

APPENDIX 3

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The roles of intermediaries in a regional knowledge system

Anssi Smedlund

Helsinki University of Technology, Espoo, Finland

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Abstract

Purpose – The purpose of this article is to provide a tool to map the critical roles of intermediate organizations. To clarify the concept of intermediate organizations in a regional context, especially from the network dynamics point-of-view.

Design/methodology/approach – Regional dynamics are presented as networks of production, development and innovation in the regional cluster. The intermediaries are divided into national, regional and local level actors. The roles of the intermediaries from the network dynamics point-of-view are then illustrated with examples from a case study in a medical technology cluster located in a sparsely inhabited area in Finland.

Findings – According to the results of the case study, the regional intermediaries have the most important role in the creation and supporting of the network dynamics. The most critical roles include forming shared innovation strategies between the actors and attracting anchor tenants to the region.

Research limitations/implications – The characteristics of the case region are discussed in a generic sense with the concepts of social capital and communities of practice.

Practical implications – Conceptually, the article provides an approach to reducing the complexity of the regional networks to a more understandable level. The model provides a tool for the decision makers in a region to define the critical roles of the intermediaries from the network dynamics point-of-view.

Originality/value – The novel approach introduced in this paper addresses three gaps in existing research: it helps to define the concept of an intermediary in a regional context; it shows that the intermediaries have a much broader role in a region than just knowledge transfer and that the roles of the intermediaries differ on national, regional and local levels.

Keywords Intermediaries, Innovation, Regional development, Intellectual capital, Knowledge processes, Finland

Paper type Conceptual paper

Introduction

Globalization has made it possible for companies to outsource virtually anything to a country with lower costs of production. This leads to numerous challenges in regional development. It has been said that in the new knowledge-based economy, the importance of attractive regions is emphasized (Castells, 1996). A region and the clusters within it are the main building blocks of successful states. The region has to be able to maintain its critical mass of constant innovation and effective production in order to prevent slow decay. Only a healthy region is capable of attracting flows of capital, competent employees and multinational companies, and compete against other regions in the world.

Based on a case study in the mechanical wood processing industry, Pöyhönen and Smedlund have taken a dynamic knowledge-based view on clusters and argue that regional clusters can be perceived as consisting of three types of networks: production, development and innovation networks. Each network type creates a certain type of



knowledge-based competitive advantage, and has its own operational logic and effectiveness criteria. Furthermore, it can be claimed that in order to implement, develop and innovate intellectual resources effectively, a regional cluster has to include all types of network. (Pöyhönen and Smedlund, 2004).

Smedlund and Pöyhönen also argue that a single actor in a regional cluster can be a member of different kinds of networks at the same time. In order to be successful, the regional cluster has to be able to:

- make use of existing knowledge as efficiently as possible in a vertical production network;
- transfer firm-specific knowledge and ideas in a horizontal development network; and
- invent new knowledge, products, production methods or processes in a diagonal innovation network.

When these network types are all present in a region, new innovations are transmitted to all the actors to benefit each of them individually, and new innovation ideas emerge constantly. The cyclic nature of innovations and innovation ideas between the production, development and innovation networks can be called the regional knowledge system (Smedlund and Pöyhönen, 2005).

In brief, the main idea of the dynamic, knowledge-based view of regions can be summarized as follows: a regional cluster of small firms is structured in a network type of co-operation, depending on the intellectual capital-related functions. These functions come in three basic forms:

- (1) knowledge creation;
- (2) knowledge transfer; and
- (3) knowledge implementing.

They represent the basic tasks of a firm in the new knowledge based economy. Knowledge creation is needed in new innovations, knowledge transfer is needed in learning the best practices, and knowledge implementing is needed in producing products as efficiently as possible. A single firm in a region can be a member of a dynamic innovation network, an organic development network and a mechanic production network at the same time (Stähle *et al.*, 2003). The networks have members outside the region as well.

Thinking of a regional cluster as a set of interconnected networks that serve different IC-related functions provides a preliminary understanding on how regional competitive advantage is created in the knowledge -based economy. The question that still remains is how to foster the process of continuous and simultaneous innovation, learning and production in a regional cluster. In other words, how to improve the overall dynamics of the regional knowledge system? According to Saxenian (1994), networking among firms in a region is enabled and supported by regionally embedded institutions such as chambers of commerce, employers' unions, banks, science parks, universities, and training centres (Saxenian, 1994; Ebers, 1997). These kinds of institutions can also be called intermediaries, or intermediate organizations that transfer knowledge inside the region and influence the success factors of the region.

In this paper, the roles of intermediaries are discussed from the regional dynamics point of view. The dynamic, knowledge based view of the region adopted in this paper reduces the complexity of the regional networks into a more understandable level. Besides knowledge creation, knowledge transfer and knowledge implementing functions, the intermediaries are divided into national, regional and local level actors. The roles of the intermediaries in a regional knowledge system are then illustrated with examples from a case study in the eastern part of Finland. As the result of the case study, it is argued that the regional level intermediaries have the most important roles in the improvement of regional dynamics. These regional roles include such tasks as ensuring coherent innovation strategies between the actors and attracting anchor tenants to the region.

There is no one recipe to create successful regions. Managers and decision makers working with regional development issues face difficult challenges, including how to attract not only physical capital but also creative human capital to the region. Furthermore, the needs and motives of the different regional actors seem in many cases inconsistent and undefined. With the simple modeling tool that this article provides, it is easier to see the critical roles of the intermediaries that are associated with the dynamics of a region, and this way improve the overall regional capability to meet the future challenges and adapt to the global market environment.

Dynamic success factors of a region

In this paper, the success factors of a region are divided into three classes:

- (1) substance;
- (2) structures; and
- (3) dynamics (Stähle *et al.*, 2003; Smedlund *et al.*, 2005).

This division is logical and provides a mind map to explain different kinds of factors that are related to the success of regions. This division is highly inspired by the intellectual capital literature, where IC is commonly explained in terms related to: human capital; structural/organizational capital; and relational capital (for a good overview, see Andriessen, 2004).

In the regional context, the substance factors are field specific knowledge, skills and competence. Structural factors form the infrastructure of a region and dynamic factors make the region alive. This way, the dynamic success factors can be seen as the processes that turn the substance and structures of a region into value.

The production and transaction cost-based structures of regions have traditionally been regarded as their success factors. These components include factors of production, demand conditions, related and supporting industries, and rivalry, as presented by Porter (1990), and geographical distance and the economics of scale as presented by Krugman (1991).

Both Porter and Krugman argue that the success factors of clusters are “hard” structures typical for mature and physical capital intensive industries. These hard structures are easier to make concrete than new intellectual capital-based, “soft” structures. From the viewpoint of the overall success of a region, the soft structures include such things as regional steering methods, strategies, institutions and legislation that are likely to support innovation, development and production activities

in the region. The soft structures should be as unequivocal as possible to steer the economic activity in the region persistently and consistently (Smedlund *et al.*, 2005).

Besides structures, a region also needs a solid base of substance that is the knowledge, competence and managerial skills – human capital – of the actors inside the region. Even though the structures and substance are important for a region, the new knowledge-based theory emphasizes dynamics – the tangible and intangible flows that occur inside the region that make the system alive (i.e. Allee, 1999, 2000, 2002). In the heart of the dynamics are the different networks and their interplay.

The structure, substance and dynamics of a region can be further made concrete by using the terms appearing in the intellectual capital literature. The approaches to the determinants of competitive advantage in the knowledge-based economy can be divided into three categories: assets, capabilities and relations (Pöyhönen and Smedlund, 2004). To take full advantage of the hard and soft structures of a region, the existing intangible assets need to be identified and valued. Capabilities are related to the substance of a knowledge-based region, because the capabilities view emphasizes the capability to create, develop and modify intangibles. The capabilities view also highly emphasizes personal skills and know-how. Thirdly, the relations are connected to the dynamic side of a knowledge-based region. Production, development and innovation networks require social relations, interaction and collaboration (Figure 1).

The dynamics of a region can be argued to be the most important success factor of the region. In Allee's view of value networks, the flows that take place in the networks make a value system alive (Allee, 2002). Without the dynamics, a region is just a skeleton. The tangible and intangible flows between the actors function as a blood circulation system in the region, enabling the system to meet the changing needs of the business environment.

According to the idea of a regional knowledge system (Smedlund and Pöyhönen, 2005), the tangible and intangible flows flow in the regional networks of production, development and innovation. An individual actor can be a member of each type of

Substance	=	Knowledge, skills and competence	→	Needs <i>capabilities</i> to create, develop and modify substance
Structures	=	<i>Hard structures:</i> factors of production, demand conditions, related and supporting industries, rivalry, distance and economics of scale. <i>Soft structures:</i> regional steering methods, strategies, institutions and legislation	→	Needs identification and evaluating of existing <i>assets</i>
Dynamics	=	Networks of production, development and innovation	→	Needs social <i>relations</i> and interaction combined with networks and collaboration

Figure 1. Substance, structures and dynamics as success factors of a region

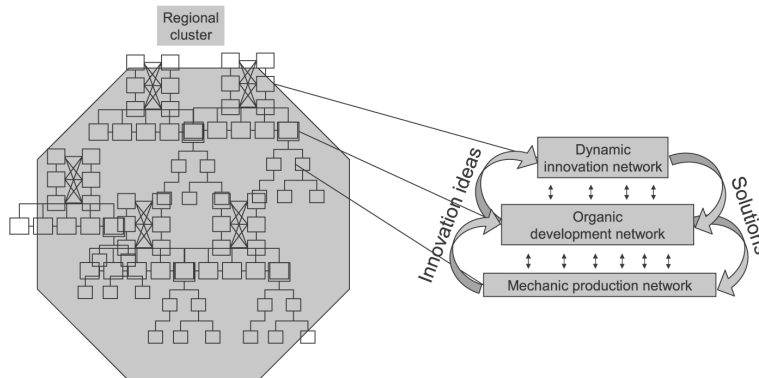
network simultaneously. A production network is a vertical type of co-operation between multiple actors, and its purpose is to create value to the region by producing and selling products to the markets. In achieving this purpose, the production network implements the existing knowledge as effectively as possible. The main benefit of the production network is that it lowers the transaction costs of the actors by letting them to concentrate on their core competences.

The development network is horizontal, and the purpose of the network is to ensure that information is transferred between the actors. In achieving this purpose, the development network shares firm-specific knowledge between the actors. The development network increases learning among the actors by creating trustworthy relationships and increased communication.

The shape of the innovation network is diagonal. The innovation network is a complex network of many kinds of actors, for example firms, institutions, financiers etc. The relations in the innovation network cross many traditional borders of hierarchy. The main purpose of the innovation network is to bring together different actors and resources to raise the value of the network. The task of the innovation network is to create new knowledge. The main benefit of the innovation network for the region is continuous improvement of products, production methods and production processes.

The idea of the three types of networks of knowledge creation, knowledge transfer and knowledge implementing is originally based on the theories of the knowledge environments of an organization presented by Stähle (Stähle, 1998; Stähle and Grönroos, 2000; Stähle *et al.*, 2003). According to Stähle the competitive advantage of an organization is formed with the interplay of mechanic, organic and dynamic knowledge environments. The knowledge is managed in the organization by creating different environments that have different logic of producing value with knowledge. Another similar classification has been presented recently by Möller and Svahn (2003). In their theoretical article based on the theories of the industrial network approach, strategic management and dynamic capabilities, Möller and Svahn argue that there are three main archetypes of inter-organizational networks. These are stable value systems, established value systems and emerging value systems. In their approach, firms in a certain market form strategic "nets" that follow different value system logics. In a stable value system, well-known and specified value activities prevail. The actors, technologies and business procedures are clear and defined. In an established value system, the incremental improvements take place between the actors. The value system is well known, but the network evolves through local and incremental modifications within the existing value system. An emerging value system represents radical changes, where the whole value system is not yet defined, the actors are not known and the old value activities are changed radically. An emerging value system is capable of changing rapidly, but there is also a lot of uncertainty involved.

The implications of the different knowledge environments and value systems on the regional level are the production, development and innovation networks. These networks form a hologram type of system that we call the regional knowledge system (Figure 2). According to this framework, new innovations are innovated on the innovation network level with the combination of different knowledge, competence and creativity. On the development network level the innovations are improved gradually, but nothing new is invented. In the production network the final products are produced



Source: Smedlund & Pöyhönen (2005)

Figure 2.
Regional knowledge system

as effectively as possible, or a new production method or process is applied into practice. It is important to understand that the dynamic innovation network level alone does not guarantee the success of a region. The region also needs organic development networks and mechanic production networks to turn innovations into money. Besides having these different types of networks, the networks have to be linked with each other. According to the framework that this thinking provides, the region is able to achieve the benefits of lower transaction costs, economics of scale as a form of united market force, and continuous innovation simultaneously.

In the regional knowledge system, the production network (order and supply chain) brings cash flow to the region and functions as a customer interface. The development network (best-practice type of learning, spillover of knowledge) improves the performance of the independent actors. The innovation network (research and design) ensures continuous creation of new knowledge. In the regional knowledge system of production, development and innovation networks, not only new innovations are utilized, but also new innovation ideas that emerge in the production function can be taken into account rapidly.

In the regional knowledge system framework, every actor in the region can be a member of every type of network. The network-based view of the dynamics of a region is that the actors form collaboration relationships to serve different tasks. Production, development and innovation are just the archetypes of different tasks that firms need in the knowledge-based economy. The actors have to be conscious of other actors in the region as well. The interplay of the different networks is a prerequisite for the dynamics of a region. New innovations require a platform for new ideas, a broad learning base and the capability to make products effectively. Links between the networks are formed when an actor is involved simultaneously for example in production and innovating. This makes it possible for new innovation ideas and best practices to improve the production processes through mutual learning.

As mentioned above, the success factors of a region can be thought of as factors related to substance, structures and dynamics. Substance consists of the field-specific knowledge base in the region and structures are the factors that make it possible to

make profit out of knowledge with the dynamics. In this paper, regional dynamics are defined as being the networks of production, development and innovation and their interplay. Structures and substance can be influenced directly to some extent, because they are easy to understand and concretize. Dynamics, instead, cannot be acted on directly. The networks cannot be administered, but they can be steered towards the desired outcome. In the following I will discuss the concept of an intermediary and particularly the roles that intermediaries have in the network dynamics of a region.

National, regional and local intermediaries

In general, an intermediate organization is an organization that functions in the midst of the users and producers of knowledge. According to Vonortas, intermediaries can be found between the government and the private sector (Vonortas, 2002). Case studies in Latin America have shown that these intermediaries have a significant effect on the performance of SMEs. The intermediaries assist SMEs in many ways. Vonortas argues that "Frequently, the most useful type of assistance to SMEs is not technological but more general business oriented such as locating and approaching the customer, achieving a steady cash flow, developing relationships of trust, accessing finance, managing the firm effectively, and training the employees" (Vonortas, 2002, p. 4).

A narrow definition of the concept of an intermediary is related to the substance of the region. According to this definition, the purpose of an intermediary is solely knowledge transfer from the creators of knowledge to the users of knowledge. This is the definition that is used when the technology transfer from universities to local firms is studied.

However, the effect of an intermediary to the surrounding region is broader than just technology transfer. For the success of a region, the founding of structures and dynamics is also an important task of an intermediary. The broad definition of an intermediary thus covers:

- the knowledge transfer related to the substance of a region;
- the direct or indirect effect of intermediary on the structures of a region; and
- the direct or indirect effect on the dynamics – production, development and innovation network and their interplay (Smedlund *et al.*, 2005).

Defining clear roles for intermediaries is not simple. On one hand, an intermediate organization can be a form of an organization of its own, but on the other the concept of an intermediary can be defined as being a role or a mission of any organization in a region. In a regional cluster, there seldom are organizations that focus exclusively on intermediating tasks. Many organizations can function as intermediaries unconsciously. The concept of intermediary should be defined as a framework in which the roles of different actors in a regional knowledge system can be studied.

In the field of social capital research, and especially in the publications of the World Bank, the unit of application highly depends on whether the event studied is considered to be on the macro, meso or micro level (Grootaert and van Bastelaer, 2001).

The macro level is the national political atmosphere in which the norms, networks and trust between individuals and groups evolve. It is possible to influence the macro level social capital by influencing the institutions, political regime, laws, or the freedom of speech (Grootaert and van Bastelaer, 2001). Some researchers even consider the differences on the macro level social capital between nations to be the reason for the

economical success of certain nations (Hjerppe, 2003). This view is based on the idea that even though the knowledge is available to all, only nations with high social capital can turn this knowledge into economic value. The social capital on the macro level offers national conditions for the success of the regions and it also includes the meso and micro levels.

The micro level covers the relationships between individual persons and/or individual small groups of persons. When these micro level groups function properly, they cause positive externalities to the surrounding society. Of course, the externalities can also be negative, as for example in the case of mafia. The meso level perspective includes mainly the relationships and networks between organizations and groups. Individuals or organizations perform actions within a certain type of social structure. The links on the meso level are both vertical and horizontal, and therefore it functions as a link between the macro and micro levels (Grootaert and van Bastelaer, 2001).

As with the concepts of social capital, the goals and missions of an intermediary vary according to the level of observation. These levels are:

- national (macro);
- regional (meso); and
- local (micro).

The mission of a national intermediate organization is to ensure the success of the nation as a whole. The mission of a regional intermediary is to support the success factors of the region, and the mission of a local intermediary is to serve local firms in their business. The macro, meso and micro level intermediaries have a different effect on the success of the regional knowledge system. The different levels of intermediate organizations represent the nature of the mechanisms that make a region successful.

The macro level intermediate organizations create national prerequisites for successful regions. According to Porter (1996), the government has to support companies, because companies create competitive industries. Porter also states that "Government policies that succeed are those that create an environment in which companies can gain competitive advantage rather than those that involve the government directly in the process" (Porter, 1996, p. 185). The macro level intermediate organizations are those that function, in Porter's terms, as catalysts and challengers for companies.

On the regional level, the main task of an intermediary is to orchestrate collaboration between the key actors in the region. The regional meso level ensures that regional strategies are consistent and up to date. An intermediary on the regional level also functions as a link between the micro and macro levels.

The local micro level intermediary functions locally and helps individual firms or persons to gain knowledge. On the micro level, interpersonal relationships are emphasized and the basis for trust and communication between the actors is created. The local intermediaries establish contacts, arrange networks and offer resources to the companies in the region. Examples of local intermediaries are knowledge intensive business service firms (KIBS). According to Miles, KIBS organizations, for example, work with companies in the innovation process, mobilize new ideas for further development, and keep track on possible partners and markets (Miles, 2001; Kempplä and Mettänen, 2004).

Roles of intermediaries from the regional dynamics point of view – case Kuopio region

National, regional and local intermediaries influence the substance, structures and dynamics of a successful region in many different ways. The right substance – knowledge and competence – require regional capabilities to create, develop and modify intangible assets. The intermediaries are able to influence these capabilities for example by creating national programs, by regional politics or by supporting local competence. From the point-of-view of structures, existing assets need to be identified and valued. An intermediary can evaluate the existing structures and intangible assets and focus on developing essential structures. A national intermediary can for example try to change patent laws, a regional intermediary can build the basic infrastructure, and a local intermediary can improve the business services of a region.

In this paper I concentrate merely on the dynamics creation aspect. As mentioned above, by regional dynamics I mean different networks and their interplay in a regional cluster. From the viewpoint of regional dynamics, the roles of the intermediaries are related to relationships, interaction, networks and collaboration. Naturally, a successful region is based on a solid base of substance that the structures support. It is also obvious that without dynamics the substance and structures cannot be turned into value. Therefore, substance, structures and dynamics are connected together with positive feedback loops. The intermediaries can affect the loops by taking the right initiatives. When the roles of the intermediaries are known, it is easier to make the right decisions.

The roles of the intermediaries from the regional dynamics point of view were constructed during the summer 2004 in a research project launched by the Finnish Ministry of Trade and Industry (Stähle *et al.*, 2004; Smedlund *et al.*, 2005). The result of this short research project was a report on the challenges of Finnish national, regional and local intermediate organizations. The case region was the Kuopio region in the eastern part of Finland, and especially the medical technology cluster in the region. The data collection method was a theme-based interview ($n = 8$) with the key persons in the region. The themes were the missions, roles and collaboration of the organizations, and the personal opinions of the interviewees. Also previous reports and articles about the case region and the Finnish innovation system were used. During the case study, around 20 organizations were identified in the Kuopio region that have a role of an intermediate organization in the region. In this paper I use only three of these organizations to illustrate the roles of the intermediaries in the region. The three intermediaries presented in this part are: the national “Finnwell” technology program (www.tekes.fi/eng/), the regional “Health-Kuopio” project (www.tervekuopio.fi/freimstart.htm), and the local “Teknia”-technology center (www.teknia.fi/).

In Finland, the growth of the economy takes mainly place in three areas: in the Helsinki area, where most of the people live, in the Tampere region in central Finland, and in the Oulu region in the north. Oulu has been successful mainly because of Nokia, Tampere has a long industrial history, and Helsinki has most of the head offices of Finnish companies as well as most of the research and development activity in Finland. The Kuopio region is an exceptional region compared to the other growing regions in Finland. The whole region, including the town of Kuopio and the surrounding municipalities has only 117,000 inhabitants (Valovirta and Virtanen, 2004). The Kuopio region is located far from all the other growth areas (Helsinki = 250 miles,

Oulu = 150 miles and Tampere = 180 miles). Also, Kuopio does not have a port and there are no natural resources, except for spruce trees and lakes. The industrial history of the region is also not very notable, except for a couple of forest mills and pulp factories. The main field of business in the region has been agriculture, but along with the structural changes in the agricultural politics of Finland and the EU, farming has become unprofitable. Furthermore, basic labor in Finland is too expensive, so basic factory labor will not be the source of the future success of the Kuopio region.

The main competitive advantage of the future that the whole Kuopio region counts on is the University of Kuopio and the research and development activities that the university supports. The University of Kuopio was founded in 1972 as a result of the regional politics of the Finnish government. In the 1960s and 1970s, three universities were established in the sparsely inhabited eastern part of Finland. It is widely agreed among the key persons of the Kuopio region that the university provides a solid base of substance and knowledge. In fact, the university is the third biggest employer in the region after the city of Kuopio and the central hospital. There are only a few considerable employers in the private sector, and the rate of unemployment is around ten percent (Statistics Finland, 2003). This skewed employment situation in the region illustrates the present situation of the region as a periphery of the EU and one of the poorest regions in Finland.

The main direction of the strategy of the region is clear, and all the key actors think similarly about the future of the region. The competitive advantage of the region is going to be built on technology related to medical technology. There is no clear definition for this field, but the concepts of wellbeing, welfare or life-science are commonly used.

Examples of national, macro level intermediaries affecting the dynamics of the region are national technology programs where the actors in the region participate. The actors in the region take part in numerous national research and development programs that provide funding and form national and international links between universities, research laboratories and companies. Examples of the programs are “iWell” and “FinnWell”, both of which study how to improve health care services with new technology. According to de Juan (2002), the strength of the Finnish national system of innovation is often considered to be the close cooperation between companies, research organizations and universities. One reason for the cooperation is that the National Technology Agency (TEKES) requires joint research projects between companies and universities in their funding programs.

In the research of regional development, the “triple helix” model is often used to describe the regional collaboration between universities, government and firms. In the “triple helix” model, private, public and science worlds are interwoven when the processes of innovation and strategy formation are built up in the region. Shared discussions and projects blur the borders of the institutions, and the actors may even take up the role of each other in the region (Etzkowitz and Leydesdorff, 2000).

In the Kuopio region, an example of a regional “triple helix” type of shared building of strategies and visioning is a project led by the city of Kuopio. This project, called “Health-Kuopio” is a kind of an “umbrella” project for the overall strategy of the whole region. The ambitious vision of the project is that the region will be the best life-science centre in the EU. The steering group of this project consists of members from all-important actors of the region from private, public and science sectors. This project

was considered as being important, because it keeps the different strategies of the different actors consistent. One result of this project is a study of the region's strengths and weaknesses compared to other life-science clusters in Finland. Besides strategy formation, one of the goals of this project is to give a positive image of the region to the outside world.

High-technology industrial parks and technology centers are examples of intermediaries of the local level. In Kuopio, the technology center "Teknia" was considered to be the most important local level intermediate organization. Teknia's role in the region is to help the small firms in the region. It provides a set of basic services to the firms: for example office space and legal consulting. Teknia also seeks partners from outside the region and evaluates the business ideas. To some extent, the publicly owned Teknia functions as a KIBS organization. This is a good thing because the region is not big enough yet to support specialized private service organizations. In the long run, however, the business services should be privatized.

As a whole, the Kuopio region has good conditions for new innovations. From the innovation network point of view, the region has the right substance and structures. Universities, financiers and small businesses are located close to each other. From the viewpoint of the development networks, the region lacks high quality business services and the substance of a knowledge base for example in marketing, patent laws and international relationships. In fact, the interviewees mentioned a variety of examples of excellent innovations that had failed to succeed because of lack of management and market competence. The production function in the region is very poor. At the time of the interviews, it seemed that there were only a couple of firms in the region that actually sold their life-science -related products to the market successfully. The obvious hindsight of the lack of production networks was that the new knowledge did not find its way to be used in practice. There was also no feedback system to receive innovation ideas from the production. Roughly speaking, the new research and innovations were either left unutilized or they were taken out of the region.

The interviewees saw the absence of big firms a problem in the region. The presence of big, anchor tenant type corporations creates regional dynamics and provides growth opportunities for other firms in a region (Agrawal and Cockburn, 2003). Also, the trend in the field of medical technology seems to be that the nature of the business environment favors large units. Furthermore, evidence of the importance of anchor tenants can be found in the success of the Oulu region. Oulu in northern Finland seems to be based on the fact that the Nokia corporation functions as an anchor tenant in the region. Nokia, its subcontracts and the University of Oulu have been working in close collaboration since the 1970s (Synocus, 2004). The substance created in the university has been utilized successfully in Oulu and the knowledge has been successfully anchored inside the region to benefit other regional actors.

As a result of the interviews and the regional knowledge system framework (Smedlund and Pöyhönen, 2005), the main roles of the intermediaries from the regional dynamics point of view can be introduced. National, regional and local intermediaries have distinct roles from the point of view of the innovation, development and production networks of a regional cluster of small firms. As summarized in Table I, the main roles of a national intermediate organization is to support the joint projects of science and private sectors in innovation, provide national forums of knowledge sharing, and influence the institutional environment for production. The roles of

	National/macro level intermediaries	Regional/meso level intermediaries	Local/micro level intermediaries
Innovation networks	Supporting joint projects of science and private sectors	Keeping the innovation strategies coherent between the actors. Promoting triple helix type of cooperation.	Trusted third parties. Selection of innovation ideas. Hubs in the transfer of information.
Development networks	Providing national forums to encourage firms in building national and international links	Forming national and international relations. Forming regional forums for knowledge sharing	Coordinating forums of knowledge sharing and learning among entrepreneurs.
Production networks	Influencing the laws, taxation and other institutions for a better environment for production	Attracting anchor tenants to the region	Creating trust and communication Knowledge intensive business services to small firms

Table I.
The roles of intermediaries in the dynamics of a regional knowledge system

regional intermediate organizations are related to the overall strategy of the region. The regional intermediaries promote the triple helix co-operation, form relations and attract anchor tenants to the region. Local intermediate organizations are in a close relationship with the firms in the region. The local intermediaries function as hubs in the networks, coordinate forums of knowledge sharing and provide knowledge intensive business services to firms.

In the Kuopio region, the main roles of the case intermediate organizations support the roles introduced in Table I. The technology programs, such as the FinnWell program, financed by the National Technology Agency (TEKES) are joint projects between the universities and the private sector, the "Health-Kuopio" project lead by the city of Kuopio is an umbrella type of a project to provide shared vision and strategies to the whole region, and finally, the main role of the technology center Teknia is to support the development of the start-ups and small firms in the region.

Discussion

Defining the concept of an intermediary and making sense of the numerous roles that national, regional or local intermediaries have in a region is not simple. The narrow definition presented in this paper was that the intermediaries transfer knowledge between the producers and users of knowledge, thus improving the knowledge and competence base of the region. In a broader sense, the intermediaries also influence the structures and dynamics of a region. The view presented in this paper considered the universities as producers of knowledge and local firms as the knowledge users. In real life, besides the knowledge transfer from universities to firms, there is also a lot of knowledge transfer and sharing between firms. The role of corporations as knowledge producers is increasing and firms even produce the same kind of reports and articles as universities do. Also, joint projects between firms and universities blur the distinction between knowledge producers and knowledge users.

According to the case study, the regional intermediaries can be argued to have the most important roles from the point of view of the overall dynamics of the region. The regional intermediaries link local and national levels together with mutual strategy formation and visioning processes. With the functioning triple helix of public, private and science worlds, the overall strategy of the region can be steered towards the right fields of business. This conclusion supports de Juan's view that direct national interventions cannot work alone when building successful regions (de Juan, 2002). It seems that in addition to national regional politics and other macro level steering methods, a successful region needs mutual commitment of the key actors in the region as well as good business services to local firms.

The regional level intermediaries seemed to be emphasized in the case region, possibly due to the small size of the region and the lack of possible paths of success in the future. Medical technology was seen as the only possible competitive advantage in the future among the interviewees. The region has good preconditions for this, only companies making use of the knowledge and competence of the region are still missing.

The case region has many unique Finland-specific characteristics, such as the high involvement of national government as the buyer of products and services from the firms in the region, and the fact that nearly all of the intermediaries studied in the Kuopio region were publicly run. The intermediaries introduced above (Finnwell, Health-Kuopio and Teknia) have been founded and have hired professional managers

at the expense of the tax-payers. In the early stages of building the regional dynamics in Kuopio, this was considered a good thing, because according to the definition of the intermediary introduced in this paper, intermediaries “patch up” holes in the existing regional networks and influence the success factors of a region in many ways. In this sense, the focus of the roles of intermediaries is always different depending on the characteristics of a region.

The general characteristics of the Kuopio case can be transferred to other regions as well by using the concepts of social capital and communities of practice. At its simplest, the concept of social capital is based on the notion that “social relationships have value” (Putnam, 2000). Cohen and Prusak (2001, p. 4) define social capital as follows: “Social capital consists of the stock of active connections among people: the trust, mutual understanding, and shared values and behaviors that bind the members of human networks and communities and make cooperative action possible”. It was stated above that social capital has three dimensions, namely macro-, meso- and micro level (Grootaert and van Bastelaer, 2001). In the regional context, there are studies that show positive correlation with social capital and learning benefits in young technology firms (Autio, 2000; Yli-Renko *et al.*, 2001). In the case region, the intermediaries seemed to leverage the social capital on macro-, meso- and micro level by directing funding to the shared projects between firms and universities, bringing different actors together to form shared strategies in a “triple helix” (Etzkowitz and Leydesdorff, 2000) for the region and building shared technology centers for the firms in the region.

The concept of communities of practice is related to social capital. In fact, it can be stated that communities of practice represent micro level social capital that has positive externalities to the surrounding region. Wenger and Snyder (2000, p. 139) state that communities of practice are “groups of people informally bound together by shared expertise and passion for a joint enterprise”. They also argue that communities of practice cannot be created intentionally, but they can be encouraged by bringing the right people together and providing an infrastructure for them. From the learning perspective and in the light of a case study in Silicon Valley, Benner (2003) argues that significant individual level learning takes place in communities of practice. He also argues that communities of practice can be actively built through the formal activities of professional associations.

In the Kuopio region, the intermediaries were able to encourage the formation of communities of practice. The local level intermediaries working directly with the companies can be considered especially important in building communities of practice. During the work with companies, the intermediaries form a good understanding of the characteristics and competencies of the region’s firms. This way they can act as brokers in the building of different work-related associations between individuals working in these firms. In Kuopio, Teknia also arranged seminars and other events regularly for the firms in the region. Furthermore, mentioned as a curiosity, it was noted that the shared cafeteria in the technology center Teknia was purposefully built to be a little bit too small to encourage social networking between the employees of different companies during lunch and coffee breaks.

The main contribution of this paper is the framework for defining the roles of intermediaries in a region. By dividing the regional networks according to their intellectual capital functions – knowledge creating, knowledge transfer and knowledge implementing – and combining this with macro, meso and micro

perspectives, provides a tool for the decision makers of a region to understand the critical roles of the intermediaries.

In the final analysis, only private sector companies can turn the substance, structures and dynamics of a region into economic value. The most important task of the intermediaries should be to offer support to the companies located in the region, make the region attractive for entrepreneurs and allure anchor tenants to the region. From the dynamics point of view, this leads to numerous challenges in the leadership of the intermediaries. Especially on the regional level, the challenges will be to improve the image and identity of the region, leverage the social capital and encourage communities of practice in the region, create appealing environments to creative individuals, and generate local, regional, national and international links and relationships of knowledge creation, knowledge transfer and knowledge implementing. When the roles of the intermediaries are realized first, it is easier to meet these challenges.

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Further reading

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About the author

Anssi Smedlund, M.Econ.Sc., is a researcher at Helsinki University of Technology in Innovation Management Institute. Anssi is also a PhD student in Lappeenranta University of Technology. He can be contacted at: anssi.smedlund@hut.fi