive partnerships with universities. *MIT Sloan Management Review*, *53*(4), 79-88.

Powell, W. W., & Grodal, S. (2005). Networks of innovators. *The Oxford handbook of innovation*, 56-85.

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology. *Administrative science quarterly*, 116-145.

Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*.

Region Skåne. (2015). *Skåne developing with innovation arenas and clusters.* Accessed 2015-03-04 http://www.skane.com/en/skane-developing-with-innovation-arenas-and-clusters

Ring, P. S., & Van de Ven, A. H. (1992). Structuring cooperative relationships between organizations. *Strategic management journal*, *13*(7), 483-498.

Rothwell, R. (1994). Towards the fifth-generation innovation process. *International marketing review*, *11*(1), 7-31.

Sábato, J., & Botana, N. (1968). La ciencia y la tecnología en el desarrollo futuro de América Latina. *Revista de la Integración*, *1*(3), 15-36.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students* (5th ed.). Harlow: Prentice Hall

Sysko-Romanczuk, S., & Platonoff, A. L. (2005). The concept of stimulation of entrepreneurship—A benchmarking and co-evolution approach. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *15*(1), 71-82.

Teece,J., Pisano, G., & Shhuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, (18)*7, 509-533

Tidd, J. (2006). A review of innovation models. *Imperial College London*, *16*.

Trott, P. (2005). *Innovation Management and New Product Development.* Harlow: Pearson Education Limited.

Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. *Academy of management Journal*, *41*(4), 464-476.

Tödtling, F., & Kaufmann, A. (1999). Innovation systems in regions of Europe—a comparative perspective. *European Planning Studies*, *7*(6), 699-717.

van Fenema, P. C., & Loebbecke, C. (2014). Towards a framework for managing strategic tensions in dyadic interorganizational relationships. *Scandinavian Journal of Management*, *30*(4), 516-524.

Vangen, S., & Huxham, C. (2003). Nurturing collaborative relations Building trust in interorganizational collaboration. *The Journal of Applied Behavioral Science*, *39*(1), 5-31.

Von Hippel, E. 1988. *The Sources of Innovation*. New York: Oxford University Press

Von Stamm, B. (2009). Leadership for innovation: what you can do to create a culture conducive to innovation. *Strategic Direction*, *25*(6), 13-15.

West, R. E. (2014). Communities of innovation: Individual, group, and organizational characteristics leading to greater potential for innovation.*TechTrends*, *58*(5), 53-61.

Wiewiora, A. (2011). *The role of organisational culture, trust and mechanisms in inter-project knowledge sharing.* (Doctoral thesis).

Yin, R. K. (1994). *Case study research: Design and methods.* Thousand Oaks, CA: Sage Publications.

Appendix 1. Interview guides

Interview Guide: Triple Helix organisations (SFIN and Packbridge)

1. Introduction

- Please tell me about yourself
- Also, please give a brief background about the organisation and its objectives
- How familiar are you with the triple helix concept?

2. Triple helix and triple helix organisation

- How do you wish to work with triple helix, what is the vision?
- Please explain the role of SFIN/Packbridge as a neutral arena
- What characterises management of a triple helix? How can one encourage that all actors work in the same direction?
- Do you have any examples of particular outcomes and issues/disagreements that have occurred in SFIN/Packbridge?
- How would you describe the practical triple helix? The ultimate triple helix?
- Is there any element missing in the theoretical model?
- Which complexities or challenges are particularly apparent in this context?
- What are the benefits of arranging a network as a triple helix? I.e. Why is a triple helix good?
- What are the advantages of working across sectors?
- How do you imagine the future triple helix is arranged?
- What is the value provided for the members?

3. Collaboration/Interaction

- How would you describe the relations between the sectors?
- What are the prerequisites for a successful and productive interaction? What are the challenges?
- What is required of the members to achieve a fruitful collaboration?
- Personal or organisational characteristics?

4. Innovation

- In your words, what is innovation?
- How can one ensure that the interaction and collaboration is innovative?
- Can you think of any concrete examples of innovations developed because of the arrangement of SFIN/Packbridge?
- Who takes the role as innovation driver in the triple helix collaborations?
- What is the role of SFIN/Packbridge in the innovation process?

Interview Guide: Member organisations

1. Introduction

- Please tell me about yourself and give a brief background about the firm/municipality/university and its membership in SFIN and/or Packbridge
- How familiar are you with the triple helix concept?

2. Membership

- When did X become member in SFIN/Packbridge?
- What was the motivation behind the membership and expectations of it?
- What is the main value that the membership provides?
- What does your organisation invest in the network?

3. Triple helix

- How would you describe the practical triple helix? The ultimate triple helix?
- Is there any element missing in the theoretical model?
- Which complexities or challenges are particularly apparent in this context?
- What are the benefits of arranging a network as a triple helix? I.e. Why is a triple helix good?
- What are the advantages of working across sectors?
- How do you imagine the future triple helix is arranged?

4. Collaboration/Interaction

- How would you describe the relations between the sectors?
- What is the role of your organisation/sector in the collaboration?

- What are the prerequisites for a successful and productive interaction? What are the challenges?
- What is required of the members to achieve a fruitful collaboration?
- Personal or organisational characteristics?

5. Innovation

- In your words, what is innovation?
- What is the main exchange in the interaction? Knowledge/experiences/information?
- How is this connected to innovation?
- How can one ensure that the interaction and collaboration is innovative?
- Can you think of any concrete examples of internal innovations developed because of the membership? Has the membership allowed for different kinds of innovation?
- Who takes the role as innovation driver in the triple helix collaborations?
- What is the role of SFIN/Packbridge in the innovation process?
- What are the obstacles to reach full potential?

Interview Guide: Experts

1. Introduction

- Please tell me about yourself
- Describe your knowledge/background within the triple helix concept

2. Triple helix and triple helix organisation

- How would you describe the practical triple helix? The ultimate triple helix?
- What has encouraged the development of triple helix?
- Is there any element missing in the theoretical model?
- What are the benefits of arranging a network as a triple helix? I.e. Why is a triple helix good, and why better than other network arrangements?
- What are the prerequisites for an effective triple helix?
- What are the main challenges of achieving this (an effective TH)?

3. Collaboration/Interaction

- How would you describe the relations between the sectors?

- What are the prerequisites for a successful and productive interaction? What are the challenges?
- What is required of the collaborating actors to achieve a fruitful collaboration?
- Personal or organisational characteristics?

4. Innovation

- In your words, what is innovation?
- Please explain the main advantages of working across sectors
- How do these advantages connect to innovation?
- How can one ensure that the interaction and collaboration is innovative?
- What is required to achieve an innovative environment?