KNOWLEDGE FOR INNOVATIONS – RESOURCES FOR SMART SPECIALISATION

FINAL REPORT

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Executive summary

The aim of this study was to bring insight into how to improve actor-network co-operation structures, a fundament for smart specialization, by entangling the mechanisms for resource integration in companies.

As a theoretical fundament for this study co-operation between different type of actors and resource integration were considered as two critical tenets for innovations. The explorative research approach applied in this study command the choice of a qualitative research methodology, and based on personal interview with the top management of strategically selected firms belonging to the energy cluster of Ostrobothnia, Finland, the following key findings can be absorbed.

1) For innovations and preserve global competitiveness, co-operations partners are sought worldwide. However, if possible, there is a benefit in finding local ones.
2) There are several different types of resources involved in innovation processes. In this study a lot of emphasis was put on financial resources, and actors representing this helix.
3) Knowledge for innovation is critical, and has to be found in ongoing research, own or in universities (or a combination)
4) More within the same industry is perceived as a benefit and the cluster idea is supported. Critical is that all actors within the energy cluster feel the “clusterness”

These findings bring the following policy issues into front. Companies belonging to the energy cluster are different and act differently when it comes to innovation processes, and must be understood and supported accordingly. The very big, global, companies have their own agenda and resources to manage that. Therefore, more focus should be put on middle size and small companies. It is also obvious how the big companies already have well established co-operation structures with universities. Here, it is recommended to excel the discussion how to improve co-operation between the middle sized and small companies. Finally, the idea of “a cluster” must be further emphasized, the benefits underlined and “internal” marketing improved. There are still actors within the energy cluster, who do not only talk positively about the “cluster” idea. This must be improved.

This study would not have been realized without the financial support of the Regional council of Ostrobothnia. To them we say thank you. As the theoretical framework in this study underlines, innovations are best practiced in actor networks of Triple helix structures. This report, on one hand verifies the importance of this type of co-operations for innovations, and on the other is a document for further and ongoing discussions on how to improve the competitiveness of single companies, as well as, the region at large.

Background

This paper report findings from a follow-up study to the one done by Virkkala, Mäenpää and Mariussen (2014) by answering three research questions:

1) How do companies co-operate and share resources
2) How cooperation for innovations could be enhanced
3) How to excel smart specialization in the region

By bringing insight to how companies perceive knowledge for innovation and resources for smart specialization, flaws in the existing Triple-helix based actor-network structures can be identified and strategies for smart specialization scrutinized.

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In transformative contexts and fluid business landscapes, firms survive if they better than their competitors adjust to change and, in these turbulent environments, manage to identify new business opportunities (Dreyer & Grönhaug, 2004). In a rapidly changing World where competition is global, and firms are expected to be innovative, resources for sustained competitive advantage are also to be found in constellation of actor-network co-operations. Nieto and Santamaria (2007), who studied Spanish firms, found a positive relationship between the level of collaboration and novelty of product innovations, and point out the critical choice of suitable partners. Regional characteristics for innovations have also been analyzed. Andersson and Johansson (2008) conclude, after having analyzed 81 regions in Sweden, that there is a tendency that large gateway cities are more innovative, and that there are path-dependence phenomena. For regions applying a smart specialization strategy this implies detailed analysis of existing actor-network structures pertaining resource configurations for policy planning and implementation to elevate and strengthen existing co-operation networks.

Resource-based theories explain that resources for innovations can be found in-house, in firms, but also be absorbed from co-operating actors of different type (Mower, Oxley & Silverman, 1998). The Triple Helix framework for innovations identifies three categories of actors firms, universities and organizations, and, emphasizes knowledge transfer, free flow of people and ideas, between the different helices (Dzisah & Etzkowitz, 2008).

Smart specialization is an innovation policy for regional economies in Europe. It emphasizes a vertical logic, and aims at exploring technological and market opportunities (Foray, 2013). In line with the new service marketing logic (Grönroos, 2013), it, does also, have a focus on activities (Foray & Goenaga, 2013). Being a key element of the EU 2020 development framework smart specialization still, surprisingly, lack a theoretical platform (Foray, David and Hall, 2011) explaining how regional policies, actor-network and innovation are interlinked. This issue was to some extent researched and discussed by Virkkala, Mäenpää and Mariussen (2014), who developed an instrument for measuring connectivity among actors belonging to

the energy cluster of Ostrobothnia, Finland. The map of actor-network connections explored the structure of interactions, but not the contents (Björk & Johansson, 2014).

In a more detailed analysis less studied is the structure of actor-networks in terms of co-operation partners, number and relevance. In particular, priorities in networking for smart specialization have not been addressed. To fill this void, the aim of this study is to bring insight into how to improve actor-network co-operation structures, a fundament for smart specialization, by entangling the mechanisms for resource integration in companies. This is done by analyzing the resource structure of the energy cluster in Ostrobothnia, Finland. The explorative research approach applied in this study command the choice of a qualitative research methodology, based on personal interview with the top management of strategically selected firms belonging to the energy cluster of Ostrobothnia, Finland.

Resources in interactions for smart specialisation

Smart specialization

Smart specialization or RIS3 (Research and Innovation Strategies for Smart Specialization) is a strategy for supporting research and innovation. According to the S3 platform (2015):

> *"Smart specialization is a strategic approach to economic development through targeted support to Research and Innovation (R&I). It will be the basis for European Structural and Investment Fund interventions in R&I as part of the current Regional and Cohesion Policy's contribution to the Europe 2020 jobs and growth agenda. More generally, smart specialisation involves a process of developing a vision, identifying competitive advantage, setting strategic priorities and making use of smart policies to maximise the knowledge-based development potential of any region, strong or weak, high-tech or low-tech."*

A long period of low economic growth in Europe forced the European Union to search for new ideas in order to strengthen its position in the global economy. The notion of smart specialization is usually attributed to Dominic Foray and the "Knowledge for Growth" expert group within the European Research Area framework. The expert group found that the research investments in Europe were spread out over a broad spectrum of research fields. This was considered to be problematic, many different fields received some funding but it was not enough for anyone and only small actual impact was made. The group also found a lack of diversity in regional investments. Funds were often allocated to new, emerging and fashionable technologies. As a result, many actors would be competing for the same resources planning to do similar things regardless of their strengths and potentials (Midtkandal & Sörvik 2012)

A potentially smarter investment strategy would be to find and incorporate the strengths of different regions in the decision making process, identifying areas where a region is doing well in terms of research and innovation and where they are likely to be strong also in the future. This is a process that cannot be governed in a top-down fashion by trying to implement some master plan; instead it has to be a learning process where input is brought in from the local level. Much of the knowledge will be found in entrepreneurial actors, familiar with local skills

and conditions. The role of the policy makers is to make informed decisions on which areas of specialization to support, but more importantly, provide incentives for co-operation and also information about opportunities and constraints (Foray, David & Hall 2009).

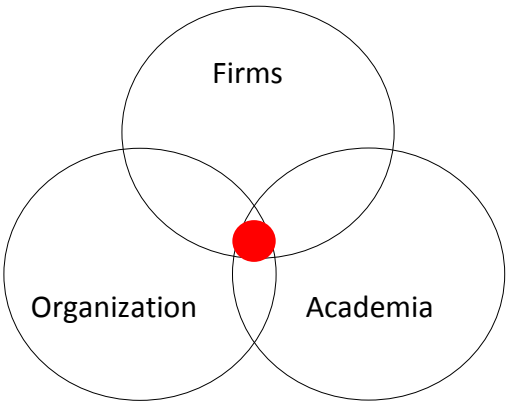
At this point the European Commission, through the strategy Europe 2020, is encouraging authorities around Europe to develop their research and innovation strategies based on the concept of smart specialization. The stance taking in this paper is that this smart specialization hinges on resource identification and integration of many types, e.g. resource in the center of the Triple helix.

Triple helix

The Triple helix model for innovation was developed by Etzkowitz and Leydesdorff (2000) in the 1990s in an effort to link institutional arrangements to the evolution of knowledge base economies (Leydesdorff & Meyer, 2006). Insight in knowledge-based development in complex dynamic interacting actor-networks was sought. As being an analytic and normative tool, the Triple helix model identifies the "role of government in different societies in relation to academia and industry", explains the importance of seamless interaction between these relatively independent institutional spheres, and guide policy documents for industry and regional development (Dzisah & Etzkowitz, 2008, p. 102).

The Triple helix consists of universities, firms and public organizations represented as an intertwined structure in trilateral connections (Figure 1).

Figure 1. The Triple Helix structure



In the center, at "the heart of knowledge-based development … a free flow of people, ideas and innovations" is to be identified (Dzisah & Etzkowitz, 2008, p. 102). Actors, resources, and activities in these intra-sphere networks of dynamic character are to be synchronized and managed (Björk, 2014), not an easy task if necessary prerequisites for close cooperation, such as common interests, similar work cultures, and consistent perspectives on IP issues, are lacking. Inter-helices linked actor to actor cooperation can be measured as strong or weak. On an aggregated level, summing up all interactions, the three helixes can be either connected or disconnected. For regional innovativeness a dense structure, a large number of actor-to-actor relations, are to be preferred to a porous structure. The basic idea is that more

and better connections between Triple helix actors will support the innovation process, with trilateral initiatives seen as the most innovative alternative (Etzkowitz & Leydesdorff 2000).

Resource-based theory

Re-visiting the key tenets of resource-based theory, introduced in the late 1950s and early 1960s (c.f. Selznik, 1957; Penrose, 1959; Chandler, 1962; Sloan, 1963) as a theory of firm (Conner, 1991), four founding principles can be listed:

- The logic of resource-based theory revolves around firms' capability to gain and defend its market position by optimizing strategy fits between internal competencies and external opportunities (Das & Teng, 2000; Wernerfelt, 1984).
- Resources are of different types; human, managerial, organizational, physical, financial, and reputational, and firm performance is conditioned by its competencies to identify, organize, combine and process these (Hofer & Schendel, 1978; Rubin, 1973).
- Firms' performance differences in competitive contexts are due to asymmetries in knowledge and competencies (Conner & Prahalad, 1996).
- Actor-network co-operation is practiced by firms to get access to other firms' valuable resources (Eisenhardt & Schoonhover, 1996).

Being one of the most widely accepted and influential theories of strategic management (Kraaijenbrink, Spender & Groen, 2010), resource-based theory has also received some criticism not being reflexive on the importance of "the firm's organizing context and its valuable, rare, inimitable capabilities (dynamic and otherwise) and core competences" (Newbert, 2007, p. 142), and do not take the full spectrum of resource structures into consideration, such as information systems (Wade & Hull, 2004) and alliance networks (Lavie, 2006). Consequently, extensions have been suggested. A more detailed gaze at knowledge, intellectual capital (IC), and value-creation processes, is suggested by Galabov and Ahonen (2011). Mower, Oxley and Silverman (1998), who studied technology overlap and interfirm cooperation, suggest more focus on interfirm resource integration.

Interfirm resource integration for excel competitiveness has been of interest to industrial network researchers, who often categorized resources as physical (plant and equipment), human (experiences, knowledge, skills), or organizational (planning and coordination, reporting and control), and underline the importance of finding network partners with complementary resources. Linked to tenets of service dominant logic operand or operant resources are to be integrated in value co-creating processes of many actors (Vargo & Lusch, 2004). With a focus on innovations and an attempt to extend the classic resource-based theory, inspirations can be found in the, today well-known, Triple helix model (Etzkowitz & Leydesdorff, 2000).

Research setting and methodology

Virkkala, Mäenpää and Mariussen (2014) explored the structure of interactions within the energy cluster in Ostrobothnia. From a Triple helix point of view, their results show that the helices are in general well connected. They also find that the company helix forms a well-

functioning network with few obvious problems. In this study, we would like to add to the results by taking a closer look at the network contents. How are networks formed, and why? What important resources are gained in the process and how are these resources utilized for innovation?

The region in focus, Ostrobothnia, is located on the western coast of Finland. It consists of 15 municipalities, stretching from Kruunupyy in the north to Kristiinankaupunki in the south. The population is approximately 180.000 and the regional center is the city of Vaasa with approximately 66.000 inhabitants. The region is bilingual with a close to 50/50 mix of Swedish- and Finnish-speakers. Within the region there are bilingual municipalities as well as municipalities that are exclusively Swedish or Finnish. The region is also one of the most international regions in the country with many foreign inhabitants and over 100 spoken languages. There are four universities in the region (University of Vaasa, Åbo Akademi University, Hanken School of Economics and University of Helsinki) and two universities of applied sciences (VAMK Vaasa University of Applied Sciences and NOVIA University of Applied Sciences). In addition to this, there is also a joint department between Aalto University and the University of Vaasa. Overall, there are over 12.000 university students in the region.

The region has a longstanding industrial tradition and is one of Finland's strongest export regions. The Vaasa region energy cluster is the biggest energy sector cluster among the Nordic countries. The cluster consists of over 140 companies with some 10.000 employees and an annual turnover of approximately 4 billion euros. The cluster is dominated by big multinational companies supported by supply chains of small and medium-sized enterprises. Several of the companies are global market leaders within their field and the export rate exceeds 80 per cent. This is currently the most important business sector in the region and has managed to remain thriving even during the long difficult period in Finnish economy with general trends of declining industrial output and rising unemployment rates. The economic hardships can be felt also in the Ostrobothnia region, but the energy cluster has managed to keep its position. As a result, Ostrobothnia is the region with the lowest unemployment rate in mainland Finland.

For the purpose of this report, we have carried out a small number of in-depth interviews with selected firms from within the energy cluster. The sampling of cases plays an important role and when selecting the firms we have aimed at organizations with a strong presence both in Ostrobothnia and in the energy cluster. Within this framework, we have tried to include different types of firms for maximum variation and in order to get a broad spectrum of viewpoints.

Eight face-to-face interviews were conducted in late 2016 and early 2017. Our interviewer went to the selected companies for the interviews, their discussions were recorded and later transcribed. The interviews followed a semi-structured setup. Each interview adhered to the basic structure outlined in the interview guide (see appendix A), but the respondents were allowed and encouraged to discuss and elaborate based on their own opinions and insights. In the next paragraph, we will describe the most important findings.

Findings

The results from the study clearly shows that the Triple helix model is in play. All companies (except one) are in more or less elaborate co-operations with other companies, universities and public organizations.

On the company side there is a broad spectrum of partners, extensive co-operation is done both together with customers and sub-contractors. There are also examples of strategic joint ventures where companies join forces attempting to benefit from each other's strengths. In general, company-partners can be found all over the World, but there seem to be perceived benefits in having partners (geographically) close by. The existence of a cluster of many similar companies is valued, and offers good opportunities for forming local partnerships.

In the interviews, great emphasis was given to funding organizations (e.g. TEKES). These are seen as extremely important partners. It is obvious that many current projects would not have been possible without the aid and support from these organizations. Looking at university co-operations, we see some of the same patterns as for company co-operations. The companies have good relationships with local universities, however, due to the profiles of the local universities it is not uncommon that they lack the desired resources. In such cases, companies have no trouble in finding and utilizing them elsewhere. Lappeenrannan teknillinen yliopisto and Aalto are two viable alternatives. Furhermore, there are also some examples of co-operations with international universities.

Looking at innovations, we could observe three distinct models: in-house innovation, innovation in co-operation with other companies (including joint solution development), innovation together with customers or sub-contractors (Table 1). Obviously, the type of innovation model is dependent on resources, which often is linked to the size of the company.

The concept of the energy cluster also provoked many comments from the respondents. The comments were positive in general, but included some interesting discrepancies. Different companies have, naturally, different views on the state and usefulness of the cluster, and on their own role within the cluster. Some companies see themselves as the "essence" of the energy cluster, while others think that they have created or enabled the cluster. There were also some critical comments, boiling down to that the cluster is more hype than substance and that more permanent structures are needed.

What is lacking in the energy cluster? Different companies have different needs, but in general they would like to see long term investments in structures or research. On their wish list there are items like better funding opportunities, laboratories, university professorships in relevant areas etc. On the other hand, short-term publicity events are often considered to be of low value.

Table 1. Overview of the interview results

Company	**Triple Helix**			**Innovation model**
Solutions	Companies	Organisations	Universities	
1 Lightning	Sub-contractors Banks	Tekes, Finnvera	International Universities VY, laboratory for tests	In-house innovation, production resources are found abroad Co-operation with companies are not always beneficial Vaasa Energy cluster is ok for small companies
2 Pistons	Customers	Tekes	Co-operation problems with universities	Innovation in cooperation with customers Co-operation is important Vasa Energy cluster is a hype
3 Magnet generators	Regional companies	Tekes, Finnvera	LUT and Regional universities	Innovation with and support from companies (collaboration) and universities Co-operation is important Vasa Energy cluster is ok
4 Automation systems	Regional and international companies	Vasek, Merinova	VY, VAMK, Technobotnia	Innovation with other companies Project based innovation processes Vasa Energy cluster is good for small companies
5 Protection relays	Regional companies	Vasek Merinova Tekes	VAMK Technobotnia	Innovation with other companies Techonbonia is important Vasa Energy cluster is ok
6* Venture capital	Regional and international actors	Tekes	LUT Technobotnia	Strong actor in Vasa Energy cluster
7 Automation systems	Regional companies	Vasek Finnvera	VY VAMK	Innovation with other companies Vasa Energy cluster is ok
8 Electrification solutions	National and regional actors	Tekes	National universities (Aalto, LUT, VY) Technobotnia VTT	Innovation in-house and with universities Customers Strong actor in Vasa Energy cluster

Conclusions

In the report by Virkkala, Mäenpää and Mariussen (2014), Björk and Johansson draw in chapter 6, based on the number of co-operation partners, the conclusions that public organisations and universities (in particular) only marginally add to inter-helices knowledge transfer. However, knowledge for innovation and smart specialization is not conditioned by the number of cooperating partner only, but by the "right" partners as suggested by the resource-based theory. Therefore, this study aimed at a more detailed study of the process of knowledge transfer by answering three research questions:

1) How do companies co-operate and share resources
2) How cooperation for innovations could be enhanced
3) How to excel smart specialization in the region

Based on eight in-depth personal interview we draw the conclusion that the Triple helix model is in operation even if the link to public organisation is not the most vivid one. Universities, are important, but not on a general level. Obviously, companies have a few universities they cooperate and share knowledge with. It is about unique co-operations based on specialized knowledge. Still, the findings support the notion that innovations are most often "in-house". Especially so among the very big, global, companies. Based on the emerging smart specialisation structure it seems that co-operation for innovations could be enhanced by focusing on one actor-network at a time because of the large diversity of cooperation structures. This implies that Vasa Energy cluster cannot be treated as one network, but a large set of different more or less inter-connected networks. Entangling the mechanisms for resource integration, personal contacts are critical. Co-operations are most often long term and financial resources in companies are traded with human resources in universities. In theoretical innovation models, an often forgotten type of actor is the financial institutes, banks, risk capitalists and investment funds. All informants agree on the importance securing capital for the innovations.

In this structure, three different innovation models could be identified. Primarily, the large companies handle their innovation processes in-house. There are some companies, which do also innovate in co-operation with other companies on the same level, and finally we have those innovation processes, which are done in interaction with sub-contractors and customers.

The discussion about Vaasa Energy Cluster is ongoing, and is definitely a resource for the region. However, the informants analysed for this study can be categorized either as the drivers of the discussion and development or as scepticals. Those, who have a slightly negative attitude towards the discourse of the mighty Energy Cluster claim that there is no cluster and they are not part of it. This has regional policy implications by the arguments that the "cluster", out of a marketing perspective, is not stronger than its weakest component (actor). It is assumed and critical that all companies involved in the Vaasa Energy Cluster feel a high level of belonging and can act as an ambassador for the cluster.

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Appendix A

Interview guide

Haastatteluohje

Tärkeät yhteistyökumppanit innovaatiotoiminnoissa

1) Valitse kaikista yhteistyökumppaneista 3 tärkeintä ja kerro miksi?
2) Mikä yhteistyö on niin tärkeä, ettette pärjäisi ilman sitä?
3) Mikä yhteistyö olisi vaikea korvata toisella vaihtoehdolla?

Resurssit yhteistyössä

1) Yhteistyössä_____***yritys x***___mitä resursseja?
    - Mitä resursseja teillä on?
        - Fyysiset tuotteet (osat)
        - Laboratoriot
        - Rahoitus
        - Henkilöresurssit/osaaminen/henkilöstö
        - Johtamisosaaminen
        - Maine/imago
        - Markkinatieto
        - Pääsy jakelukanaviin
    - Mitä resursseja **toisella osapuolella** on?
    - Millaisia resursseja yhteistyössä jaetaan?

2) Yhteistyössä_____***organisaatio x***___mitä resursseja?
    - Mitä resursseja teillä on?
        - Fyysiset tuotteet (osat)
        - Laboratoriot
        - Rahoitus
        - Henkilöresurssit/osaaminen/henkilöstö
        - Johtamisosaaminen
        - Maine/imago
        - Markkinatieto
        - Pääsy jakelukanaviin
    - Mitä resursseja **toisella osapuolella** on?
    - Millaisia resursseja yhteistyössä jaetaan?

Appendix A

3) Yhteistyössä_____***yliopisto/korkeakoulu***___mitä resursseja?
    - Mitä resursseja teillä on?
        - Fyysiset tuotteet (osat)
        - Laboratoriot
        - Rahoitus
        - Henkilöresurssit/osaaminen/henkilöstö
        - Johtamisosaaminen
        - Maine/imago
        - Markkinatieto
        - Pääsy jakelukanaviin
    - Mitä resursseja **toisella osapuolella** on?
    - Millaisia resursseja yhteistyössä jaetaan?
    - Miksei yhteistyötä alueen korkeakoulujen kanssa?

Erikoistuminen

Yritys

1. Miten yhteistyö edistää kilpailukykyä?

Alue/Seutu

2. Kuinka yrityksenne edistää ”alueellista erikoistumista”?
3. Kuinka yrityksenne sopii ”energiaklusteriin”?