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BUILDING A COMPETITIVE REGIONAL INNOVATION ENVIRONMENT – THE REGIONAL DEVELOPMENT PLATFORM METHOD AS A TOOL FOR REGIONAL INNOVATION POLICY

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ABSTRACT

The study focuses on building a regional innovation policy tool that takes into account the demands of the present techno-economic and socio-institutional paradigms. Regions are seen to be strongly dependent on their history. The competitiveness of a region is based on the regional resource configurations. In a turbulent world these resource configurations have to be renewed over time setting demands for regional dynamic capabilities. This study emphasises five regional dynamic capabilities: leadership capability, visionary capability, learning capability, networking capability and innovative capability.

The study takes a holistic point of view in assessing the regional innovation environment. This environment is seen as a system of innovation networks and institutions located within a region, with regular and strong internal interaction that promotes innovativeness and is characterised by embeddedness. Innovations are increasingly seen to be the results of non-linear processes deeply embedded in normal social and economic activities. The non-linear and interactive nature of the innovation processes sets new demands for social cohesion in the regional innovation system.

The new era is crying out for innovation policy tools that foster the visionary, leadership, networking and learning activities in the process of designing and implementing innovation policies and strategies. In this study a new tool for regional innovation policy – the Regional Development Platform Method – is designed and tested. The main aspects behind the creation of this innovation policy tool are: (i) understanding the effects of the changing techno-economic-paradigm

on the regional innovation environment (ii) understanding the phenomena of regional path-dependency and agglomeration, (iii) avoiding regional lock-ins, (iv) defining competitive regional resource configurations, (v) creating multi-actor innovation networks to exploit the resource configurations, (vi) enhancing the absorptive capacity of the innovation networks, (vii) creating sufficiently creative social capital, (viii) promoting regional dynamic capabilities and (ix) understanding the multi-level governance environment in forming innovation policies and strategies. The Regional Development Platform Method is tested in the Lahti region in Finland. The experiences of the policy tool have been encouraging and it has crucially influenced the most recent strategies and programmes in the region.

Keywords: Regional innovation systems, innovation policies, regional competitiveness, learning systems, networking, social capital, network leadership

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Lahti, February 2004

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1 INTRODUCTION

1.1 Background of the Study

The importance of the regional level in research has risen during the last two decades. A vast literature in the fields of, for instance, evolutionary and institutional economics, network theory, innovation and learning systems, as well as in sociology, has focused on regional level questions. In this literature a region is seen as an essential part of the economic co-ordination under the present techno-economic and socio-institutional paradigm. Accordingly, there is much influential empirical evidence that the present world includes phenomena increasing the role of regions in explaining the ongoing economic transformation.

The regions are seen as nodal points in the worldwide network society. The sources of regional competitiveness are seemingly changing in the post-Fordist era. This development is characterised by the change from mass production towards a knowledge-based economy. In the present world, the meaning of the old resource-base creating competitiveness in the industrial era has been strongly replaced by the new factors leading to absolute rather than comparative regional competitiveness. These new factors are often quite abstract in their nature and are typically strongly related to the history, culture and institutional structure of a region.

Innovations are increasingly seen as the driving force of regional competitiveness and economic growth. However, our understanding of the nature of innovation has changed during the last century.

Innovation was earlier seen as a radical invention accomplished by a heroic inventor. Nowadays, innovation is considered to be most often a result of co-operation in normal social and economic activities. The innovation process normally includes many kinds of interaction, and innovations do not have to be radical, on the contrary, they are as well incremental social and organisational changes as technological advancements.

Consequently, innovations are not just the results of scientific work in a laboratory-like environment. They are done in networks where actors of different backgrounds are involved in the process setting new demand for innovativeness. The science push effect as the driving force of innovations is an exception rather than a rule in these processes. A more influential source of innovations seems to be factors like the ability to interact, learn collectively and build trustful relations between the innovating partners. Innovativeness depends in most cases on the innovation network's ability to interact rather than on an individual actor's progress in a particular scientific field.

Characterising innovation as a socially and economically embedded process raises the question of the socio-institutional environment where the innovation processes are taking place. In a regional context, innovation is seen as a process embedded in a regional innovation system. A regional innovation system is understood as a system of innovation networks and institutions located within a certain geographic area, with regular and strong internal interaction that promotes the innovativeness of the region. Thus, a regional innovation system consists of different kinds of multi-actor innovation networks aiming to increase the innovativeness of a region.

The change in the techno-economic paradigm always meets with inertia in a socio-institutional adaptation. The new environment places

demands on innovation strategies and policies aiming to reconfigure the regional socio-institutional settings. Earlier the innovation policy has, in most cases, been equivalent to science policy including elements of technology policy. These policies have strongly believed in resourcing scientific work as the key activity in producing innovations. The causality of science and innovations has, however, proved to be quite weak. Therefore, the present paradigm demands innovation policies and strategies that focus on fostering interactive non-linear innovation processes in multi-actor innovation networks.

The demand for new innovation policies and strategies is clear and widely accepted. It is, however, far from clear what practical form these new policy applications should take. The regional policy-makers lack practical step-to-step methods for reforming regional innovation environments in order to respond better to the demands of the new techno-economic paradigm. This study is an attempt to form a concrete tool for regional innovation policy-makers in order to apply new innovation strategies.

1.2 Research Problem and Objectives of the Study

This present study assesses the factors important in promoting a regional innovation environment under the present techno-economic paradigm. It takes a highly endogenous point of view for building regional innovation systems. Therefore, the study does not aim to assess how the regional innovation systems should be resourced exogenously. Its point of departure is to build a development tool that uses the existing resource base of a region and promotes regional endogenous growth of innovativeness. Such a tool should enable new institutional settings to be built to foster innovativeness, but at the same time, the tool should be quite insensitive to the existing

institutional setting of the region, making the created tool widely applicable in different kinds of regions. The tool should emphasise the exploitation of the unique regional resource base and regional dynamic capabilities in order to be able to respond to the demands set by the changing techno-socio-economic paradigm. In particular, the focus in this task should be placed on the considerations regarding the building of regional multi-actor innovation networks. Such an innovation policy tool should, at the very least, aim to improve knowledge creation and management, social cohesion, interaction and leadership in those networks.

The research problem and objective of the study can be defined as follows:

Research problem
What kind of innovation policy tool is needed to promote a regional innovation system in the information era?

Objective of the study
The objective of the present study is to develop and conceptualise an innovation policy tool for designing and running regional innovation systems in the information era in order to increase sustainable regional competitiveness.

In order to be able to solve the research problem and reach the objective of the study the following questions should be considered in the study:

How does the new techno-socio-economic paradigm affect the regions?

How have the political processes changed the development environment of the regions?

What are the important factors in creating sustainable regional competitiveness in the present society?

What is a regional innovation system and what is its role in forming regional competitiveness?

What are the main elements and goals of regional innovation policy?

What are the basic elements in building regional innovation strategies?

How to promote innovation, leadership, learning, networking and visionary processes in a region?

How to create regional social capital?

How to explore competitive regional resource configurations?

How to exploit the competitive resource configurations existing in the regional innovation system?

1.3 Research Methodology

Niiniluoto (1980; 1983) defines truth as the main objective of science. He defines practicality and usefulness as other objectives of science. In addition, he defines the characteristics of science as being objective, critical, autonomous and advanced. Furthermore, science can be defined as information and knowledge about reality collected in a systematic and critical way (Niiniluoto, 1983). From my point of view these aspects introduced by Niiniluoto can be the only general conditions in choosing a methodology for a study. Other commanding factors are the background and objectives of the study, as well as the background and qualifications of the researcher.

Information and knowledge is an essential part of our existence. Generally, knowledge is defined as a justified belief. Gibbons *et al.* (1994) define two classes of knowledge. Mode 1 is hierarchical and tends to preserve its form, Mode 2 is more heterarchical and transient in nature. Mode 1, traditional knowledge production based on single disciplines, is homogeneous and is primarily cognitive knowledge generation context sets within largely academic paradigms. Mode 2 knowledge production, by contrast, is created in broader, heterogeneous interdisciplinary social and economic contexts within an applied setting. One of the key contrasts between the two modes is that in Mode 1 problem solving is carried out following the codes of practice relevant to a particular discipline and problem solving whilst under Mode 2 knowledge activity is organised around a particular application and is more diffuse in nature. Gibbons *et al*. report an epoch change in knowledge activity with a shift from Mode 1 to Mode 2 knowledge creation. (Howells, 2000.)

I saw once a debate of Nobel Prize winners on TV. One of these eminent scientists stated the existence of two kinds of scientists. Some are, in military terms, like soldiers aiming to proceed along a wide front and trying to conquer the land metre by metre, whereas others are like commandos who desire to be personally sent far ahead of the front to fight in an unknown environment. The latter approach – referring to my army education as a commando officer – is much nearer to my personal character and interests. This can be seen as the more risky way, but I am willing to take the risk in this present study.

The discussion about research approaches has traditionally dealt with the question, whether the research should be quantitative or qualitative, whether it should be positivist or hermeneutic or whether it should be based on large data collection or narrow data collection.

One of the basic questions in these considerations is how the researcher positions himself in relation to the study and whether the values are eliminated from the research. (Kasanen *et al*., 1991.) For me the research setting is decisive: choosing the wrong methodology is like trying to plough a field with a rowing boat or trying fish on the lake with a tractor. A tractor and a rowing boat are versatile equipment but only when they are used in their right “fields”.

This study takes a holistic approach to assessing regional competitiveness, developing a regional innovation environment and designing a regional innovation policy tool in the information era. It tackles in particular the question of how the regions can be developed rather than the question of how they have developed (see Bengs *et al.*, 2000). The study is strongly based on the theories on evolutionary economics and regional innovation systems defining regions as highly individual and specific entities where general development strategies and policies are normally useless encouraging the use of deeply qualitative case methods. With the positivist quantitative research methods have been reached a lot of valuable contribution of regional development, but implicating them in these circumstances would be in many ways dubious and could be even strongly misleading. Accordingly, the knowledge creation activities in this study lean strongly towards Mode 2 knowledge production.

My own background is originally in the field of industrial management. Regarding this study, I have started as a developer rather than a researcher of a regional innovation environment. In the end of the 1990s I found myself in a position to develop a regional innovation environment in one specific region. This set-up started a learning loop including intensive phases of practical work and theoretical assessment. The method used was close to the “science by doing” approach, where practice, theory and a long practical follow-up create

new, personally experienced, tested and interpreted knowledge (Sydänmaanlakka, 2003). A thorough theoretical assessment forms an essential part of the study. Kolb's cycle of experimental learning is very close to the process effectuated during this research.

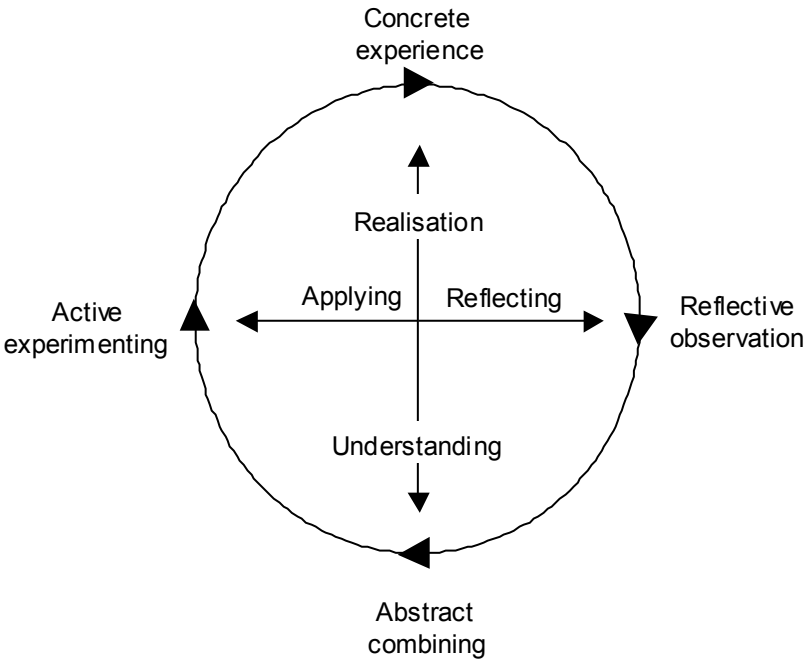

Figure 1. *Kolb's cycle of experimental learning (Järvinen* et al. *2000: 90).*

Combining scientific research with practical work has its pros and cons. The researcher, being part of the phenomenon studied and being able to steer the studied development process, enables a quick practical application of the conclusions drawn by reflective observation and abstract combining. The developer's role in a research project also gives a good basis for the applicability of the final results of the study.

One of the main dangers in the process is that the practical work takes all the time from the theoretical assessment and a deep understanding of the phenomenon studied remains incomplete. This is a danger that can be avoided by properly planning and scheduling the phases in the learning cycle. One needs to regularly step back from the practical work and take time for deep theoretical thinking. This method also protects the researcher from being steered by intuitive practical decision-making instead of justified scientific reasoning.

Under the circumstances described constructive action research based on depth-inside case analysis was seen as a justifiable method for the present study. Constructive research produces constructs. Developing a construct means creating something new that is deviant from earlier constructs. Constructive research can be seen as a form of applied research. The aim is to achieve, from a certain point of departure, a desired result. Therefore, constructive research can be defined as a normative approach. An essential part of constructive research is that it is closely based on existing knowledge and the novelty and functionality is demonstrated. In Figure 2, a presentation of Kasanen *et al.* of the nature of constructive research is depicted. (Kasanen *et al.*, 1991.)

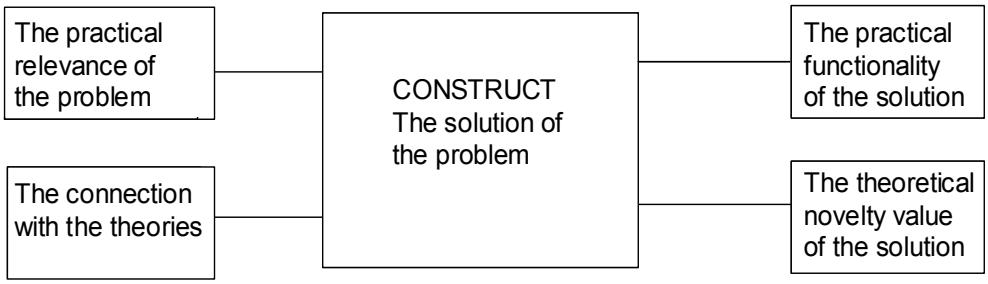

***Figure 2**. The basic parts of constructive research (Kasanen* et al., *1991).*

Constructs can be built in several ways. One common way is that the researcher takes an active role in steering the process in real action where the construct is built and its applicability is demonstrated. This kind of research method can qualify as action research. Action research can be defined as a term “for describing a spectrum of activities that focus on research, planning, theorizing, learning and development. It describes a continuous process of research and learning in the researcher's long-term relationship with a problem.” (Cunningham, 1993: 3.) Constructive research and action research are especially applicable together in the empirical part of the present study. For developing some constructs, for example, policy tools, the active participation of the researcher is often a prerequisite for successful research.

Constructive action research typically uses a case study approach. The cases used are normally restricted from one to several cases. Therefore, it is normally based on relative narrow empirical data. The objective is to reach with one or a few cases a deeper and more systemic understanding of the studied phenomenon than it would be possible with large horizontal data. The central idea in a constructive case study is that the researcher compares theory, construct and empirical evidence. This occurs through constant comparison between these factors leading to a well-defined construct. The iterative constructive action process gives the researcher the advantage of carrying out adjustments during the research process making it possible to react rather than shift out what is seen as important concerning the phenomenon studied (Eisenhardt, 1989).

With the chosen methodology, the assessment validity and reliability of the research may become (from the positivist point of view) somewhat problematic. The positivists mostly refer to the apparent lack of generalisation because of the narrow database. I see,

however, that trying to generalise research with the normal positivist methodologies in this kind of study would lead to very undesired results: the baby would be thrown out with the bath water. In the environment studied, the usage of quantitative and statistical methods would lead to restrictions in the scope and studied variables of the phenomenon, making it impossible to reach the aims of the study. Furthermore, I believe that a construct that works with some object will most probably be applicable with other fairly similar objects, in this case sub-national regions, as well (Kasanen *et al.*, 1991).

Kasanen *et al.* (1993) have defined validation criteria for constructive research. The criteria are used as a measure for reliability and validity in the study. The criteria are as follows

- Relevance: the importance of the topic, relation to an issue of public importance and the contribution of the conclusions to the existing knowledge.
- Construct validity: correct operational measures for the concepts being studied.
- Internal validity: establishment of a casual relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships.
- External validity: establishing the domain to which a study's findings can be generalised.
- Reliability: demonstrating that the operations of the study, such as the data collection procedures, can be repeated with same results.
- Experience: the researcher's own experience supporting the deep understanding of the phenomenon being researched.
- Market based validation: finally the market will test the "truthfulness and usefulness" of new constructions in the long term.

The structure of the present research report is as follows. In Chapter 2 the environment in which the regions exist in today's world is

considered. The assessment tackles the role of regions under the present techno-economic and socio-institutional paradigm. The focus is on the factors forming sustainable regional competitiveness in the information era. Chapter 3 tackles the regional innovation environment and the main factors and phenomena affecting regional innovation systems. Chapter 4 sheds light on the strategic and policy matters in regional development, especially in the development of a regional innovation environment. Finally, theses for building sunrise innovation policies and strategies are stated. Chapters 2, 3 and 4 are based on a theoretical assessment of the relevant existing literature predominantly in the fields of innovation and learning systems, strategic management, evolutionary and institutional economics, regional sciences, sociology and networking theory.

In Chapter 5, the regional development platform method as a tool for innovation policy is designed. The development tool has emerged as a result of an experimental learning cycle including a thoroughly made combination of the theoretical assessment in earlier chapters and experiences gained in the practical development work. Chapter 6 describes the practical implication of the innovation policy tool in one region and includes the assessment of the aptitude of the tool developed for regional development in the current world. In Chapter 7 the problematic questions in building the regional innovation policy tool and the experiences gathered in the Lahti region are discussed. In Chapter 8, the reliability and validity of the study is considered, and in Chapter 9 the conclusions of the research are drawn. Finally, in Chapter 10 some directions for further research are outlined.

1.4 Main Terms and Concepts of the Study

Because of the holistic nature of the study many different terms and concepts are used in this present study. These terms and concepts have many different and sometimes even partly contradictory definitions. Therefore, it is reasonable to give definitions of the main terms and concepts already at this early stage of the study.

Information era
Information era describes the reigning techno-economic and socio-institutional paradigm.

Region
Region is understood in this study as a sub-national functional region being defined not only by geographical distance, but also by relational distance, and being a natural unit in benefiting positive externalities and increasing returns.

Regional competitiveness
Regional competitiveness can be defined as the reigning techno-economic sensitive absolute competitiveness. The competitiveness is based on regional resources and a region´s socio-institutional capability to renew the resource base in an interactive and collective learning process increasing regional productivity and innovativeness, as well as producing wellbeing for the citizens of a region.

National innovation system
National innovation system is “the system of interacting private and public firms (either large or small), universities, and government agencies aiming at the production of science and technology within national borders. Interaction among these units may be technical, commercial, legal, social, and financial, inasmuch as the goal of the

interaction is the development, protection, financing, regulation of new science and technology" (Niosi *et al.*, 1993: 212).

Sectoral innovation system

Sectoral innovation system can be defined as a set of products and a set of agents carrying out market and non-market interactions for the creation, production and sale of those products. A sectoral system has a specific knowledge base, technologies, inputs and demand. Agents are individuals and organisations at various levels of aggregation (Malerba 2002).

Regional innovation system

The regional innovation system is "a system of innovative networks and institutions located within a certain geographical area, with regular and strong internal interaction that promotes the innovativeness of the region´s companies." (Kostiainen, 2002: 80.)

Learning economy

Learning economy is "an economy, where the ability to learn is decisive for the economic success of individuals, firms, regions and nations. Learning, in this context, does not just refer to the acquisition of information or access to the sources of information, but also to the development of new areas of competence and new skills" (Lundvall and Borrás, 1999: 29).

Learning region

Learning regions are regions that "function as collectors and repositories of knowledge and ideas, and provide an underlying environment or infrastructure which facilitates the flow of knowledge, ideas and learning. Learning regions are increasingly important sources of innovation and economic growth" (Florida, 1995: 528).

Industrial district

Industrial district is a “socio-territorial entity which is characterised by the active presence of both a community of people and a population of firms in one naturally and historically bounded area” (Beccatini, 1990: 38).

Innovative milieu

Innovative milieu is “the set, or the complex network of mainly informal social relationships in a limited geographical area, often determining a specific external “image” and internal ‘representation’ and sense of belonging, which enhance the local innovative capability through synergetic and collective learning processes” (Camagni, 1991: 3).

Social capital

Social capital “refers to features of social organisation, such as trust, norms and networks, that can improve the efficiency of society by facilitating co-ordinated actions” (Putnam, 1993: 167).

Creative social capital

Creative social capital refers to a field-specific, resource-based form of social capital including the elements of creative tension.

Regional dynamic capabilities

Regional dynamic capabilities are defined as a region's ability to generate in interaction competitive development paths in a turbulent environment. Dynamic capabilities aim to reform regional resource configurations based on the history of the region and opportunities emerging from the techno-socio-economic development.

Regional innovative capability

Regional innovative capability is defined as a regional innovation system's ability to exploit and renew existing resource configurations in

order to create sustainable competitive advantage by innovation activities (cf. Teece and Pisano, 1998).

Regional learning capability

Regional learning capability is defined as a regional innovation system's ability to create and manage knowledge in a collective, interactive and cumulative learning process leading to new settings of resources, competences and skills (cf. Lundvall and Borrás, 1999).

Regional networking capability

Regional networking capability is defined as a regional innovation system's ability to build interactive networks including field-specific creative social capital leading to effective utilisation of the resource configurations in the networks.

Regional leadership capability

Leadership capability in a networked regional development environment is defined as a regional innovation system's ability to effectuate actions steering the processes and resources of the system in the desired direction and avoiding harmful lock-ins.

Regional visionary capability

Regional visionary capability is defined as a regional innovation system's ability to outline the possible potential development trajectories based on travelled paths and utilising the opportunities emerging by the changing techno-economic paradigm.

Regional development platform

Regional development platforms are defined as regional resource configurations based on the past development trajectories but presenting the future potential to produce competitive advantage existing in the defined resource configurations.

Core process of a regional innovation system

The core processes of the regional innovation system are defined as processes aiming at exploiting the potential existing in the defined development platforms and enhancing dynamic capabilities and creative social capital in a region. The aim is to create and develop regional core competencies bringing sustainable, competitive advantage for a region.

2 CHANGE IN THE REGIONAL DEVELOPMENT ENVIRONMENT

2.1 Reinventing Regions

Globalisation is one of the main phenomena affecting society in today's world. Globalisation is said to mean a new, deeper internationalisation process evoked by technology and liberalisation. Technology is the driving force of globalisation. It enables the fast execution of different transactions around the world at a reasonable cost. The progress in information and communication technologies, in particular, has caused a significant change in the global ways of acting. Another remarkable force in globalisation is the political and economic liberalisation enabling the actual use of the opportunities offered by technology. The world is getting smaller in an economic, social and cultural sense.

The world is said to have changed from the space of places to the space of flows (Castells, 1996). These flows include different transactions in various kinds of networks. One of the main factors changing the structure of the world is how and on what level of society these transactions are reasonably made. The transactions can be very different in nature. Some of them can be easily and cost effectively transferred over distances, whereas some transactions are highly sensitive to distance (Storper and Scott, 1995). The very different nature of transactions in a complicated network morphology makes it extremely complex to assess the actual transformation process of the world.

Until recently the nation state was the cornerstone of economic, social and cultural transactions. Nation states were notably closed systems being able to control the human, economic, cultural and social flows. Nation states had a wide range of tools with which to control transactions. They could practice fairly independent fiscal, monetary and currency policies and many flows were strictly controlled. Nowadays, some prophets (see e.g. Ohmae, 1995) predict the death of nation states. Through globalisation and different political processes, nation states have, in fact, lost many of the tools by which they controlled economic, social and cultural activities. For example, there are practically no limitations in foreign direct investments, money can be sent around the world in seconds, markets have shown their power against monetary and currency policies etc.

The nation state is feeling pressure from other directions as well. “At first glance, it might appear that the direction of change is one way, from geographical constraint and localisation to the lessening of such constraint and delocalisation (or globalisation). But there is powerful evidence that changes in the technology of transacting are sometimes outweighed by the creation of new networks of transactions that are highly sensitive to geographical distance by virtue of their substantive complexity, uncertainty and recurrence over time.” (Storper and Scott, 1995: 507–508). The powerful evidence mentioned refers, obviously, to the influential examples of the success stories in some regional economies like Silicon Valley, Route 128, Third Italy or, closer to this study, the Helsinki, Tampere and Oulu regions in Finland (see Saxenian, 1994; Brusco, 1982; Kostiainen, 2002). Many important economic and social transactions seem to profit from geographical closeness. Such activities seem to need face-to-face contacts, building trust and other transactions being difficult to carry out over long distances. Actually, globalisation and regionalisation (or localisation) are part of the same process of economic transformation.

Therefore, the combination of the two phenomena can be called 'glocalisation' (Swyngedouw, 1992) which adequately describes the actual transformation process.

The empirical part of this present study assesses the development of the innovation environment of one European sub-national region. Therefore, a brief look is taken at European regional development in terms of political integration and regional restructuring. Integration seems to be the hegemonic idea in the present European restructuring process (Lähteenmäki-Smith, 1999). The origin of the process is in the political situation in Europe after the Second World War. Politicians wanted to build a safer and more peaceful Europe through close interaction between the European nations. In 1946, Winston Churchill set the United States of Europe as a goal for European development. Since the early phase of the process, economic reasoning has been the driving force of European integration. It is seen as essential to strengthen economic co-operation in Europe in order to respond to the competition especially from the USA-led North American and Japan-led Asian blocks (for more see Ohmae, 1990 and 1995). European integration has evolved from 1951 when the European Coal and Steel Community was founded to the present European Union which was basically defined in the Treaty of Maastricht of 1991. The aim stated in the Treaty was to build a more stable union within Europe including an economic and monetary union (with a common currency), more resources for poor regions, more co-operation between police forces and in border control, more power for the European Parliament, a common foreign and security policy with the goal of a common military defence and the subsidiarity principle.

The aims of the Treaty of Maastricht and their execution have challenged the sovereignty of nation states remarkably. For example,

much of the legislation is decided at the European level and chances of a national monetary policy within the European Monetary Union are practically non-existent. At the same time, the regional level seems to have become more powerful particularly because of the subsidiarity principle. Rosenau (1997) talks about “fragmegration” referring to the complex system of order and disorder in which globalising and localising tendencies interact. Fragmegration includes the political and social processes of fragmentation and integration that exist and interact simultaneously, creating new spheres of authority whilst transforming old ones (Rosenau, 1997: 38, 46; Lähteenmäki-Smith, 1999: 13). In Europe the subsidiarity principle and fragmentation process has lead to emphasising the regional level in political decision-making. There is much discussion about a Europe of regions or a renaissance of regions in Europe (see e.g. Törnqvist, 1998). In this discussion the regional level is increasingly seen as a proper level for fostering economic, social, cultural and political activities and increasing the wellbeing of Europeans.

The political integration process has lead to a growing tendency towards multi-level governance in Europe. Admittedly, as was suggested earlier, the role of nation states has lately diminished but the declaration of its death is strongly premature. The nation state is still a strong player in the network society in spite of the growing importance of the supra-national and sub-national levels. Therefore, the regional development environment is affected by steering activities from the European, national, regional and sub-regional levels.

Multi-level governance approach has several characteristics. First, it is assumed that decision-making is shared by actors at different levels rather than monopolised by state executives. European institutions have shared responsibilities for decision-making and, thus, they have an independent influence that cannot be solely derived from national

governments. Second, collective decision-making among the actors in the European Union framework involves a loss of control for individual state executives. Third, political arenas are seen as interconnected rather than nested. Sub-national actors are not merely nested within states – they also create transnational associations and networks. States no longer monopolise links between domestic and European actors. (Lähteenmäki-Smith, 1999: 31–32.) The governance structure is still, however, quite different when assessed for individual nations. The power between different governance levels is very differently distributed in each country. In some countries (e.g. Germany), the regional level has been strong, while, for example, in Finland, the national and sub-regional (municipal) levels have been traditionally strong, whereas the regional level has been relatively week but getting slowly stronger.

To summarise, the European regions are strongly influenced by the glocalisation process triggered by new forms of economic, social and cultural transactions and, at the same time, by the fragmegration process including elements from political integration and fragmentation. The regions find themselves in a situation where they have to be increasingly transformed from nation-led policy objects to the subjects in the European multilevel governance environment.

2.2 Shift of the Techno-socio-economic Paradigm

Designing a worthwhile regional innovation policy tool begins with understanding the surrounding world and the main megatrends affecting the regions. The world economy meets shifts in the techno-economic paradigm in certain cycles caused by leaps in technological development. During the last century, the world lived through the change from the agricultural era to the industrial era. Nowadays, the

world is in the middle of the change from the industrial era to the information era. This current cycle in the 21st century is often described as the fifth Kondratieff wave based on the development in technologies like microelectronics, digital telecommunications, biotechnology, robotics and information systems (Sokol 2003). The information era represents a new techno-socio-economic paradigm emerging mainly because of the development in information technology. The emergence of a new era has produced many theories and concepts describing it. The following theories and concept might pave the way to understanding the circumstances in which a proper regional innovation policy tool is outlined:

- information society (information technology changes the world)
- knowledge society (knowledge is the main productive factor)
- learning society (learning ability becomes a dominantly critical factor)
- expert society (increasing importance of skilled people and experts)
- network society (networks are emphasised as a way of social organisation)
- post-industrial society (emphasis on services instead of industrial production)
- post-Fordist society (change in production paradigm)
- innovation society (innovation is the driving force of economic growth)
- postmodern society (modernisation leads to plurality of values and individualism)
- risk society (risks and uncertainty are increasing in society)
- consumer society (consumer needs steer economic activities).

These frameworks reflect different points of view concerning the development phase the world is currently experiencing and they represent an extensive and often overlapping portfolio of theoretical frameworks. Such a theoretical “journey” must be taken so as to be able to carry out a holistic, extensive and infallible research approach

to the research problem. The following presentation of the frameworks will shed light on only the basic ideas underlying each of the frameworks.

Perhaps the most commonly used term of the current techno-socio-economic paradigm is that of 'information society' (see e.g. Webster, 1995). The terms 'information economy' (see e.g. Porat, 1977) and 'information age' (see e.g. Castells, 1996, 1997, 1998) are also related to this term. In the present study, all of these frameworks are treated under the same concept of information society.

The concept of the information society emphasises information's central role in building economic wellbeing. Webster (1995), (see also Hautamäki, 1996b), divides the theories of the information society into two main classes: continuity theories and revolution theories. The former emphasise the continuous development of society, whereas the latter suggest that the new era is radically different from the old ones. Probably both classes of theories have their pros and cons, but the latter theories often suggest that the leaps in societal development have often been shorter than thought, and that the leaps are strongly labelled by path dependency. In the present paper, it is considered that the shift towards the information society is a continuous process with some changes that can be categorised as radical.

Castells (1996) emphasises the enormous transformation process from the industrial era to the information era due to the vast development in technologies. This change has enabled the emergence of the global information society. Consequently, special attention is given to technologies, especially those that enhance the production, processing and exchange of information. These technologies are termed 'information technologies' (Sokol, 2003). Modern information technologies are strongly based on the

digitalisation of text, pictures and voice. This digitalisation enables the easy transfer of information. The ever-increasing capacity of information networks makes it possible to transfer huge amounts of information creating information superhighways.

In the regional context, the implications of the theories of the information society emphasise the need for regions to be connected to the information superhighways. It is important not just to assure the technical conditions of information networks, but also the social structures. The development of information technologies and networks does not assure the quality of information running in the networks (Niiniluoto, 1996). However, it is hard to imagine any region would be prosperous, if information technologies and networks were not available and if they were not deeply embedded within the economic and social processes. Special attention should be paid to the regional absorption capacity of the information that is flowing along the existing worldwide superhighways.

Information can be understood as a form of data, but knowledge can be defined as having a deeper meaning: knowledge is superior to information. Knowledge involves the understanding of how something works. Knowledge requires the understanding of relationships and behaviour. Knowledge is context dependent. Therefore, the concept "knowledge society" comprises a deeper meaning than the concept "information society". The essence of the knowledge society has been approached by many related concepts as well, such as knowledge economy, knowledge-driven economy, knowledge-intensive economy and knowledge-based economy (see e.g. Drucker, 1993; Giddens, 2000; Cooke, 2002).

In any case, knowledge is claimed to be the most important production factor. (Lundvall and Johnson, 1994.) Therefore, knowledge as an

asset is a widely discussed topic in the context of economic development. The discussion often deals with the nature of knowledge and its meaning for development. The role of tacit and explicit knowledge has been investigated in many contexts (cf. Lundvall and Borrás, 1999; Asheim, 1999; Schienstock and Hämäläinen, 2001). The discussion is fostered by the strong role of tacit knowledge in collective learning processes and by the present tendency to increasingly codify tacit knowledge (Maskell *et al.,* 1998).

In a regional context, it is crucial to secure access to the codified knowledge and to develop a critical mass of sticky knowledge, tacit knowledge and self-transcending knowledge (see more Harmaakorpi, Melkas and Kivelä, 2003). Essential in this task is to have sufficient institutional thickness (Amin and Trift, 1995), which contributes to knowledge creation. In this context, institutional thickness refers to both informal institutions (trust, norms etc.) and formal institutions (laws, universities, research centres, technology centres etc.). Another crucial task is to enhance regional knowledge creation and the effectiveness of the management systems involved, as well as the quality of the information in the system (Harmaakorpi, Melkas and Kivelä, 2003).

Learning has often been defined as the most important process in modern society (Lundvall and Johnson, 1994). Lundvall and Johnson use the concept of “learning economy” when referring to the contemporary economy, which is dominated by the information technology-related techno-economic paradigm. In the learning economy, knowledge and learning are crucial competitiveness factors (Lundvall and Johnson, 1994). Lundvall and Borrás define the learning economy as “an economy, where the ability to learn is decisive for the economic success of individuals, firms, regions and nations. Learning, in this context, does not just refer to the acquisition of information or

access to the sources of information, but to the development of new areas of competence and new skills" (Lundvall and Borrás, 1999: 29). In the concept of the learning economy, learning is placed even above knowledge in creating competitiveness since "… what really matters for economic performance is the ability to learn (and forget) and not the stock of knowledge" (Lundvall and Borrás, 1999: 35). Kébir and Crevoisier (2002), see knowledge itself as a process rather than a stock. Indeed, knowledge of learning is considered to be the most essential skill at all levels. Knowledge of learning covers the knowledge of the importance of learning, the characteristics and the ways of learning, as well as limits and the drawbacks of learning, and the ways of dealing with the limits and drawbacks (Harmaakorpi, Melkas and Kivelä, 2003).

Learning through formal education and learning through research and development are essential in creating innovations. These types of learning are especially important in the case of radical innovations and in the case of linear innovation processes. Formal education searches for answers to questions like "know-what" and "know-why". Such knowledge is normally explicit in nature. However, in the modern innovation processes, the result is a consequence of different kinds of learning processes embedded in normal economic and social activities. Learning in these processes includes activities like learning-by-doing, learning-by-using and learning-by-interacting. All these types of learning involve many kinds of actors (Lundvall, 1992). Such processes often produce tacit knowledge giving answers to questions like "know-how" and "know-who".

In the regional context and in the framework of the learning economy, the concept of "learning region" has emerged. Learning regions "function as collectors and repositories of knowledge and ideas, and provide an underlying environment or infrastructure which facilitates

the flow of knowledge, ideas and learning. Learning regions are increasingly important sources of innovation and economic growth, and are vehicles for globalisation" (Florida, 1995: 528).

The structure of work has to be rethought in the information era. Different kinds of features in working life are gaining importance in creating prosperity on an individual, regional, national and global level. In the present study, the framework created by Reich (1993) is used to describe the changes in the structure of work when the society changes towards the expert society. According to Reich, there are three different categories of work in the global expert society: routine production services, in-person services and symbol-analytic services. These categories include about 80 % of the work done in the world. The people whose work does not fall into any of these categories of work are mainly farmers and people using natural resources.

In the industrial era, the routine production services were important in creating economic growth. The routine production services are typically made in factories and involve many repetitions, checking etc. Also routine supervisory jobs and routine handling of information is included in this category of work. The importance of such work as a success factor is continuously decreasing, because routine production can increasingly be replaced by automation. In the global world whole factories, including much routine work, are transferred to places where the competitive edge is built on a cheap labour force. Therefore, the number of routine workers is continuously decreasing in the developed world.

In-person services comprise mainly relatively simple and repetitive work. However, they are not as directly involved in global competition as routine production services often are. People providing in-person services are in direct contact with the ultimate beneficiaries of their

work. The immediate objects of these services are specific customers rather than flows of goods or data. Typical in-person service jobs are barbers, nurses and taxi-drivers. They are an essential part of regional development, but rarely form competitive advantage for any region.

Symbol-analytic services are seen as the main source of competitive advantage in the information era. Such work includes problem solving, problem identifying and strategic-brokering activities. These activities require a high education and, in many cases, a high degree of creativity. Information technologies are often an essential part of symbol-analytic work. The work of symbol analysts can be traded globally, especially in a world having developed information super-highways. Symbol analysts are a mobile class of workers due to their high educational level and fairly common global means of communication.

People able to do symbol analytic work are needed for regional wellbeing. The agglomeration of skilled experts is a prerequisite for creating new business activities. Therefore, it is essential to be able to educate new symbol analysts and attract them from other regions. In some fast-growing regions (for example, the Helsinki region in Finland) there might also be a lack of employees in the two other categories of workers. However, symbol analysts lead the way to regional competitiveness and prosperity. Therefore, it is crucial to establish education units in the region, as well as take care of the regional features attracting symbol analysts to the region.

Castells (1996, 1997, 1998) has formulated a systemic theory of the information era that takes into account the fundamental effects that information technologies have on the contemporary world. He is interested in the emergence of a new social structure, which he labels a network society. The network society is defined as informational and

global emphasising the importance of knowledge creation and international networks in creating economic wellbeing. The concept of the network society refers to well-known megatrend changes in social, economic and technological spheres of society. The globalisation process of economics, development of technology, reconstruction of political systems and the new values in people's social life create new demands and changes for all kinds of organisations in the private and public sectors. This reconstruction process of societies means that for social actors of all kinds it is a question of life and death to belong to global and regional networks.

In the network society, the change from the space of places to the space of flows is taking place. The places are seen as hubs and nodal points of a worldwide network. Therefore, the network society is far from placeless, but its operational logic is based on flows rather than on places. Castells (1996) categorises three layers of flows. The information technology infrastructure constitutes the first layer, the material support of the space of flows. The nodes and hubs of the space constitute the second layer. The third layer refers to the spatial organisation of the dominant, managerial elites. The flows running in this system can be different. Flows of technology, information, people, capital and firms are examples of such flows.

Regions must attract essential global flows in order to stay successful in the competition between regions. The means to create attractiveness are manifold depending on the specific flows to be attracted. Regional economic development policies should emphasise such factors that are anticipated to attract the desired flows. The flows can be, for example, certain kinds of people, technology, capital and firms. Important factors in this process are generally said to be, for example, a well-developed innovation system and a knowledge base, the quality of life and the quality of public decision processes of a

region. An aspect to remember is, however, that while the network society enables easy access to the important flows worldwide, it increases the risk of losing the regional competitive advantage due, for example, to unwanted knowledge or technology diffusion to other regions.

The framework of post-industrial society has been greatly developed by Bell (1973). At first, Bell used the terms "knowledge society" and "information society", but finally he preferred the use of the term "postindustrial society". The starting point to Bell's theories was the notion of the size of the service sector continually taking over from the industrial sector. This occurred together with the notable expansion of science, research and development (R&D), business services, and the rising number of scientists, researchers, academics and professionals (Sokol, 2003).

Bell predicted that industrial societies would undergo a massive transition resulting in an emergence of a post-industrial society that would be based on services. Accordingly, the post-industrial society has, in many writings, been called the service society. Within such a society, the important factors are not things like muscle power or energy, but information. The "decisive category" of services in the post-industrial society would be health, education, research and government. These are represented by the expansion of the "new intelligentsia – in universities, research organisations, professional organisations and governments" (Bell 1973: 15).

The framework of the post-industrial society emphasises the importance of service sector activities in regional economic growth. Some studies (see e.g. Vahverbeke and Cabus, 2003) suggest that structural change towards an increase in the service sector has been especially fast in big and growing urban regions. It is, however,

statistically difficult to verify, where the value added service activities happen. Often there are many knowledge intensive service activities included in high quality industrial production that cannot be separated in statistical analysis. However, knowledge intensive business services (KIBS) seem to play an important role in regional development. Therefore, services, such as computer, research and development (R&D) and training services, are among the economy's most rapidly growing sectors and play an important role in the regional innovation system (OECD, 2000).

The information era is changing the technological paradigm for production systems. The world is experiencing the change from Fordism to post-Fordism. The Fordist production system had certain obvious characteristics. Typical of Fordism is a high share of standardised products for large markets (mass production). In Fordism, large corporations have a dominant role in organising production and innovation. Furthermore, there is a highly developed division of labour and a clear-cut separation of conception and execution (Tödtling, 1994).

The post-Fordist production system can be described fairly well with the concept of flexible specialisation (Piore and Sabel, 1984; Beccatini, 1990; Pyke and Sengenberger, 1992, etc.). This concept identifies flexible specialisation as an alternative to mass production. The paradigm change was made possible by the development in computerised production technologies enabling quick changes in markets and production structures. The framework of flexible specialisation has its roots in the theory of industrial districts (Marshall 1916) stressing the strong role of institutions and institutional networks in the shift from Fordist production systems to post-Fordist production systems.

The characteristics of post-Fordist production systems are (Tödtling, 1994 citing Moulaert *et al.* 1988; Harvey, 1990; Benko and Dunford, 1991; Cooke and Morgan, 1991):

- a diversification of consumer demand and, consequently, a lower standardisation of products
- use of flexible technologies, organisations and labour practises
- a certain decentralisation of functions within large firms (bringing some of the higher-level functions back to the production level) and a bias towards horizontal instead of vertical information flows
- a more prominent role of small firms partly through vertical disintegration of large firms, creation of spin-off firms and subcontracting relations with large firms
- an increasing importance of institutions as actors in economic development.

In a regional context, the post-Fordist framework focuses on regional production systems (see e.g. Maillat and Kébir, 1998). The firms are increasingly seeking competitive advantage by concentrating on their core competences and being part of firm networks. Local production systems are orienting towards regional innovation systems enabling interactive learning and flexible specialisation. Essential things in the competitive post-Fordist regional production system are: many specialised small and medium-sized firms (SMEs), interaction between different firms and institutional infrastructure fostering the development of the production system.

In the present techno-economic paradigm, innovation is widely seen as a driving force of competitiveness. As Archibugi and Michie (1995: 1) put it, “the production and use of knowledge is at the core of value-added activities, and innovation is at the core of firms’ and nations’ strategies for growth”. The concept of innovation, however, has been understood in numerous ways during the last century. Nowadays,

innovation is seen as a social as much as a technical process. Innovations are seen to emerge as non-linear processes. They are considered to be deeply embedded in normal social and economic activities.

Processing innovations deal with producing new knowledge or combining knowledge in new ways and turning it into economically profitable products and processes. Innovations have different characteristics; they can be called, for example, radical or incremental, or they can be technical, process related, social or organisational. The terms are partly overlapping, but each of them describes the nature of the innovation underlying them. Innovation processes can be categorised as two main types, linear or non-linear, depending on the type of interaction in them. Recent development has emphasised the increasing role of non-linear innovation processes and incremental innovations in creating economic success. Characterising innovation as a social, non-linear and interactive learning process raises the question of the role of socio-cultural structures in innovation processes (North, 1986 and 1990; Asheim, 1999). The regional socio-institutional environment where innovations emerge plays an essential role in successful innovation processes.

In the information era, the postmodern society (see e.g. Garvin 1980; Bauman 1987, 1992, 1993; Lash 1990; Crook *et al.* 1992) is said to follow the modern society of the industrial era. According to these theories, postmodern is labelled especially by the rise of individualism and plurality of values. The world is said to have lost its faith in great tales; individuals prefer to construct their own small stories. As a counterbalance to individualism, a new kind of communitarianism is emerging in postmodern society (see Etzioni,1993.). People want to belong to communities where they feel accepted and can be creative. These communities are often characterised by temporality. Centre-

periphery (at the regional, cultural and regional level) theories seem old-fashioned in the post-modern world. Centres are emerging in places where individuals are gathering and interacting (Hautamäki, 1996a).

Bauman assesses postmodernism with three concepts: sociality, habit and self-assembly. Sociality replaces the word society, habitat replaces normative groups, and self-assembly replaces identity. These new concepts reflect the radical changes in society evoking a need for a new conceptual analysis. Modern sees the history of movement with a binding logical direction, where as the post-modern world is a world without direction and solid goals. (Jallinoja, 1995.) Bauman (1993: 240–241) describes the agents in modern and postmodern with the metaphor of pilgrims, tourists and vagabonds. Pilgrim is modern because he has a goal for his journey. Vagabond is postmodern because he is wandering from one place to another without a goal believing he will find something satisfactory in each place. The journey continues, because a vagabond always believes that there is some place offering something better. Postmodern frees the agents from the bonds of time: the past does not force and the future does not have a colonising effect. Therefore, according to Bauman, futures research is impossible.

In a regional context, the theories of postmodernism raise questions at two levels: at the regional level and at the individual level. It is tempting to assess regions as subjects in postmodern society. Are they vagabonds or pilgrims? Mainstream regional science strongly opposes the suggestion that history does not matter. On the contrary, regions are considered to be strongly path-dependent (Maskell and Malmberg, 1999; Teece, *et. al.* 1997; Harmaakorpi and Pekkarinen, 2003) limiting the available future paths. The post-modern theory also claims that it is impossible to forecast the future. In the world of today,

it might be difficult, but it is worthwhile to practice futures research anyway. However, setting solid and rigid goals in the present turbulent world could be difficult and even dangerous. The regions in the postmodern society could be characterised as vagabonds being strongly dependent on their past, and having to continuously make new decisions under insecurity.

Secondly, postmodern individuals could be assessed as objects of regional policies. It is suggested that postmodern individuals are individualistic with a plural value basis. On the other hand, there is said to be a tendency towards communitarianism. These are the facts that should be considered in regional development. How could regions attract postmodern individuals who have high expertise? These individuals often belong to groupings like symbol analysts (Reich, 1993) or creative class (Florida, 2002). This places high demands on the plurality of regional services (culture, leisure activities, day-care, education) and on the chance to exercise individual choice in the different phases of life.

Risk society is the famous definition of Beck (1986, 1992, 1996, 1997) of the contemporary world. Beck uses the terms the "first modern" or the "simple modern" to describe the industrial era. He uses the terms the "second modern" or the "reflexive modern" to describe the emerging information era. The risk society is caused by the development of the first modern (industrial modern). The first modern focuses on producing goods, causing increasingly social and societal risks. These risks cannot be handled in the first modern; the second modern meaning the process, where society is becoming aware of the risks produced. A clear border cannot be drawn between the first modern and the second modern. In some parts of society, reflexive modernisation has already gone quite far, whereas other parts are just beginning to ponder the questions related to it.

According to Beck, the Western world has focused on technological development, economic growth and the creation of the welfare state. Great trust has been placed in consumption and in increasing material security. This trajectory was seen to be fairly clear and problem-free. Some facts, like economic crises, mass unemployment, environmental problems, increasing crime and terrorism have shaken the trust in basic structures and development trajectories. The risk society is characteristically global. Many risks cannot be avoided on a national or regional basis. Risks are also touching everybody regardless of, for example, class status. Many risks are like produced risks, un-insurable.

According to the theory of the risk society the risks are increasingly global risks. But could the framework give some hints considering regional development? Although overall security and ecological sustainable development are global matters, there are considerable differences in these at the regional level. Regions are increasingly emphasising these aspects in their policies and strategies (see e.g. Päijät-Hämeen liitto, 2001). It is, however, far more disputable, how much the matters of security and ecology are affecting regional economic development.

The framework of the consumer society is underlining the power of consumer needs in steering economic activities. According to Toivonen, the modernisation of consumption has taken place in the 20th century in three phases (Toivonen, 1998). The first phase started in the 1920s, when the wealthiest people could purchase cars, refrigerators, washing machines etc. The second phase started in the mid 1950s, when such items were becoming common among the middle and working classes. In addition, some new goods emerged, of which the penetration of television took place especially quickly. The third phase was in the 1980s, when more developed electronics, like

videocassette recorders and microwave ovens almost simultaneously were diffused to all social classes. This penetration did not follow the Simmel's trickle down hypothesis (Simmel, 1905). This hypothesis suggests that the upper classes adopt new habits of consumption first and this is followed by the lower classes.

Schulze (1992) describes the consumer society by the concept 'experience society'. According to Schulze, the modernisation process in the Western world has led to the affluent society, where the general standard of living has risen measured by any indicator. Furthermore, he makes a difference between choice and influencing. When the operational environment is restricted people try to influence the environment. When the limitations get looser people change from influencing to choice. Then our thoughts are directed inside us. The goals lay within ourselves. The goals are in the form of feelings, psychological processes and experiences. The society of choice is an experience society.

In the regional context, the individuals in a region should be seen as consumers and clients instead being subservients as seen earlier. This places new demands on, for example, public and semi-public services: culture, health care, day care etc. Regional public service consumers make choices like any other consumers and they should be listened to. For a short time they might be satisfied even with a lower level of services, but in the long term low levels of service could be dangerous for regional development. When talking about consumption, there is an increasing temptation to consider things like brand and image. In many cases, it is suggested that fulfilling the needs of regional public service consumers leads to higher regional brands. A good regional brand, again, increases the chances of attracting experts and knowledge intensive firms, enabling regional economic growth.

In this chapter the current techno-socio-economic paradigm was examined through several theoretical and conceptual lenses. Based on the analysis, some more or less implicit suggestions of the factors influencing regional success in the information era are made. According to the theories examined, among the “information era features” enabling regional success are

- the region is well connected with information superhighways
- there is a high level of research and development (R&D) activities in the region
- there is a high number of symbol analysts in the region
- the share of the information sector is high in the region
- the number of specialised and networked small and medium-sized firms (SMEs) is high in the region
- the region's economic life is connected with global networks
- the region is a learning and innovative region
- the region can attract flows important to regional development
- the share of the knowledge intensive service sector is high
- there are enough innovation and learning fosterin establishments in the region
- there is a multi-value atmosphere in the region
- the region can provide security for its inhabitants
- the region offers its inhabitants a possibility of choice and experience.

The theoretical analysis in this section was largely trying to enlighten the wide debate on the change in the techno-socio-economic paradigm that has taken place in the last few decades. One might think that the assessment was even too wide-ranging from the point of view of the objective of this present study. However, the theories describe the complexity of the environment development processes taking place in individual and path-dependent regions. Hence, this study focuses on how to build a competitive, learning and innovative region and the kind of policy tool needed to complete this task. The approach taken is endogenous and dynamic emphasising learning,

networking and the visionary and social aspects of the process. Therefore, the theories of knowledge, learning, network and the innovation society are in the foreground of the following analysis. However, everything depends on something else when enhancing the regional innovation environment. Promoting the regional innovation environment depends, for example, on the connections to information superhighways, number of symbol analysts, share of information sector, structure of the production system, connections with global networks, share of the knowledge intensive service sector, innovation and learning fostering establishments and multi-value atmosphere in a region. Even providing security and the chance to choose, as well as experience, for the actors of a region affect the development of regional innovation environment in a positive manner; and vice versa, a dynamic regional innovation environment attracts these essential factors and flows enabling the dynamism to increase further. The focus of this study is on how this dynamism might be evoked.

2.3 Regional Competitiveness in the Information Era

Sustainable competitiveness is the main source for a success of an economic actor. The competitiveness of the economic actors is strongly related to their adaptability to the emerging techno-economic environment (Schienstock and Hämäläinen, 2001 citing Abramovitz, 1995 and Lipsey, 1997). The question arises as to how regions adapt to these changes and how regions find prosperous trajectories in the turbulent environment. The first question to consider, however, is whether a region is a reasonable unit to assess with terms like competitiveness. Krugman (1998) questions the whole idea of territorial competitiveness as being wrong and even dangerously misleading. However, in a vast array of literature the regional level is strongly growing in importance as a reasonable entity in assessing

economic growth and socio-institutional adjustment (see, for example, Florida, 1995; Storper, 1997; Scott, 2000; Cooke *et al.,* 1997; Camagni, 2002). These theorists emphasise the meaning of the local business environment for the success of firms. Firms, being the real competitors in the global business forums are seen as strongly embedded in their territorial socio-institutional set-up (see Granovetter, 1985).

Krugman's suggestions are based foremost on the international trade theories and neoclassical growth theories. The neoclassical economic theories are based on the assumptions of efficient markets, no unemployment or unused capacity, immobility of resources and international specialisation of production based on comparative advantage (Hämäläinen, 2003; Camagni, 2002). These theories, however, do not seem to match very well with the actual world. One can, with good reason, question the suggestion of efficient markets. It is based on the assumptions of open access to the resources and rational choice. There is, however, much evidence that is not the case in real life (see e.g. Granovetter, 1985; Nelson and Nelson, 2002). No unemployment and no unused capacity are rare exceptions in the modern world. The resources are not immobile in reality, on the contrary, most of them are highly mobile.

In such a world territories cannot rely on comparative advantage including wage and price adaptation. Thus, the regions play in the game where the determinants of absolute competitiveness adjust the rules of the game, not the determinants of comparative advantage. The theory of comparative advantage has its origins in the work of Ricardo (1903). Ricardo's model operated in terms of relative costs and the prices of two goods in two countries. Even if one of the two countries should have an absolute advantage in producing both goods, an equilibrium would be achieved through (i) a "Ricardian" mechanism of downward pressure on real wages and prices, triggered by the

imbalance in the labour market and by the reduction of the money supply determined by the outflow of gold (to pay for the imports) or through (ii) a mechanism of devaluation of the exchange rate, triggered by the deficit in the trade balance (Camagni, 2002:13).

These mechanisms do not apply in the present regional context since (i) it is not possible to assume the initial Ricardian condition of autarchy as a logical starting point, since trade between territories is the rule – between regions, between cities, between city and countryside, (ii) there are movements of production factors between territories (commuting workers, labour and capital movements, purchases of estate and property assets from outside) and (iii) a specific regional currency and exchange rate for each individual territory do not exist. Therefore, due to their intrinsic openness both to the movement of goods and the movement of factors, regions operate within a regime of absolute competitiveness and not within a regime of comparative competitiveness. Their absolute competitiveness being at an in-sufficient level with respect of the other regions may result in mass employment, and, if public transfers of income are insufficient, emigration and abandonment. (Camagni, 2002: 13, 15.)

In the search for factors of regional absolute competitiveness in the information era has to be looked for new directions and set the neoclassical theories on the background. For example, evolutionary economics and institutional economics give a somewhat different view to the economic development than the earlier assessed mainstream theories. Actually, Nelson and Nelson (2002: 266) propose that before the modern neo-classical theory gained its dominant position in economics, much of economic analysis was both evolutionary and institutional. Evolutionary economics was originally developed to explain the success and failure of organisations, but has been successfully applied in the regional context (see e.g. Cooke *et al.*,

1998; Boschma, 2003). According to the theoretical framework, the competitiveness of an actor depends on its ability to innovate and learn (Nelson and Winter, 1982). These sources of competitiveness have also been considered essential in a regional context (Lundvall, 1988; DePresson and Amesse, 1994). Economic development is seen as a path dependent, communicative and cumulative process that tends to be local in nature. The sources of competitiveness are determined in non-market environment rather than in market environment including for example the untraded interdependencies (Storper, 1995). These untraded interdependencies include the institutional, social, cognitive and cultural conventions being formed during history in a region. Evolutionary economics and institutional economics frameworks emphasise the importance of the regional institutional settings and routines in fostering the localised, cumulative and geographically bounded collective and interactive development processes. These institutional settings must include elements enabling the processes networking, learning, innovating and leadership in the regional development network. These processes should lead to increasing regional productivity, since “productivity is not everything, but in the long run it is nearly everything” (Krugman, 1994; see also Porter, 1990 and 1998).

This present study underlines the importance of the changing factors of regional competitiveness in the information era. The sustainable competitive advantage depends rather on absolute non-price competitiveness and soft supply-side factors in building productivity and economic growth (Hämäläinen, 2003; Camagni, 2002). Further on, the focus of forming sustainable regional competitiveness has to be shifted from macro-economic factors towards microeconomic factors (Porter, 1998: 89). This statement does not mean that all the macroeconomic factors should be neglected, just that their meaning has radically diminished. It does not mean, either, that the

competitiveness factors of the industrial era should be totally forgotten. But relying on them in the information era would lead to a surely declining absolute regional competitiveness and productivity leading to unwanted regional development. In this present study, regional competitiveness is defined as the reigning techno-economic sensitive absolute competitiveness. The competitiveness is based on regional resources and a region´s socio-institutional capability to renew the resource base in an interactive and collective learning process increasing regional productivity and innovativeness, as well as producing wellbeing for the citizens of a region.

3 REGIONAL INNOVATION ENVIRONMENT

3.1 Innovations as the Driving Force of Economic Growth

Innovations are widely seen to be the driving force of economic growth in the information era. The concept of innovation, however, has been understood in numerous ways during the last century. In the early stages of industrialisation, innovations were seen mostly as great leaps of knowledge achieved by talented individuals or research groups. With regard to this, Schumpeter (1942) created his theory of the heroic entrepreneur being the driving force of successful innovation. Innovations were largely seen to be results of linear processes. This has given a name to the concept of “linear model of innovation”.

The traditional linear model of innovation focuses on explicit knowledge developed in research processes. Each level in the linear model produces outputs that are transferred to the next level as inputs. The flow of knowledge is unidirectional, that is, later outputs do not provide inputs for earlier stages (Kline and Rosenberg, 1986). The linear model of innovation is often connected with radical innovation processes. These processes are mainly caused by science push or market pull effects.

In today’s world, linear innovation processes are, in reality, exceptions. The traditional approach is seen as too research based and technocratic. Many scholars have criticised the linear model due to its incompatibility with the present techno-economic paradigm (cf. Kline

and Rosenberg, 1986; Lundvall, 1988; Dosi, 1988; Asheim, 1999). Schienstock and Hämäläinen (2001: 50) have listed the main reasons for the criticism as follows:

- innovation processes are seen as exceptional events
- knowledge creation is understood as a process of reasoning and inference isolated from the rest of human activities
- problems of uncertainty are not dealt with
- research focuses only on R&D as the main function in innovation processes
- collaborative elements are seen as irrelevant.

Nowadays, the innovation process is seen as a social as much as a technical process. Innovations are seen to emerge as the results of non-linear processes deeply embedded in normal social and economic activities, and as the processes of interactive learning between firms and their environment (Lundvall, 1992). The interactive and non-linear innovation model emphasises "the plurality of types of production system and innovation (science and engineering is only relevant to some sectors), 'small' processes of economic co-ordination, informal practices as well as formal institutions, and incremental as well as large-scale innovation and adjustment" (Storper and Scott, 1995: 519).

In non-linear innovation processes, multi-directional information flows are emphasised in creating and combining knowledge. Non-linear innovation is a consequence of many kinds of learning processes embedded in various ordinary economic activities. Many different kinds of actors are involved in innovation processes. The non-linear model assumes that innovations can be triggered by various causes. Instead of understanding innovation as a linear process, we have to take into account complicated feedback mechanisms and interactive

relationships involving science, technology, learning, production and demand (Edquist, 1997: 1).

Evolutionary economics emphasise the uncertain and cumulative nature of innovations (Dosi, 1988). Uncertainty is included in innovations because of the manifold risks that are involved in the innovation processes. The uncertainty is especially embedded in the unresolved technological problems and in the impossibility of knowing the future consequences of the decisions made. Innovations seldom happen randomly and individually. They follow rather certain technological paths making them cumulative in nature. Thus, innovations are strongly path dependent and they include high risk factors making it important to promote learning processes and to diminish unnecessary uncertainty in the innovation environment.

The development of innovativeness is linked to the following dimensions of the innovation process (Cappelin and Steiner, 2002: 9, citing Kline and Rosenberg, 1986 and Lundvall, 1992.):

- the gradual and cumulative character of the innovation process – developing in a gradual way and proceeding along trajectories or development paths – which is based on a continuous learning process by entrepreneurs, technical experts and workers engaged in the innovation network;
- the integration of different and numerous technological and organisational knowledge inputs, derived from other sectors and regions, which allow know-how to be renewed and new problems to be solved. External knowledge should be combined with the knowledge and technologies available internally, since the frontier of technology is increasingly at the crossroads of two or more disciplines and traditional cultures; and
- the interactive character of the learning process, which involves groups of individuals, both within individual firms, as well as outside (social networks), and requires the development of

linkages, networks and co-operation between different actors, again outside the channels of existing institutional structures.

3.2 Agglomeration in the Regional Innovation Environment

One important aspect affecting regional innovativeness and forming a regional innovation environment is agglomeration economies. Already Smith (1776) recognised the benefits of specialisation. He introduced the idea that productivity increases with the scale of production allowing the firms and workers to specialise in specific tasks. This specialisation and division of labour increased productivity. Marshall (1916) emphasised agglomeration economies and the importance of production clusters behind the phenomenon. Marshall pondered the concept of industrial atmosphere describing the characteristics of spatial industrial agglomerations. He found regions where this atmosphere was very beneficial for certain industries. An important observation was that the atmosphere had been developed over a long period and could not be moved. Marshall also saw that the interaction in an industrial district was not just buying and selling. He called the interaction constructive co-operation, describing the multifaceted characteristics of the communication process.

Other important first wave scientists contributing to the theories of agglomeration from different points of view are, for example, Weber (1929), Christaller (1933), Hoover (1937), Lösch (1954), Myrdal (1957), Chinitz (1961) and Kaldor (1970). In their works the emphasis is on the considerations of location and urbanisation economies. Location economies assess agglomeration as a process external to the firm but internal to the industry, urbanisation economies as a process external to the industry and internal to the region. According to the theories of location economics, the existence of industry based production agglomeration originates from the existence of economics of scale in

large-scale production within the same production unit or among different production units. Efficiency of agglomeration is thus justified within the production indivisibilities. Some theorists stress the importance on market indivisibilities besides production indivisibilities in location economies. According to the central place theory of Christaller and Lösch (Christaller, 1933; Lösch, 1954) an industry oriented towards a local market will not appear in the market until the maximum distance at which the goods can be sold is greater than the distance which corresponds to the minimum quantity of goods produced under efficiency rules: goods are produced within the local market if the distribution costs do not exceed the efficiency production levels leading to market indivisibilities. Location economics have been criticised due to its focus only on transactions within one industry and neglecting the transaction between industries as a source of externalities. As a response to the critics, urbanisation economics focuses on studying agglomeration on an urban area level. According to these theories, the inter-industry relations are an important source of productivity. Urbanisation economics is concerned with the size and density of an urban area, whereas location economics is concerned with the size of an industry in producing economies of scale. (Capello, 1999.)

Also such famous theorists as Porter (1990, 1998) with his cluster theory and Krugman (1991, 1998) with his research in the field of “new economic geography” have been influenced by Marshall’s theories. Porter (1990) created his influential diamond model emphasising the meaning of “home base” for the competitiveness of firms. According to Porter firms are the real competitors in the world economy but their success is strongly related to the features of their home base. Porter works with the idea of clusters trying to find strengthening powers leading to agglomerations and clustering crossing the industry borders. Therefore, clusters are knowledge agglomerations where a positive

circle is achieved by strong investments in specialised production factors.

Agglomeration is nowadays not seen as much a result of economics of scale and production and market indivisibilities as one of local knowledge spillovers (Krugman, 1991; Lundvall, 1992) being closely related to interactive multi-actor innovation processes. Firms co-operate with public, semi-public and private institutions leading to the creation of different regional institutional schemes of partnership (Cooke, 1998; Cooke and Morgan, 1998). Agglomeration consists of formal and informal institutional networks being the channels of flowing knowledge. The interaction in these networks has been increasingly seen to be the real source of increasing returns and agglomeration benefits. The social collaboration in these networks is said to decrease transaction costs, correct market failures and decrease the risk of the interacting partners leading to increased productivity.

The benefits of agglomeration economies are, inevitably, mixture of both “classical” location and urbanisation economies based and “modern” knowledge-based reasons (see Malmberg and Maskell, 2002). Therefore, the advantages of agglomeration and clusters are, for example, (Cappelin and Steiner, 2002, citing Marshall, 1916; Chinitz, 1961 and Porter, 1995):

- access to a maximum flow of information and ideas and a provision of shared or non-traded inputs specific to an industry
- greater opportunities for collaboration
- greater availability of specialist subcontractors and suppliers
- greater availability and efficiency of particular local services such as venture capital, specialised property, education institutions, airports, ICT and other public goods and infrastructures
- development of a local pool of specialised labour related to the existence of specialist training institutions

- less risk for firms and workers to locate in clusters than elsewhere, because their options are greater
- greater customer choice.

The world can be seen to be formed of Marshallian “islands” getting advantages from Marshallian benefits (Törnqvist 1998). The network of Marshallian islands can, however, include quite different nodes. The mosaic of regions is a compound of many different kinds of regions taking part in the global division of labour (Scott, 2000). The basic premise is that the bigger and denser the agglomeration, the more advantage it gets form agglomeration economies (see e.g. Henderson, 1974; Segal, 1976). There are many reasons for this, for example (Capello 1999):

- economies of scale stemming from the production and use of public goods and services
- economies of scale stemming from the size of the urban market: quality of the labour market, a large market for final goods, existence of different possible market niches
- economies stemming from the role of the city as an incubator of production factors and input market: large and diversified labour market, accessibility to highly specialised and qualified functions and accessibility to information and communication.

Referring to the vast empirical evidence, economies of scale still matter and big agglomerations seem to be the winners in the regional mosaic. But is it possible for smaller and less dense functional regions to overcome this handicap? Is there something new in the new techno-economic paradigm with the emphasis on interactive and non-linear innovation processes that could benefit smaller scale activities?

Economies of scale deal mostly with increasing returns achieved by the quantity of transactions. Another important dimension is, however, the quality of transactions. This leads to the consideration of the regional institutional settings and, for example, social cohesion in the

networked regional innovation environment. This present study suggests that some important transactions might be more effectively and efficiently accomplished in smaller scale urban areas, where things like shared vision and mutual trust can be more easily achieved. Therefore, there might also be room for smaller successful agglomerations that specialise in a few industries based on location economies or more diversified small agglomerations based on urbanisation economies using the better co-ordination of innovation activities as the source of success. In these possible cases "the advantages of smallness" must be based on the sound institutional organisation of regional decision-making, learning, leadership, net-working and innovation processes and social cohesion in a region in order to overcome the disadvantage caused by lacking the benefits of economies of scale.

3.3 Innovation Systems

The recent discussions about developing competitiveness and innovativeness have dealt with innovation systems. Depending on their context, they can be called "national innovation systems" (cf. Freeman, 1987; Lundvall, 1992; Nelson, 1993), "regional innovation systems" (cf. Cooke *et al*., 1997; Storper, 1997; Braczyk *et al.*, 1998; de la Mothe *et al.*, 1998; Doloreux, 2002) or "sectoral innovation systems" (cf. Breschi and Malerba, 1997; Malerba, 2002). Since the focus in the present study is on the regional innovation environment, the concept of the regional innovation system is closest to the scope of the study. However, understanding the national and sectoral systems of innovation is equally important in developing a regional innovation environment.

Even though there is a notable resurgence of regional economies the innovation and technology policies and related resources are often at the national level. Therefore, regional innovation systems are embedded entities in national innovation systems and strongly influenced by the national level. The national innovation system includes not only industries and firms, but also other actors and organisations, primarily in science and technology, as well as the national innovation policy. Freeman (1987) defines national innovation system as ”a network of public and private institutions that through its activity and interaction creates, brings, modifies and spreads new technologies”. Niosi *et al.* (1993: 212) give the definition: a national innovation system is “a system of interacting private and public firms (either large or small), universities, and government agencies aiming at the production of science and technology within national borders. Interaction among these units may be technical, commercial, legal, social, and financial, inasmuch as the goal of the interaction is the development, protection, financing, regulation of new science and technology”. A definition by Metcalfe (1995: 410) is “a national innovation system is a set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provide the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies”.

Sectoral innovation systems play an important role in developing a regional innovation environment, while the sectoral or thematic innovation networks existing in a regional innovation system can and ought to be embedded in the global sectoral innovation systems. The framework of sectoral innovation systems is based strongly on the ideas of evolutionary economics. A sectoral innovation system can be

defined as a set of products and a set of agents carrying out market and non-market interactions for the creation, production and sale of those products. A sectoral system has a specific knowledge base, technologies, inputs and demand. Agents are individuals and organisations at various levels of aggregation. (Malerba 2002.) Sectoral innovation systems are based on the idea that different sectors operate under different technological regimes, which are characterised by particular combinations of opportunity and appropriability conditions, degrees of cumulativeness of technological knowledge and characteristics of the relevant knowledge base (Carlsson *et al.*, 2002). The sectoral system experiences changes in a dynamic evolutionary process affecting many elements of the system.

The concept of a regional innovation system provides a good framework for assessing the technology and innovation policies in the new regional innovation environment. At least three different schools have greatly contributed to the assessment of regional innovation systems: the Marshallian school of industrial districts (see Marshall, 1916, 1932; Piore and Sabel, 1984; Beccatini, 1990; Pyke and Sengenberger, 1992 etc.), the school of new industrial spaces taking as their starting point the works of Coase and Williamson (see Coase, 1937; Williamson, 1979; Storper and Scott, 1992 etc.), and the mainly European GREMI school emphasising the importance of the concept of an innovative milieu (see Aydalot and Keeble, 1988; Camagni, 1991; Crevoisier and Maillat, 1991 etc.).

The theory of industrial districts is based on the work of Marshall. In the theory of industrial districts, the co-operation of small and medium size firms and the transparency of the regional actors are emphasised, as well as building a real service network for the firms. The theory has been developed further especially in the Third Italy. The industrial district can be defined as a “socio-territorial entity which

is characterised by the active presence of both a community of people and a population of firms in one naturally and historically bounded area" (Beccatini, 1990: 38). The literature of industrial districts has emphasised some facts, such as a strong tendency to specialised traditional sectors, the development of a flexible system of production as opposed to the Fordist mass production, the presence of an "industrial atmosphere", a small urban dimension because industrial districts develop around a small city or even village, the existence of a local community which shares a homogeneous system of values embedded in local institutions, importance of family ties and trust due the merger between the economic production and social environment and a high social mobility due to the very flexible labour market (Leoncini *et al.*, 2003 citing Becattini, 1990; Goodman, Bamford and Saynor, 1989; Keeble and Weever, 1986; Pyke, Becattini and Sengenberger, 1990).

The theory of new industrial spaces is based on neo-institutional economic theories. Why do firms exist? That was the question asked by Coase (1937) more than 60 years ago. Even though it is not perfect, Coase's analysis of transaction costs and vertical integration provides a good starting point for the understanding of the existence of different organisational forms. According to the theorists of new industrial spaces, the regional production system is formed by the relation of intra-firm organisational costs and the transaction costs in the network of firms. However, assessing only traded interdependencies through the transaction cost theory is not sufficient. Therefore, Storper (1995) has introduced the term "untraded interdependencies" to complete the framework of new industrial spaces. Untraded interdependencies are, for example, regional conventions, norms and values or public or semi-public institutions.

The concept of the innovative milieu focuses on the relationship between innovative capability and the regional economic milieu. Camagni (1991, 3) defines innovative milieu as “the set, or the complex network of mainly informal social relationships on a limited geographical area, often determining a specific external ‘image’ and internal ‘representation’ and sense of belonging, which enhance the local innovative capability through synergetic and collective learning processes”. Kostiainen (2002, 44) defines the innovative milieu as “a whole of relations appearing in a certain geographical area with a high level of quality of life which has also networked beyond the area itself and which increases the unity of production systems, economic actors and industrial culture creating local collective learning and acting as a mechanism alleviating insecurity within the innovation process”. Entrepreneurship, the forms of the organisations, the atmosphere for entrepreneurship and the ability to use technology are the basic elements of the innovative milieu. According to this school, economic success in a region depends a great deal on the quality of the internal innovation network in the region. It also raises the idea of collective learning to the centre of the dynamics of innovation networks.

The regional innovation system can be understood to be a regional system “in which firms and other organisations are systematically engaged in interactive learning through an institutional milieu characterised by embeddedness” (Cooke *et al*., 1998) or “a system of innovative networks and institutions located within a certain geographic area, with regular and strong internal interaction that promotes the innovativeness of the region´s companies.” (Kostiainen 2002: 80.) Doloreux (2002) emphasises three aspects in the definition of regional innovation system, namely the expression “interactive learning”, the term “milieu” and the concept of “embeddedness”. Furthermore, he defines firms, institutions, knowledge structures and holistic innovation

policies which are the main elements comprising a regional innovation system.

A regional innovation system consists of loose multi-actor innovation networks aiming at increasing the innovative capability of the system (Cooke and Wills 1999). These networks have different forms defined by, for example, the origin, size, structure and objective of the networks (Harmaakorpi *et al*., 2003). However, most regional innovation networks fulfil certain typical characteristics. They are often formed of heterogeneous groups of actors including representatives of firms, universities, technology centres and development organisations. In comparison with innovation networks within or between individual firms, regional innovation networks are looser structures. The values, goals and ways of acting of the actors in a regional network may differ significantly. This emphasises the role of creating a suitable social and cultural environment for achieving common goals and co-ordination of action.

In the assessment of regional networks and clusters, the interregional relations are often neglected. However, regional innovation networks are by no means closed systems. In fact, it would be strongly misleading even to think they could be closed systems due to the multi-actor character of the networks. The company members of the network are typically involved in global competition and they belong to sectoral interregional networks. The research institutions are normally strongly networked with similar institutions globally. Regional innovation networks have to be open for the essential global information flows. An important question is how to process information between the innovation network and the outside world. It would be of crucial importance to get essential information from the outside world to enhance the collective learning process of the network. In this

connection, the main issue is to assess the absorptive capacity of the innovation network (Cohen and Levinthal, 1990).

Even if the importance of regional level of innovation systems has arisen in recent discussions, some are seriously questioning its significance. Bathelt (2003: 770) argues that it is hard to find regions that contain a large part of the economic value chain and has a governance structure of its own independent of its environment. Further, he suggests that 'normal' regions do not fulfil the criteria of self-sustained economic specialisation and political governance, which would be characteristic of a regional innovation system. According to this view, the national innovation system is dominant, since the nation still has much power in forming the innovation system in its territory. This present study, however, disagrees with the notions of Bathelt. The world should not be understood as a 'containerised, top-down' system of economic flows (Cooke, 2004). Assessing and developing regional innovation systems is essential in avoiding unnecessary regional disparities caused by the failures in the national innovation system. There is a clear political tendency towards regionalisation and strengthening the resource base of the regions. If innovativeness is not assessed at the regional level these resources are used ineffectively. Moreover, learning tends to be local and innovation processes benefit from face-to-face contacts. Therefore, the point of departure of this study is not the level of the system itself. The focus is on assessing and fostering the dynamics of regional innovation networks regardless of their participation in different innovation systems. The regional resources used effectively to promote the functioning of these networks benefit the innovation system whether it be regional, national, supra-national or sectoral.

The innovation system approaches have some differences, but many characteristics are similar. Edquist (1997) defines nine features that

can be found in all the approaches: (i) innovations and learning are at the centre, (ii) assessments are holistic and interdisciplinary, (iii) a historical perspective is natural in them, (iv) differences between systems and non-optimality are present, (v) emphasis is on interdependence and non-linearity, (vi) approaches encompass product technology and organisational innovations, (vii) institutions are central, (viii) approaches are conceptually diffuse, (ix) approaches are conceptual frameworks rather than formal theories. These common features presented by Edquist give a good overall picture of the approaches describing a regional environment where competitive advantage is created during the present techno-socio-economic paradigm. Much emphasis is placed on the role of institutions, interactivity, collective learning and non-linearity in the innovation processes.

3.4 Social Cohesion in Regional Innovation Systems

Regional innovation networks are an essential part of a regional innovation system. Since regional innovation networks are defined as loose multi-actor networks composed of many different actors, particular attention must be given to the relationships in the networks. In this context, the critical question is how it is possible to create a trusting atmosphere in these networks and in the whole system, in order to achieve positive externalities in the interactive and joint learning processes. This leads one to consider how social cohesion could be promoted in the innovation networks. Since the innovation processes are highly co-operative, the actors of the innovation network “need to develop a common language and modes of interpretation and, above all, trust in order to overcome some of the uncertainties characterizing the innovation process” (Lundvall and Borrás, 1999).

Gambetta (1988) defines trust as a particular level of the subjective probability with which an agent assesses that another agent or a group of agents will perform a particular action, both before he can monitor such action (or independently of his capacity ever to be able to monitor it) and in a context in which it affects his own action. A trustful atmosphere and sufficient social cohesion have several concrete advantages in the regional innovation system. Firstly, they affect the productivity of the network by reducing general uncertainty in specialisation and division of labour. Secondly, they reduce the transaction costs in the network. Thirdly, they affect the coordination costs of the network. These three effects are connected to the internal dynamics and efficiency of the network. Fourthly, and perhaps most importantly, they affect the amount and diversity of knowledge achievable by an actor. (Schienstock and Hämäläinen 2001, 144.)

Within the last ten years, the concept of social capital has become a popular term, also used in everyday language. The reason for the popularity is that the traditional economic models have been widely seen as insufficient in explaining competitiveness and economic growth. Differences in social and cultural factors are seen to explain much of the emerging differences between regions in the globalising world where the regions seemingly have more equal chances to access the resources (Temple 1999). Putnam (1993) has produced particularly influential evidence of this evolution in his assessment of the development of the civil society in Italy.

Social capital is considered to be one of the most interesting concepts in the research of regional innovation systems. In this context, it is of interest in at least the following ways:

- it offers a conceptual framework to specify the processes of non-linear innovations;

– it provides a tool for handling theoretically the importance of networks and strategic alliances in the regional innovation systems. (Cf. Lesser 2000: 9–12.)

In order to develop these themes further, the concept and the problems connected with it should be examined. The concept has been used in various, sometimes even contradictory meanings, because of different theoretical traditions. Bourdieu (1985), whose background is in the classical sociological discussion of capital, is considered to be one of the pioneers of modern research concerning social capital. Other important early theorists are Coleman (1988), who relies on rational choice theory, and Putnam (1993; 1995), whose work is strongly connected to the American communitarian discussion. While there have been important theoretical efforts to combine these backgrounds (e.g. Nahapiet and Ghoshal, 1998; Adler and Kwon, 2000; Woolcock, 1998), they are still quite distinct in empirical research. This has been especially the case between the research emphasising economics and concentrating on the social capital of individuals and networks on the one hand, and the social political research of communities on the other. Even if the overall importance of social capital in regional innovation processes has been accepted, its specific role in producing innovations and creating innovation systems is far from clear. This is partly due to the theoretical looseness and unspecificity of the concept, and partly to the undeveloped methods for empirical research of social capital. In general, social capital refers to the possession of certain social relationships and membership in certain collectives, and to the resources that derive from these relationships and memberships. Portes (1998: 7) explains the basic idea behind the concept in the following way: “[w]hereas economic capital is in people’s bank accounts and human capital is inside their heads, social capital inheres in the structure of their relationships”. (Tura and Harmaakorpi, 2003.)

In some writings the concept of social capital comes near to the concept of institution (see e.g. Ilmonen: 2000). The relationship between institutions, innovativeness and economic performance has been greatly developed by North (1986, 1990), who suggests that an institution is based on incessant social interaction. Institutions cannot be based on sporadic relationships between the actors in the regional innovation system. Institutions in a regional innovation system are defined as the norms, values and rules that are steering the actions in the system. Simultaneously, social capital "refers to features of social organisation, such as trust, norms and networks, that can improve the efficiency of society by facilitating co-ordinated actions" (Putnam, 1993: 167). In these definitions hardly any difference is to be seen. In this study, however, a clear distinction between the concepts 'institutions' and 'social capital' is made: institutions determine the forms in which a regional innovation system is constructed (including, for example, informal innovation networks), whereas social capital refers to social resource configurations existing in the institutional settings and at these institutions' disposal.

As a starting point for the definition of social capital, a parallel with economic capital can be drawn. On what basis is something called economic capital? How are certain objects recognised as money? The answer given by the conventionalist theory of institutions (e.g. Searle, 1995; Lagerspetz, 1995) is that something is money only if one believes it is money. More specifically, an object counts as money if and only if there is a practice or context, where that object functions as money. In this way, economic capital is an institutional form of capital. Social capital has this same feature. There cannot be social capital without there being some kind of convention or common practice, which defines the relevant forms and scope of social capital. The interpretation used in this study of social capital can be defined as a resource-based view on social capital. According to this view, social

capital refers to an actor's resources, the sources of which are located in the social relations of the actor. These resources making up social capital enable certain actions or make certain objectives obtainable that would have been impossible or unattainable without those resources (cf. Nahapiet and Ghoshal, 1998: 244). This view comes close to Lin's (2001, 29) definition of social capital as "resources embedded in a social structure that are accessed and or mobilized in purposive actions". The resource-based definition of social capital basically follows Coleman's (1988) functional definition. A social relationship of an actor becomes social capital when it functions by increasing his or her capacity for action and access to relevant resources. (Tura and Harmaakorpi, 2003.)

According to the resource-based view, social capital is not independent of its context. A certain social capital 'works' – is causally relevant – only in certain fields of action. This context-dependence can be called the field-specificity of social capital. This simple idea has some important consequences. The concept of field-specificity helps one understand the problems of the utilisation of social capital. There are situations where an actor's social capital is 'worthless'. A simple example of this is a distinguished scholar, who has much social capital within the scientific community. This status does not, however, automatically give him or her social capital in the regional innovation system where both the respected actors and the rules of the field differ significantly from those of the university. The scholar's social capital – resources based on a certain social status and relationships – is not causally relevant in another context or field. (Tura and Harmaakorpi, 2003.)

In the case of regional innovation systems, it is interesting to assess the concepts of bridging and bonding social capital. Bridging social capital creates bonds of connectedness that are formed across

diverse horizontal groups, whereas bonding capital connects only the members of homogeneous groups (Granovetter, 1985; Putnam, 1995). This division of social capital into bridging and bonding becomes crucial in assessing regional innovativeness, since it is essential both to build an atmosphere of trust in each innovation network and to keep them open in order to allow the necessary flows of information to take place. Although bonding social capital can be seen as partly fruitful for the functioning of one innovation network, the regional innovation system being formed characteristically of networks of strong bonding social capital, might lead to unwanted results, whilst the closeness of an innovation network harms both the network itself, by decreasing its absorptive capability and the entire innovation system, since closed networks may act against the interests of other networks leading to rent seeking behaviour reducing the aggregate economic performance (Olson, 1982). Bridging social capital is seen as positive due its nature in bringing the individual innovation networks into trustful interaction enabling, for example, the increase of absorptive capacity of these networks. It is possible that the weak ties (Granovetter, 1973) are more beneficial for an actor in a regional innovation system than very tight, strong and bonding ties. This brings us close to the theory of structural wholes (Burt, 1992), where the optimal position for an individual is between several groups.

The basis of innovations in a regional innovation system are the resources and competencies existing in the system. These resources can be material, economical, intellectual and social. Innovativeness is a combination of these four types of resources and the ability to use and apply them. Thus, social capital can be understood as one element in the basis of the innovation process. Social capital is not only one resource among others, but is also located at the centre of the whole innovativeness. Social capital is a resource which gives an organisation or a network the capacity to use and utilise the material,

economic and intellectual resources of the whole collective – as well as social resources reaching outside the collective. Generally, social capital can be defined in this context as a necessary but insufficient part of the innovativeness of the network.

The relationship of the concepts of social capital and innovativeness is not without its problems. In their essay, Florida *et al*. (2002) claim that places with strong social capital are in fact the worst places for innovation and creative processes. They base their argument on large empirical data, which show that areas with low levels of innovation scored high on social capital – and vice versa. They argue that regions with strong social capital become complacent and insulated from outside information and challenges. However, this argument is problematic in its details. The problem is that it equates social capital with stability. It is based on the idea that the stronger the ties in a given collective, the more social capital there is. If our resource-based definition of social capital is accepted, this is not necessarily the case: the sources of social capital may come from various kinds of social relationships – from the weak ties as well as from the strong ones. The apparent weakness of innovativeness that Florida *et al*. refer to is in fact connected to two 'distortions' of social capital: closure of the network and collective blindness[1]. Closure refers to the way a network separates itself from its environment. The members of a closed network have close, interactive relationships within the network, but only a few or loose relationships with the actors outside the network. The concept of collective blindness can refer to the way a network may collectively set its focus erroneously: it may be misled in its goals and the appropriate means to reach them. These are risks that can

[1] *Apart from these, there are also other important risks of social capital. Among them are the problems of free riding, cheating and moral hazard, as well as the risks of the fragmentation of a broader society (e.g. Adler and Kwon 2000: 106–107).*

appear with the maintenance and utilisation of social capital. However, they do not follow from the development of social capital. (Tura and Harmaakorpi, 2003.)

This idea can be explained by the concept of field-specificity. Social capital is relevant only in certain fields of action and in relation to certain objectives. Let us think about a tight innovation network with strong trust, common values and common ways of acting among the members – a network with 'good spirit'. The actors of the network interact mainly with each other, holding meetings resulting in a common understanding and an agreement of the strong trust and exceptionally good spirit of the network. What can be said about innovativeness and social capital of this network? Florida *et al*. probably would say that the innovative capability of the network is extremely weak. It is easy to agree with this judgement: the network does not adopt new information, and its bridging social capital is practically non-existent. Is there, then, too much social capital within the network? Let us assume that the network in question is a regional innovation system, and thus its main function is the creation of opportunities for innovations. The resources of the network and its members should support this function. They have to be relevant in the field in question. In this network, this is not the case: the social capital the network offers to its members does not work as a means of reaching the objectives of the regional innovation system. It can be said that either the network works in the wrong field (the social capital creates action opportunities the actors do not in fact pursue); or it works in the right field but in the wrong way (the actors do not in fact have the social capital they would need). The weakness of the innovativeness of the network is thus a consequence of the closure of the network and its wrong direction (collective blindness), not of the quantity of social capital as such. The mistake in the argument of Florida *et al* is their tendency to see social capital in such way that it

is, by definition, directly proportional to the tightness of the relationships between the actors of a community. (Tura and Harmaakorpi, 2003.)

Related to the reasoning of Florida *et al.,* Sotarauta sees paradoxes and differences in networks as a driving force of the development process. He presents a term “creative tension” (Sotarauta and Mustikkamäki, 2001) as a counterbalance for social capital in a networked environment. Creative tension is needed, because regional development is moving toward an insecure and unknown future in a turbulent world. Actually, social capital and creative tension should not be seen as competing forces in regional innovation systems. Both are needed and should complement each other in order to maintain sufficient social cohesion and creative drive in regional innovation networks. In fact, perhaps real field-specific social capital does not exist in a regional innovation system if creative tension is not tolerated in it.

In this present study the concept ‘creative social capital’ is introduced to describe social capital needed in the regional innovation system. The characteristics of the creative social capital in the regional innovation system are

- it is understood as a field-specific resource
- it is a balanced amalgam of bridging and bonding social capital
- it includes the elements of creative tension
- it supports the necessary socio-institutional change caused by techno-economic development.

3.5 Learning in Regional Innovation Systems

Clustering and networking are important factors in creating regional competitive advantage. However, “both concepts, clusters and networks, describe important organisational aspects that are closer to the issue of infrastructure than to the issue of innovation. The proximity of various firms does not itself yield innovative results. Communication frequency between companies contained in vast networks does not guarantee innovation, either. Both concepts lack the sound foundation of the underlying resource: knowledge” (Nonaka and Reinmöller, 1998: 407). Thus, learning and knowledge creation are the driving force of innovations leading to competitive advantage of regions. Learning can take place at an individual level, or it can be seen as a collective process. In the present study, learning and knowledge creation are assessed primarily as a collective process.

Learning through formal education and through research and development are essential in creating innovations. They are especially important in the case of radical innovations and in the case of linear innovation processes. Formal education searches for answers to questions like “know-what” and “know-why”. Such knowledge is normally explicit in nature. However, in the cases of non-linear innovation processes and incremental innovations, the result is a consequence of different kinds of learning processes embedded in normal economic and social activities. The learning in these processes includes activities like learning-by-doing, learning-by-using and learning-by-interacting, involving many kinds of actors (Lundvall, 1992). Such processes often produce tacit knowledge giving answers to questions like “know-how” and “know-who”.

Theories of organisational learning (cf. Argyris and Schön, 1978; Senge, 1990; Garvin, 1993; Nonaka and Takeuchi, 1995) are close enough to give a basis for the study of learning and knowledge in regional innovation networks. Learning and knowledge creation in organisations is interaction between different actors and between different kinds of knowledge. The interactive processes of “learning by doing” and “learning by exploring” between different kinds of actors are the main sources of innovative collective learning processes.

Knowledge as a regional asset is a widely discussed topic in the context of regional economies. The discussion often deals with the nature of knowledge and its meaning for regional development. The role of tacit and explicit knowledge has been investigated in many contexts (cf. Polanyi, 1962, 1966; Nonaka and Takeuchi, 1995; Lundvall and Borrás, 1999; Asheim, 1999; Schienstock and Hämäläinen, 2001). The discussion is fostered by the strong role of tacit knowledge in collective learning processes and by the present tendency to increasingly codify tacit knowledge (Maskell *et al.*, 1998).

Explicit knowledge is understood to be easily codifiable and, therefore, easy to transfer with the modern technologies, making it, in principle, available everywhere. On the other hand, tacit knowledge cannot be transferred easily over distances, because it is not expressed in explicit form. Therefore, tacit knowledge seems to be a more valuable asset in the regional context. However, regional knowledge advantage is not based just on tacit knowledge, since the local knowledge infrastructure also contains “sticky” codified (explicit) knowledge (Asheim, 1999). Sticky knowledge refers to codified knowledge that is generally based on a high level of individual skills and experiences, collective learning processes and a well-developed institutional framework – making such knowledge very difficult to transfer between regions (de Castro and Jensen-Butler, 1993). However, sticky know-

ledge and the more easily transferable explicit knowledge are not two separate categories, but explicit knowledge is nearly always to some extent sticky. Only the level of stickiness varies.

Scharmer (2001: 68–69) recently introduced the concept of “self-transcending” knowledge, or “tacit knowledge prior to its embodiment”. It is the ability to sense the presence of potential, to see what does not yet exist, and it is usually associated with artists. Scharmer cites Michelangelo, who, talking about his sculpture of David, said: “David was already in the stone. I just took away everything that wasn’t David”. The ability to see a David where others just see stone is what distinguishes the truly great artist. Today’s leaders are also faced with the challenge of figuring out what in their environment may contain the potential new “David”, but they also have to figure out how to take away everything that isn’t David. As the director of Nokia Research Center puts it “… Understanding hidden trends is extremely important. A researcher may only have a faint idea of what is coming next. Sometimes you are not even able to express it verbally, but deep in your head know that by investing resources in a certain field, something new will emerge” (Talouselämä, 2003: 22). Scharmer argues that the knowledge management discussion of the next decade will revolve around the interplay of the three forms of knowledge: explicit, tacit and self-transcending. In this present study, sticky knowledge is understood as a sub-category of explicit knowledge, and thus it is not mentioned separately in the rest of the study. As such, the topic of sticky knowledge is fascinating, and it deserves further investigation in the context of regional innovation networks. (Harmaakorpi, Melkas and Kivelä 2003.)

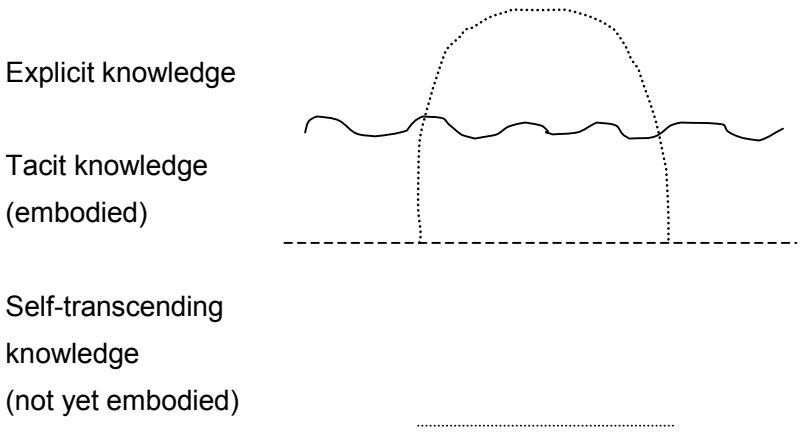

***Figure 3**. The three forms of knowledge (Scharmer, 2001: 70).*

Figure 3 depicts the three forms of knowledge by Scharmer using the model of an iceberg. Above the waterline is explicit knowledge. Below the waterline are the two types of tacit knowledge. Self-transcending knowledge is neither outside nor inside the knower. Within regional innovation networks, self-transcending knowledge seems particularly important. Moreover, there seems to be a close relationship between innovativeness and self-transcending knowledge. Scharmer has not commented on that, but at least as a process, there would seem to be similarities with regard to how innovations and self-transcending knowledge emerge and are produced. (Harmaakorpi, Melkas and Kivelä, 2003.)

Learning and knowledge creation are too important questions to be left to occur spontaneously. According to Nonaka and Reinmöller (1998), in order to design knowledge-creating areas, all the processes by which knowledge is converted need to be supported within the region. Therefore, special attention should be directed at knowledge

management at the regional level. As to the concepts, although many authors (cf. Nonaka and Teece, 2001a) distinguish clearly between knowledge creation and knowledge management, the discussion of their differences in the context of regional multi-actor innovation networks is beyond the scope of this study. Nonaka and Reinmöller (1998: 421) claim that “industrial regions can provide the necessary explicit knowledge and tacit knowledge through collocation”. With regard to practical arrangements, they note that “physical proximity can guarantee frequently scheduled meetings, where face-to-face communication enhances the sharing of tacit knowledge” (Nonaka and Reinmöller, 1998: 415).

Nonaka and his colleagues focus on the creation of tacit and explicit knowledge and on the interaction between explicit and tacit knowledge in collective learning. Tacit knowledge (Polanyi, 1962; 1966) is seen to be a more important factor than explicit knowledge especially in non-linear innovation processes causing incremental innovations. Nonaka and Takeuchi (1995) set their focus on “knowledge conversion” in networked innovation processes. By knowledge conversion, they mean the interaction of the two types of knowledge in an innovation network. Nonaka and Takeuchi’s learning cycle (the SECI model) consists of four phases of knowledge conversion:

1 socialisation (from tacit knowledge to tacit knowledge);
2 externalisation (from tacit knowledge to explicit knowledge);
3 combination (from explicit knowledge to explicit knowledge);
4 internalisation (from explicit knowledge to tacit knowledge).

The aim of the SECI model is to cause a learning spiral where the collective learning process increases knowledge in the network.

According to Nonaka and Konno (1998), knowledge conversion takes place in certain forums or arenas. Describing those forums and arenas, they use the concept of *ba*. *Ba* can be a concrete or virtual place where knowledge conversion occurs. Different kinds of knowledge processes need different kinds of *bas*. Each phase of the SECI model corresponds to a specific *ba*:

- socialisation to originating *ba*;
- externalisation to interacting *ba;*
- combination to cyber *ba*;
- internalisation to exercising *ba.*

The following descriptions of the phases and *bas* are from Nonaka and Konno (1998).

Socialisation and originating *ba*

Socialisation involves the sharing of tacit knowledge between individuals. In practice, socialisation is capturing knowledge through physical proximity and face-to-face contacts. Originating *ba* is the world where individuals share feelings, emotions, experiences, and mental models, removing the barrier between the members of a group. Originating *ba* is the primary *ba* from which the knowledge creation begins. The socialisation phase in originating *ba* creates a common understanding and social capital among group members.

Externalisation and interacting *ba*

Externalisation requires the expression of tacit knowledge and its translation into comprehensible forms that can be understood by others. That means converting tacit knowledge into explicit knowledge using metaphors, analogies, concepts, hypotheses or models. Externalisation takes place in interacting *ba,* where dialogue is the key to knowledge conversion.

Combination and cyber *ba*

Combination involves the conversion of explicit knowledge into more complex sets of explicit knowledge. At this stage, new knowledge generated at the externalisation stage transcends the group in analogue or digital signals. Cyber *ba* is a place of interaction in a virtual world instead of real space and time, and it represents the combination phase. Combining new explicit knowledge with existing information and knowledge generates and systemises explicit knowledge.

Internalisation and exercising *ba*

Internalisation of newly created knowledge is the conversion of explicit knowledge into tacit knowledge. At this phase, explicit knowledge has to be embodied in action and practice by using simulations or experiments to trigger learning by doing processes. Exercising *ba* facilitates the conversion of explicit knowledge to tacit knowledge. Internalisation is often conducted by focused training with senior mentors and colleagues consisting primarily of continuous exercises.

A description of the SECI/*ba* model is depicted in Figure 4 (Nonaka and Takeuchi, 1995; Nonaka and Konno, 1998).

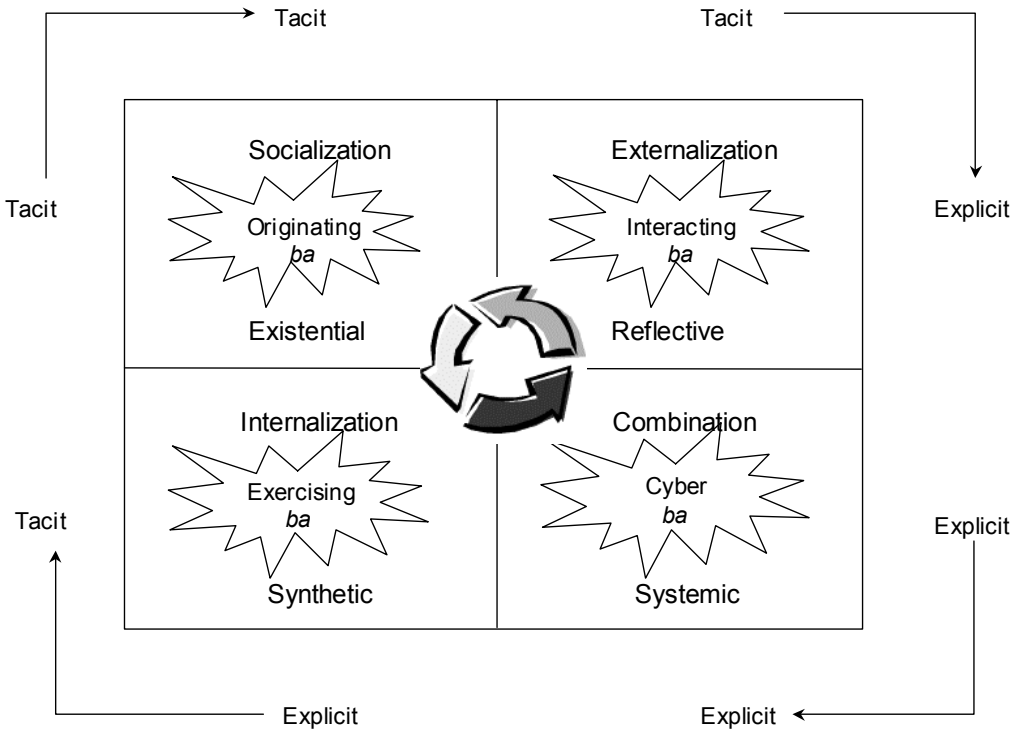

***Figure 4**. The SECI/ba model (Nonaka and Konno, 1998: 46).*

Knowledge management systems for loose regional multi-actor networks have not been studied very much. Kostiainen (2001) has applied the *ba* concept to a regional development network of Tampere Urban Region in Finland. This network is a loose multi-actor network consisting of cities and municipalities, research and educational institutions, development organisations, technology centres, state agencies and key companies in the region. In the era of programme-based regional development activities (see Vartiainen, 1998) this network should be able to work together and learn collectively in order to enable a sound development trajectory in the region. The application by Kostiainen is presented in Figure 5.

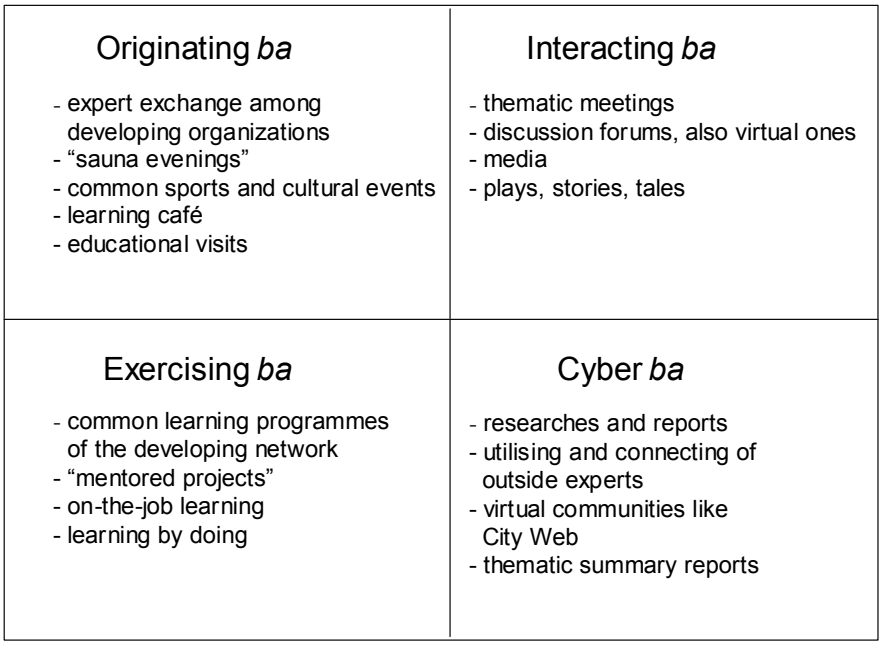

***Figure 5**. The potential* ba *in the development network of an urban region (Kostiainen, 2002).*

Knowledge assets and knowledge vision

Knowledge assets lay the foundation for knowledge creation. Knowledge assets are the inputs, outputs and moderating factors of knowledge creation and management. They need to be built and used internally in order for their full value to be realised, as they cannot be readily bought and sold. Knowledge assets could be categorised into four types: (i) experimental knowledge assets meaning tacit knowledge shared through common experiences, (ii) conceptual knowledge assets meaning explicit knowledge articulated through images, symbols and language, (iii) systemic knowledge assets meaning systemised and packaged explicit knowledge and (iv) routine knowledge assets meaning tacit knowledge routinised and embedded in actions and practices. (Nonaka, Toyama and Nagata, 2000.)

The SECI/*ba* model describes how the knowledge conversions occur in an interactive innovation process. However, it does not tell how to lead the process. Nonaka *et al.* (2000) have created the concept of knowledge vision to give a direction to the process. To be able to create and manage knowledge successfully, a network needs a vision to synchronise the network. This is especially important in regional multi-actor networks where the actors have very different backgrounds. The knowledge vision gives a direction to the knowledge-creating process and the knowledge created in it by asking such fundamental questions as “What are we?”, “What should we create?”, “How can we do it?”, “Why are we doing this?” and “Where are we going?”. The knowledge vision defines the value system that evaluates, justifies and determines the quality of knowledge that the network creates. (Nonaka *et al.*, 2000). The knowledge vision should be based on a common knowledge context (Howells, 2000) – or a common knowledge basis, which can be defined as “a common language that enables communication and co-ordination” (Dosi and Marengo, 1993: 169).

Critics on the SECI/*ba* model

Although the knowledge creation model of Nonaka and his colleagues is largely quoted and accepted, it has been criticised, in part even severely. Tuomi (1999), for instance, finds the basic structure of the Nonaka – Takeuchi model has interesting possibilities for reinterpretation and extension. However, as the concept of knowledge underlying the model is individualistic, interactions and inter-dependencies across levels of analysis are difficult to describe. There is, according to Tuomi, no way within the model to discuss development of advanced cognitive functions, which are inherently collective. The role and restrictions of language and the impact of speech and written text on social or individual level knowledge processing are not discussed. The analysis of development and

dynamics of social and individual stocks of knowledge, the enabling and constraining role of collective memory, culturally produced cognitive artefacts, institutionalised signification structures and the role of culture, in general, remain outside of the model. To extend and augment the Nonaka – Takeuchi model, Tuomi developed his own '5-A model' of knowledge generation. This model consists of articulation, anticipation (that generates knowledge that can be new to the society), appropriation (that generates knowledge that is available within the society but new for the focal learner, either through reflective thought or communication and production), accumulation (that – together with memory – underlies all processing of meaning) and action (Tuomi, 1999: 342–346). (Harmaakorpi and Melkas, forthcoming.)

Perhaps one of the severest critics of the SECI/*ba* model is Stacey (2001). According to him, Nonaka and his colleagues belong to mainstream organisational learning and knowledge theorists, who believe that knowledge can be treated like a "thing" that can be possessed and understand knowledge creation as a system. Stacey, however, argues that "knowledge arises in complex responsive processes of relating between human bodies, [and] … knowledge itself is continuously reproduced and potentially transformed" (Stacey, 2001: 4). Thus, knowledge is not a "thing" or a system but an active process of relating. He further claims that "knowledge cannot be managed, and there is no need to manage it, because knowledge is participative self-organising processes patterning themselves in coherent ways" (Stacey, 2001: 6). As a comment on Stacey, at least in later writing, Nonaka and his colleagues underline the importance of understanding the dynamic process of knowledge creation that contains an interplay between explicit knowledge and tacit knowledge (Nonaka, Toyama and Konno, 2001; Takeuchi, 2001; see also other

chapters in Nonaka and Teece, 2001b). This does not reflect thinking of knowledge as a thing, either.

Revisited model for knowledge creation and management

Despite the partly justified criticism, knowledge creation should be systematically aided in regional innovation networks. The question arising is how well the SECI/*ba* model can be applied to a loose regional development network. The model is designed for organisations having a clear leadership and a hierarchical structure enabling decision-making and control in the knowledge creation process. On the contrary, a regional development network lacks clear leadership, which potentially makes it more difficult for the learning spiral to function. It considered in the present study – as do Kostiainen and even Nonaka himself – the SECI/*ba* model to be sufficiently applicable to regional development and regional innovation networks. The reason is that modern firm organisations that Nonaka and his colleagues have investigated and where knowledge is created are no longer hierarchical but, rather, networked entities. Knowledge creation and management do not differ essentially in such environments, although differences can be seen in the ways of practical application, as well as in leadership and general management.

A great challenge is also incorporation of self-transcending knowledge into the SECI/*ba* model. This study suggests that two additional phases should be taken into account: (i) the conversion of self-transcending knowledge to tacit knowledge (embodiment) and (ii) vice versa, the conversion of tacit knowledge to self-transcending knowledge. Within a regional innovation network, these processes are both collective and individual. The network, however, needs to facilitate, support and systematise the processes, which is why they need to be included in the knowledge management system. The first-mentioned process may be seen as taking place in “imagination *ba*”

and the second in “futurising *ba*”. New concepts are suggested for these processes to illustrate their nature (Harmaakorpi and Melkas, forthcoming):

- visualisation (from self-transcending to tacit); self-transcending knowledge is embodied from the abstract to visions, feelings, mental models, etc., and
- potentialisation (from tacit to self-transcending); tacit knowledge is disembodied and forms the basis for sensing the future potentials and seeing what does not yet exist.

Key issues in facilitating the above-mentioned processes are argued to be the following (Harmaakorpi and Melkas, forthcoming):

- acknowledging the existence of this future-oriented level of knowledge (self-transcending knowledge)
- documentation, in some form or another, of the experiences gained during originating *ba* and exercising *ba*. For instance, expert exchanges quite likely result in many new insights and ideas, but as people are generally very busy at work these days, many of these are quickly forgotten, although they might be extremely useful as such or when developed further. This is related to the importance of the evaluation process of ideas (Forssén, 2002) as part of knowledge management. This process is usually very poorly arranged in individual organisations (Forssén, 2002), and the situation is likely to be even worse in regional innovation networks
- paying special attention to keeping the structure of the innovation network unbiased and unconventional – during the starting phase and continuously, to trying to find and engage people who are talented in creating self-transcending knowledge, and to ensuring that participation in the network brings some added value to all the actors. It is also important to ensure that all kinds of employees are able to participate in the innovation network and have the role they wish; that their superiors acknowledge the importance of this and provide opportunities with regard to time, for instance. This support and

space is seen as especially important in the case of self-transcending knowledge

- doing research on best practices in facilitating these processes and looking into possibilities provided by methods related to the scientific discipline of futures studies, for instance (see Chapter 6.4 for a discussion on futures studies)
- doing research on how tacit and explicit knowledge facilitate the creation of self-transcending knowledge.

Knowledge management in a regional innovation network can be compared to a football game. The regional innovation network consists of players with different roles. A football team has to follow certain rules of the game, and the team must create common tactics to be able to achieve the goals that have been set. Although the rules are set and tactics are created, the players have to interact creatively with each other during the game. During the season, players get to know the other players of the team better, which facilitates improvement of the tactics. It is a matter of collective learning.

In football, interaction between the players on the field occurs mainly by passing the ball to the colleagues in the team. In order to follow the created tactics well, exact passes are needed. To be able to pass well you have to know how the pass is made technically. However, you also have to be able adjust the pass according to the receiver. The timing of the pass is highly important. One certainly should give different passes to a fast and technical player than to a slower player with the ability to score goals by heading.

A knowledge management system of an innovation network is parallel to the rules and tactics of a football game, as it enables collective learning to take place in order to increase the capability of the network. The quality of passing and receiving the ball is very much like the quality of giving and receiving information in an innovation network. Even if the knowledge management system were correctly

built, poor information quality would destroy the collective learning process in the innovation network – just like bad passes would destroy the game, even if the tactics were correctly composed.

One important matter in designing a knowledge management system of an innovation network is, thus, to consider the questions of information quality in different phases of knowledge creation and conversion. Information quality is not an entirely new concept, but it has gained increasing attention during the last few years, particularly in business communities. Making a in-depth inside analysis of information quality in regional innovation networks goes beyond the scope of the present study. The importance of the information quality has, however, to be emphasised in forming knowledge creation and management system for regional innovation networks. Each phase of knowledge conversion should be assessed through an information quality framework (see more Melkas and Harmaakorpi, forthcoming).

The revisited model of a learning cycle including self-transcending knowledge, knowledge vision and considerations about information quality is here given the somewhat humorous but descriptive name of "rye bread model"[2]. The knowledge-creating process reforms the knowledge assets and is steered by knowledge vision from the centre of the model. The knowledge creation occurs in the defined *bas* using the SECI learning spiral and knowledge conversions. The model is depicted in Figure 6.

[2] *The name was given to the first drafts of the model that looked very much like a traditional Finnish rye bread. The descriptive name has so far been retained despite minor changes in the layout of the model.*

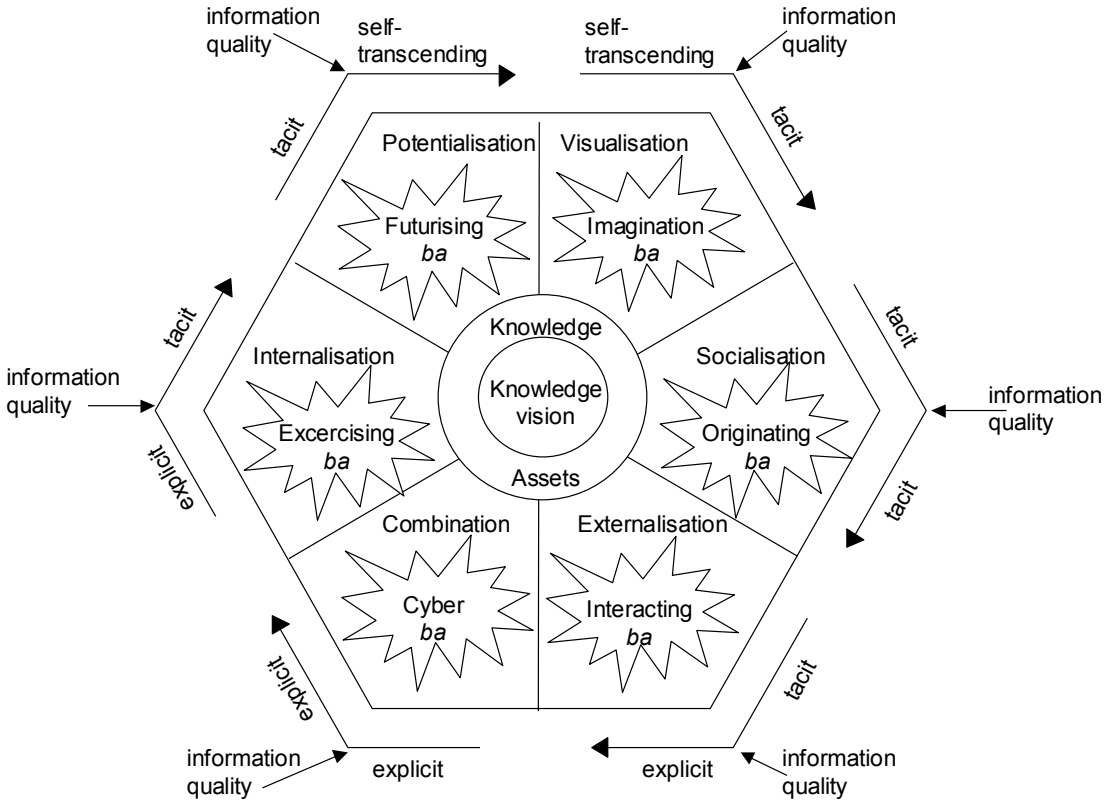

***Figure 6**. The "rye bread model" of knowledge creation (Harmaakorpi and Melkas, forthcoming; Melkas and Harmaakorpi, forthcoming).*

3.6 Networking in Regional Innovation Systems

The sub-national regions are increasingly the real players in the international competition. The regions have to build their prosperity in a new, network-based environment, which Castells (1996, 1997, and 1998) calls "the network society". Being a successful part of the worldwide networks becomes an essential success factor in the network-based society. Accordingly, it is important to be able to develop a creative networked-based regional development

environment in order to increase regional competitiveness in international competition.

Building networks based on strategic partnerships is a strong and visible trend in the new information era. But why do organisations build networks more than before? An important answer is technological development, which has resulted in a new techno-economic paradigm, which is changing the organisational forms in society. This development affects business organisations, as well as, for example, political, governmental, municipal and educational organisations.

The new information era is turbulent by nature. Network-based organisations have proved to be more flexible and elastic than hierarchical organisations. Thus, the constantly increasing pressure in the information era to build flexibility, adaptation, and the ability to react to the changes, and at the same time remaining effective, have led to network-based organisations. This process has been independent of the sector of life. Essential points in this development are continuous change, speed and competition (Ollus *et al.,* 1998).

In the present study, networking is seen as one of the basic forms of social organisations (*cf*. Castells, 1996). The main logic of the ongoing development in the information era, both in a space of flows and in a space of places, is the logic of networking. Networking has been said to be the third alternative for the co-ordination of social action after markets and hierarchies (Thompson *et al*. 1991). As Frissen (1999: 215) says, through information and communication technology, the co-ordination of functions and activities no longer has to be bureaucratic and hierarchical. In the network-based society, the co-ordination of social actions increasingly takes place in networks.

A network-based organisation can be an internally network-based organisation like a decentralised organisation, or it can be formed from independent organisations, which are connected by means of partnerships. In the case of regional innovation systems, the importance of the latter types of organisations is emphasised. In a network-based organisation, each actor has its own role and functions. As Sotarauta (1999: 104–105) suggests, network actors can have different motives for their co-operation. A network can be seen, for example, as a channel, a way to minimise expenses or as a strategic tool. Interactions are expected to be rich. Intended co-operation can take place in setting objectives, forming strategies, producing products and serving customers.

Networks change and eliminate the boundaries inside and between organisations in the regional innovation system. Hierarchies are swept away in order to bring more elasticity and enhance the utilisation of project work (Ollus *et al.,* 1998: 69–72). For the coherence of the network, it is essential that different actors share common values and the different parts integrate as one unit. Actors with shared goals can form efficient networks. The members of an efficient network have different complementary roles and their know-how supplements each other. Essential features of a network are the distribution of knowledge and continuous learning from the other network actors. Active communication supported by swift and smooth information flows facilitate knowledge sharing and learning. (Raatikainen and Ahopelto, 1994; Ollus *et al.,* 1998).

The network-based approach affects the organisation, power structure and culture of the organisation. In an efficient network-based culture, the flow of information has to be fast and open, the confidence level high, and practices elastic and effective. Networking enables the fast flow of information and wide use of expertise in the

organisation. Networking enhances the creation of innovations, especially knowledge-based innovations (Ståhle and Laento, 2000: 21).

Strategic challenges bond actors together and motivate them to co-operate. Networks can be seen, as Ramu (1997) does, as strategic alliances, which can be formed even among competing organisations. A number of theories propose the advantages of networking as a competitive strategy. However, in practice, many failures take place, primarily because one of the partners resorts to "opportunistic" behaviour in which the interest of the network is sacrificed for the interest of only one partner. In order to avoid such failures, organisations forming networks should have mutual trust and a willingness to co-operate in achieving a common goal (Ramu, 1997: 13). The functionality of the network can be described from the point of view of density, frequency, contents, and form of communication. The tradition of communication of the network has an impact on the expenses of co-ordination, production capacity, trust and sharing of common values (Kotter, 1988). Communication also has an impact on the production of know-how, as well as on the creation and diffusion of innovations.

Regional networks offer an interesting ground for a study of political activity and power struggles. The nature of the multi-actor network, lean organisations and diversification of leadership are a fruitful ground for political games. As Buchanan and Badham (1999) believe, the political activity, bargaining and coalition formation only occur when power is widely dispersed, and not when it is centralised at the top. The political perspective on networks comes from the political model of organisations. Networks in the regional innovation systems can be studied as political coalitions. The political model put forward by Buchanan and Huczynski (1997) can be applied to networks. This

model holds that normally there is no all-embracing organisational goal to which all members subscribe, or at least the goals of the actors change during the life cycle of the network. The behaviour of individuals and cliques within organisations can be explained with reference to their attempts to achieve their own unique goals. Typically, those who possess the most power will be the most successful in furthering their interests and achieving their goals (Buchanan and Huczynski, 1997: 672). Moreover, the transmission of knowledge can inherently present problems and network-based co-operation can have an unexpected impact on the organisation culture.

According to Kakabadse (1983), the politics in networks is also about overcoming the problem of resolving situations where different actors bring different values to their work, and consequently do not share common goals or views, but yet must continue to work with one another. In a network, power is shared, which means that power can be used to promote either common or separate goals within the course of interaction (Sotarauta, 1999: 105). In regional innovation networks, the sources of power are “soft sources of power" more easily than in traditional hierarchical organisations. These soft sources of power are, for example, expert power, referent power and information power. The power relationships and rules of the game are more likely to continually change in network-based organisations compared to hierarchical organisations.

Regional development can be assessed as a set of games in a network (Sotarauta 2000a). These games can be seen as a process of moves and countermoves, where the players are out to promote their own aims, or those of some group or the whole region. In the space of flows, there are many skills which the actor has to master to be successful. The successful actors are able to learn new things.

They are innovative. In addition, they can adapt to new situations. In the space of flows, there are certain skills predetermining which actors take the leadership of the networks. The winning actors understand the dynamics of the flows and the network. They also understand the logic and goals of the players of the game better than others.

3.7 Leadership in Regional Innovation Systems

Ylitalo (2000) makes three points on leadership: the essential task of the leader is to create opportunities for other people's success; the key to successful leadership is to know yourself, ability to be yourself and to lead by your own personality; the growing process to better leadership takes a whole lifetime. According to Drucker there may be ”born leaders,” but there surely are far too few to depend on them. He questions also the whole idea of the Weberian charismatic leaders. According to him, leadership must and can be learned. For Drucker, ”leadership personality,” ”leadership style” and ”leadership traits” do not exist. (Drucker, 1996).

The type of leadership needed is always dependent on its actual context, such as time, place, organisation, or tasks. A different kind of leadership was needed in the paper factories of the industrial era than in the lean organisations of the information era. More than anything leadership is a social interaction process, helping a group of people to achieve its goals. This means that leadership, like Kouzes and Posner (1996: 99–119) write, is not a place, but a process. Leadership involves skills and abilities that are useful whether one is in the executive suite or on the front line, as well as whether one is on Wall Street or Main Street. Moreover, the studies by Kouzes and Posner

show that leadership is an observable, learnable set of practices and that leadership is everyone's business.

The changes in leadership are not a cause, but a result. The cause lies elsewhere – with ”the means of production”. Three things, furthermore, shape the kind of leadership required in the information era. These are the speed of change, knowledge-based work and the unbundling of the organisation. In relation to the speed of change Drucker has noted, ”every organisation has to build the management of change into its very structure” (Drucker, 1995). Too many organisations are trying to become flexible and responsive in behavioural terms without recognising how much inflexibility and unresponsiveness is built into their structures and systems (Bridges 1996: 12–18).

The concepts of leadership and management are intertwined and somewhat fuzzy in the literature. On the one hand, leadership deals with establishing direction, aligning people, as well as motivating and inspiring. The actions of leadership produce change, often to a dramatic degree, and can potentially produce extremely useful change. On the other, management deals with planning and budgeting, organising and staffing, as well as controlling and problem solving. The actions of management produce a degree of predictability and order, as well as have the potential to consistently produce the short-term results expected. (Kotter, 1996: 26)

Leaders have to play different roles in development processes. Bennis (1989) characterises the differences of leaders and managers in the following way

- the manager administers; the leader innovates
- the manager is a copy; the leader an original

- the manager maintains; the leader develops
- the manager focuses on systems and structure; the leader on people
- the manager relies on control; the leader inspires trust
- the manager has a short-range view; the leader a long-range perspective
- the manager asks how and when; the leader what and why
- the manager has his eyes always on the bottom line; the leader on the horizon
- the manager imitates; the leader originates
- the manager accepts the status quo; the leader challenges it
- the manager is the classic good soldier; the leader his own man
- the manager does the things right; the leader the right things.

In the present study, the actions of leadership and the actions of management are analysed in the context of regional innovation systems and seen to have the following characteristics:

- the actions of leadership give direction to the organisation, and groups of people; the actions of leadership motivate and inspire doing and bring positive (sometimes dramatic) changes
- the actions of management produce plans and budgets, organising and controls; the actions of management solve problems of doing, make order, produce consistency and forecast doing.

The actions of both leadership and management are needed in regional innovation systems. In this context one has to lead both people and things, as well as structures and processes. In practice, it is difficult to distinguish between the actions of management and the actions of leadership. Leadership emphasises change, getting people involved and committed. Without those the leadership task to create change and something new is very difficult. But management is also needed. Producing changes requires difficult and large projects. Leadership is not enough, but calls for proper management if the

leader has to work with bad schedules, unclear plans of action and lack of control (Buhanist, 2000).

In regional innovation systems leadership in networks, network leadership, must be emphasised. The basic definition of network leadership is that it is an action, which directs all the operations and resources of the network into the desired direction. Management by interaction is one part of network leadership (Kamensky, 2000). The features of network leadership can be found in all fields of social life. Kickert and Koppejan (1997) pointed out that in order to get results network management is dependent on the actors' capacity to demonstrate leadership. It is not only important to create a consensus for a joint course of action between representatives of "corporate organisations", but also to establish support for these ideas within the organisation. Thus, the success and effectiveness of network projects largely depend on the quality of its leadership. Representatives must take risks by accepting new ideas and being prepared to speak up for them in their organisation. Sotarauta (1999: 30) identifies the essential characteristics of network leadership. According to him, network leadership should try to help interaction processes. It should act as a mediator in interaction processes between different actors. In addition, network leadership should direct activities to seek out common goals. Essential features for network leadership are negotiation, communication, persuasion, trade and visionary skills (Sotarauta 1999: 110). The communicative strategy process of a multi-actor and multi-goal environment needs creative and goal searching leadership.

Sotarauta and Viljamaa (2002: 18) suggest that certain abilities are especially important in network leadership in a regional innovation system.

These include the ability

- to involve people and empower them to act as a network
- to make people work to reach joint goals and separate goals and renew the goals in an ongoing process
- to promote interactive processes serving as an intermediary in interaction between actors, as well as steering activities towards seeking goals and enabling co-operation
- to connect various actors to the cluster from their own starting points
- to create and utilise creative tension in development work and create a sense of drama. This means presenting issues so that people become enthusiastic and excited
- to get short-term success so as to sustain motivation
- to form partnerships competently and efficiently utilise informal relations.

The only permanent thing in regional innovation systems is change. The recent change of the techno-economic paradigm creates strong pressures on the socio-institutional structures. There is often inertia in the regional structures to execute the necessary adaptation processes imposed by the changes in the development environment. Special attention in regional innovation systems should be paid to avoiding lock-ins caused by regional path-dependency and on releasing such lock-ins if they have occurred. Grabher (1993) has defined three different types of lock-ins in the regional context: functional lock-ins, cognitive lock-ins and political lock-ins. When preventing lock-ins and trying to find new paths out of lock-in situations, the role of leadership becomes decisive. (Tushman and Romanelli, 1985; Kotter 1986; Beer *et al*., 1990; Mezias and Glynn 1993.) In the case of regional development, the role of leadership in a network-based operating environment is particularly essential.

Change processes involve organisational learning. The increasing pace of change tends to invalidate known answers in organisations,

demanding continuous learning (Dixon, 1994). Knowledge is attained through learning. Learning generates change that can in turn lead to learning, etc. This can lead to continuous learning and development cycles. In a regional context, collective learning is emphasised. Leadership should assist the emergence of interactive learning processes in regional development networks (Nonaka and Takeuchi 1995; Nonaka and Reinmöller 1998; Harmaakorpi, Melkas and Kivelä, 2003).

Borja and Castells (1997) have reflected on which factors successful regional networks have to fulfil. Among these is leadership, which according to them must be capable of organising complex projects, managing conflicts and anomalies, as well as processing and disseminating information worldwide. Stewart (1993) describes leadership in regional development in terms such as information management, choice, flexibility, responsibility and politics. The traditional management can be described using such words as control, standard, stability, parallel, profession and task. Stewart emphasises that the new philosophy is not totally replacing the old one. Both are still needed. The new leadership tries to create a learning and innovative economy in the region, where the leadership includes an active interpretation of signals for change.

Different actors can have different skills, roles and functions in network leadership (Kickert, 1997). In the context of a network, an important role of a leader is the role of an integrator of the functions and operations (Berquist *et al.,* 1995: 42). Leadership is needed in five integrative functions. It must operate in the strategic, tactical, operational, interpersonal, and cultural functions of the network. The relationships between actors in regional innovation networks are more equal and collaborative than is the traditional principal-agent relationship (Frissen, 1999). Thus, network leadership has to handle

complex interaction settings and work with the different strategies of the various actors involved (see also Kickert *et al.,* 1997). Leaders must have the capability to coach, inspire and gain people's commitment. They must also offer personal examples of excellence (Naisbitt and Aburdence, 1990).

Leadership in regional innovation systems is, to a great degree, communication. It is important to create and maintain the communication networks and to be able to access those networks to share and receive information (Minzberg, 1989). According to Thrift (1996), human communication must be emphasised as part of the game, in spite of the strong development in the information and communication technologies.

The traditional management emphasising common visions and strategies does not fit very well with the network-based regional development (Sotarauta and Linnamaa, 1999). Traditional management does not take the split power and learning processes in a loose network sufficiently into account. In regional development, leadership deals with many goals and strategies. According to Linnamaa (1999), network leadership builds a foundation for learning and innovative actions. Good network leadership helps to create a good conversation culture. The dynamics of these innovative and learning network-based structures do not gel with the classical strategic leadership and strategic planning.

When building strategies, the talented players of the network influence the strategy more, in spite of the seemingly equal opportunities of the actors in the process. Some players make attractive moves during the game and make the other players see things the way they themselves see them (Sotarauta, 1999). They are the real leaders of the network. In the development game, a skilled

leader tries to keep the alternatives flexible as long as possible so as to get the most out of the continuously changing situations.

For Judd and Parkinson (1990) (see also Judd, 2000), leadership in a regional context means the capability to use external and local resources. They also stress that leadership functions go with democracy and not against it. In times of change, democratic organisations also need leadership to achieve common goals without coercion, bribery, deception or subordinating personal interests to group needs.

4 COMPETITIVENESS AND INNOVATION POLICIES IN THE INFORMATION ERA

4.1 Resource Based View and Dynamic Capabilities in Regional Development

Scott sets the basis for regional development as follows: “In the light of the present analysis, any rational approach to strategic regional economic planning should no doubt begin with an exhaustive audit of local assets and their developmental possibilities in relation to the acquired competitive advantages of other regions. It should then focus intently on local institution building, paying special attention to the specific tasks and objectives enumerated earlier, and with a main eye always on the search for positive agglomeration economies and an appropriate steering mechanism. However, since every regional economy is in practice an idiosyncratic mix of present resources and future opportunities, there can be little in the way of routine approaches to actual implementation programs. Successful development programs must inevitably be judicious combinations of general principle and localized compromise, reflecting the actual geography and history of each individual region” (Scott, 2000: 116). Regions are, thus, strongly dependent on their history in seeking new trajectories for future prosperity. The current position of a region is a result of the paths and trajectories it has travelled. Therefore, path dependency has to be considered one of the basic elements in regional development (Maskell and Malmberg, 1999). This follows because learning tends to be local. That is, opportunities for learning will be “close in” to previous activities and will be transaction and production specific (Teece, 1988).

This present study takes a resource-based view for regional development. The resource-based view for development has been created for strategies of business organisations, but it can be applied in a regional context, as well. According to the resource-based view, sustainable competitive advantage is mainly based on valuable, rare, inimitable and non-substitutable resources. Every region has a set of these resources. Regional resource configurations include, for example, natural, physical, social, cultural and intellectual resource configurations. Natural and physical resources are still important but their relative importance in building regional competitive advantage is constantly diminishing. Social and cultural resource configurations are closely related to the theme of social cohesion being assessed in Chapter 3.4.

Intellectual resource configurations set the basis for capabilities, competences and core competences existing in the region. Capabilities refer to the region's ability to exploit its resources both tangible and intangible. Capabilities consist of a series of processes and routines that manage the interaction among a region's resources (Javidan, 1998). Furthermore, Javidan defines competences as a cross-functional integration and co-ordination of capabilities. They are a set of skills and know-how in a region. Core competences are the basis on which the success and competitiveness, as well as competitive advantage, are built. Following Prahalad and Hamel (1994) the core competences are stated to be the region's fundamental source of competitive advantage. The core competence is the integration of resources, capabilities and other supporting competencies. That is something that the region can do well, and it is very difficult to copy. (Pulkkanen, Lintuniemi and Harmaakorpi, 2003.)

The regional competitive advantage is based on resource configurations, but these resource configurations have to be renewed

over time in order to keep them competitive. The framework of dynamic capabilities (see e.g. Teece *et al*., 1997; Eisenhardt and Martin, 2000) focuses on the processes aiming to renew these resource configurations over time. At the firm level, dynamic capabilities are defined as "the firm's processes that use resources – specially the processes that integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organisational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve and die." (Eisenhardt and Martin, 2000, p. 1107.)

Long-term sustainable competitiveness is said to lie in resource configurations rather than in dynamic capabilities. Dynamic capabilities are seen not to be idiosyncratic in nature as resources are and, therefore, there are best practices in dynamic capabilities that can be relatively easily imitated. (Eisenhardt and Martin, 2000.) In this study it is seen, however, that there are notably idiosyncratic features in dynamic capabilities at the regional level. This conclusion is supported by the quite different success trajectories among regions with seemingly similar resource bases. At the regional level, dynamic capabilities are defined as the region's ability to generate in interaction competitive development paths in a turbulent environment. Dynamic capabilities aim to reform regional resource configurations based on the history of the region and opportunities emerging from the techno-socio-economic development. Five dynamic capabilities considered to be essential in a networked regional innovation environment are: (i) innovative capability, (ii) learning capability, (iii) networking capability, (iv) leadership capability and (v) visionary capability.

In the regional context, an important success factor is the level of regional innovative capability. Regional innovative capability means the joint innovation capability of the firms and other organisations of the

region. So, it is made up of the innovation capability of not only individual actors, but also of the entire innovation network, which at best can be much more than just the sum of its parts. The regional innovative capability includes many factors, but the most important one is to increase the inner and exterior interaction of the organisations. Regional innovative capability can be defined as a regional innovation system's ability to exploit and renew existing resource configurations in order to create sustainable competitive advantage by innovation activities (cf. Teece and Pisano, 1998).

Interactive and collective learning are emphasised in non-linear innovation processes. Collective learning is a process of dynamic and cumulative knowledge creation, which has many synergy advantages due to its interactive character (Camagni, 1995). Synergic advantages emerge because of knowledge spillovers and increasing trust in the collective learning process. The intensive process of interaction is included in the creation of new knowledge (Nonaka and Takeuchi, 1995), (Nonaka *et al.,* 2000). Following the teachings considering the concepts of learning economy and learning regions, regional learning capability can be defined as a regional innovation system's ability to create and manage knowledge in a collective, interactive and cumulative learning process leading to new settings of resources, competences and skills.

Networking is suggested to be the hegemonic way of organisation in today's world. Actors of regional innovation system take part in different kinds of networks. They can be very different in their nature needing different kinds of capabilities of the actors. These innovation networks are formed by the actors with different backgrounds. The decisive success factor in these networks is the actors' ability to interact leading to considerations about social cohesion in the networked environment. Essential features of the network are the distribution of knowledge and

continuous learning from the other actors of the network. Regional networking capability can be defined as a regional innovation system's ability to build interactive networks including field-specific creative social capital leading to effective utilisation of the resource configurations in the networks.

The turbulent environment of the regions and their tendency to be strongly path dependent leads to natural inertia in regional development. The inertia in the socio-institutional adaptation process might lead to unwanted regional lock-ins. The role of leadership capability becomes decisive especially when preventing lock-ins and trying to find new paths out of lock-in situations. (Kotter,1988; Sotarauta, 1999.) In the case of regional development, the role of leadership in a networked environment is particularly essential. Leadership capability in a networked regional development environment can be defined as a regional innovation system's ability to effectuate actions steering the processes and resources of the system in the desired direction and avoiding harmful lock-ins.

The world economy meets shifts in the techno-economic paradigm in certain cycles caused by leaps in technological development and even inside a cycle the business environment can be turbulent. The success of economic actors is strongly related to their adaptability to the emerging techno-economic environment. The regions are strongly dependant on their past and have to continuously make new decisions during the ever-reigning insecurity. Regions should be able to build development strategies in the quickly changing world where setting solid and rigid goals in the present turbulent world could be difficult and even dangerous (cf. Baumann, 1993). The insecurity in a regional innovation system can be reduced by the creation of future orientated knowledge and visionary capability. In this context visionary capability refers to a regional innovation system's ability to outline the possible

potential development trajectories based on paths travelled and utilising the opportunities emerging by the changing techno-economic paradigm.

The system of resource configurations and dynamic capabilities in regional innovation system is depicted in Figure 7. The thick arrow between resource configurations and dynamic capabilities describes the strong relationship between them. The arrows between different dynamic capabilities describe both interaction between them and their partly overlapping character. Leadership capability has a steering nature on visionary, learning and networking capabilities. Innovative capability is aided by other dynamic capabilities to increase innovativeness in the regional innovation system.

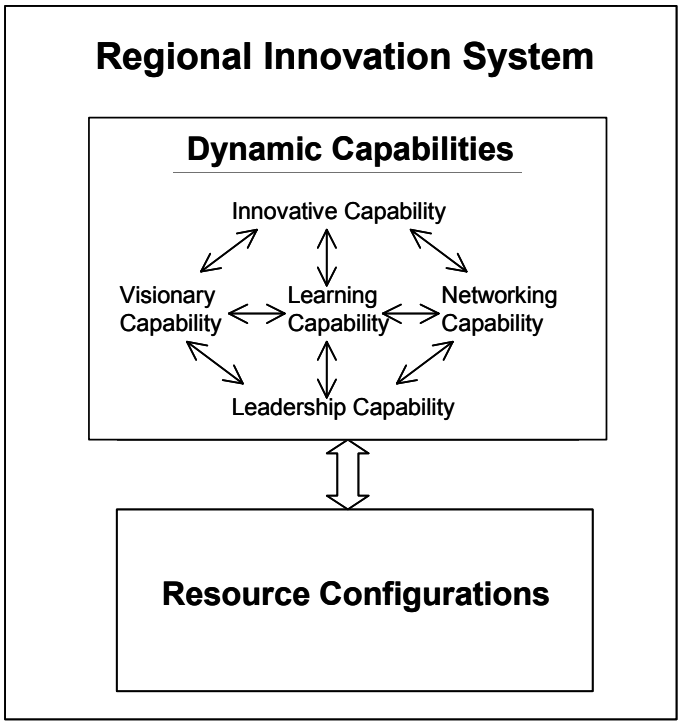

***Figure 7**. Resource configurations and dynamic capabilities in a regional innovation system.*

Thus, the competitive advantage of a region greatly depends on its innovation, learning, networking, leadership and visionary processes, shaped by its (specific) asset position, and the paths available to it (cf. Teece *et al.,* 1997). The processes should lead to building regional capabilities, competences and core competences based on regional resources, in order to enhance productivity and innovativeness (cf. Prahalad and Hamel, 1990; Javidan, 1998; Teece *et al.,* 1997; Sotarauta, 2000a) leading to sustainable absolute regional competitiveness.

4.2 Regional Innovation Policy in the Information Era

The regions have changed from being objects of state-led regional policies to the subjects of competitiveness policies, where their own role and responsibility has increased. In the new multi-level governance structure, the regions meet a new kind of process and programme-based environment (Vartiainen, 1998; Sotarauta, 2001), where they are expected to take initiatives to build absolute competitive advantage for themselves. Questions of regional competitiveness policy are possibly, however, still more disputable than those of regional competitiveness itself. The main reason for this dispute is the diverging views on the efficiency of the policies versus free market actions in the economic performance.

According to Krugman (1998), executing competitiveness policies at the territorial level leads to incorrect interventions in markets resulting in detrimental allocations of resources leading to neo-mercantilism. Krugman warns that new kinds of territorial competitiveness policies lead to wrong kinds of policy measures causing disturbances in fair resource allocation of free markets. That might be the case in a perfect market situation, but as was stated earlier, perfect markets are

a rare exception. There is a clear tendency toward imperfect market conditions due to the complexity of the world economy (Hämäläinen, 2003). Market imperfections and failures are increasingly frequent, The consequences might be eased with the right kind of competitiveness policies, which do not hurt the market mechanism and fair resource allocation.

One worry of Krugman and his colleagues is the possible zero-sum game between the competing regions. The regional economic development policy efforts are said to be neutralised by the markets and have only a negative influence on the economic performance. This is, however, not the case since (Camagni, 2002: 19):

- competitiveness reached through territorial quality and public service efficiency brings benefits to all local economic activities, both originating from inside or from outside
- competitiveness reached through spatial specialisation means widening roles for complementary specialisations, developed in complementary territorial contexts
- competitiveness reached creating local synergies among actors, or integrating and embedding external firms into the local relational web, exploits technological and organisational spill-overs and generates increasing returns that are at the very foundation of economic development, in its generative sense.

Scarce regional development resources and the advantages of agglomeration economies create a need for regional specialisation. What kind of demands does this fact place on the regional competitiveness policy? Regional competitiveness relies on regional resource configurations, but how should regional policy-makers be able to choose the most potential resource configurations in which to specialise. This is the constant contradiction between the teachings of evolutionary economics and actual need of regions to specialise.

Porter argues strongly against the picking winners policies of governments, even if his main arguments refer to building successful regional agglomerations and clusters. ”... the aim of cluster policy is to reinforce the development of *all* clusters. This means that a traditional cluster such as agriculture should not be abandoned; it should be upgraded. Government should not choose among clusters, because each one offers opportunities to improve productivity and support rising wages. Every cluster not only contributes directly to national productivity but also affects the productivity of *other* clusters. Not all clusters will succeed, of course, but market forces – not government decisions should determine the outcomes.” (Porter 1998: 89.) Porter stresses further that most clusters form independently of government action – and sometimes in spite of it. Porter comes with these suggestions very close to the point of view taken in the evolutionary economics, which strongly emphasises the spontaneous emergence of new clusters and industries due to changing events and increasing returns (Boschma, 2003).

Benchmarking has become a popular way of building regional policies. Benchmarking is used to find best practices in order to promote the regional competitiveness. According to the reasoning in evolutionary and institutional economics, benchmarking as a basis for regional competitiveness policy is unsustainable, because any best practice depends on the specific context in which it is applied. This implies that imitation of a best practice that contributed to success in one region may be detrimental for another region, because of the mismatch between the new ways of acting and the existing structures and routines. Benchmarking is, however, not useless when it is done correctly: the process of successful policy learning and policy perfection needs to combine benchmarking with insights of systemic and idiosyncratic characteristics of regional economies. What appears as a good practice in one systemic context might be less so in

another, but learning from success stories might help to design an effective policy for a region.

Regional competitiveness policies should take a new form. If they resemble the old-fashioned industrial policies with picking winners policies, subsidies and restrictions, they most probably lead to the undesirable results feared by Krugman. But if they, however, are based on promoting productivity and innovativeness by forming institutional settings that enhance things like collective learning, social cohesion, co-operative activities and visionary processes, they should lead to an overall increase in the wellbeing of citizens. Regional competitiveness policy ought to be governance rather than government; its role should be the facilitators rather than the governor's role. Accordingly, the policy measures used should target the soft factors of competition (e.g. identity, culture, institutions) rather than the hard factors (e.g. relative wages or tax levels) (Boschma, 2003; Storper, 1997). Regional competitiveness policies should be based on a constant audit of resource configurations and their continuous reconfiguration in order to respond to the challenges caused by the changing techno-economic paradigm.

In this present study, innovation policy is seen to be the most important sector of regional competitiveness policy. Innovations are the most essential factor in promoting regional productivity, which in the long run secures the absolute competitiveness and wellbeing for the citizens of a region. Earlier, the innovation policies have been very much equivalent to the science and technology policies emphasising the science push effect in creating innovations. However, the causality between science and innovation has proved to be weaker than expected (Schienstock and Hämäläinen, 2001) creating a demand to foster other sources of innovation.

The system approach is not only a tool for studying innovation processes, but also a conceptual framework for innovation policies and strategies (Edguist,1997: 16). The system approach recognises that different parts of the innovation process may become bottlenecks in the successful development of new products and processes leading to many kinds of systemic failures (Schienstock and Hämäläinen, 2001; Lundvall and Borrás, 1999). All such failures are potential targets of regional innovation policies and strategies (OECD 1998). Schienstock and Hämäläinen (2001) suggest that a system approach-based, network-facilitating, innovation policy is the modern way to enhance the regional innovation environment. The network-facilitating innovation policy pays particular attention to the communication, co-operation and networking processes among firms and support organisations aiming to tackle all areas of systematically weak performance in the regional innovation system.

An important aspect in building regional innovation policies is understanding the multilevel governance nature of the development environment. Regional innovation policy is always a mixture of activities at different levels of governance. The co-ordination, or flexible co-ordination, of these activities should be effectuated at the regional level. The regional actors – often representing the different levels of governance – should be able to form a shared vision of the goals and activities to be achieved in order to increase regional innovativeness. Building a vision as firms do might be difficult at the regional level, but the aim should be to create a portfolio of visions and a portfolio of strategies coherent enough to make it possible for the development to go further in favourable times (Harmaakorpi and Niukkanen, 2002).

The rapid techno-economic development, systemic and complex nature of innovation processes and multi-level networked

development environment placed special demands on innovation policy activities. Innovation policies and strategies are designed and implemented in an environment, where different actors and coalitions are striving to further their interests, where there is always a great risk of lock-ins because of the natural socio-institutional inertia caused by the shift in techno-economic paradigm (see Harmaakorpi and Niukkanen, 2002) and where many activities take place at different levels that cannot really be co-ordinated. Such an environment is crying out for innovation policy tools that foster the visionary, leadership, networking and learning activities in the process of designing and implementing innovation policies and strategies. These tools often need to utilise new interactive methods and new terminology to be able to create new prosperous development paths based on the potential resource configurations in a region.

When planning the sunrise regional innovation strategies and policies, and the tools helping the regional innovation system to improve, the following aspects should be emphasised:

- understanding the effects of the changing techno-economic-paradigm on the regional innovation environment
- understanding the phenomena of regional path-dependency and agglomeration
- avoiding regional lock-ins
- defining competitive regional resource configurations
- creating multi-actor innovation networks to exploit the resource configurations
- enhancing the absorptive capacity of the innovation networks
- creating sufficiently creative social capital
- promoting regional dynamic capabilities, for example, innovative, learning, networking, leadership and visionary capabilities and
- understanding the multi-level governance environment in forming innovation policies and strategies.

5 THE REGIONAL DEVELOPMENT PLATFORM METHOD AS A TOOL FOR REGIONAL INNOVATION POLICY

5.1 The Concept of the Regional Development Platform

There are some conceptual approaches based on the positive externalities achieved by agglomerations and networking. The phenomena can be assessed at least by the following approaches: (i) industry approach, (ii) cluster approach, (iii) technology trajectory approach and (iv) development block approach. Below a brief look is taken at the concepts mentioned and a new concept is introduced to this discussion: regional development platform. An attempt is also made to explain why the regional development platform approach is seen, at least in some cases, as a sound way of assessing regional development potential.

The industry approach, in spite of its limitations, is still maybe the most frequently used in practical development discourse due the clarity of the concept. Industries can be seen as groupings of firms having the same position in the production chain. Other companies in industry are seen as rivals and co-operation among competitors is rare. The industry approach neglects the importance of interaction between industries and between firms and public organisations. Clusters, on the other hand, can be defined as geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass linked industries and other entities important to

competition. They include, for example, suppliers of specialised inputs such as components, machinery and services, as well as providers of specialised infrastructure. Many clusters include governmental institutions that provide specialised training, education, information, research and technical support. (Porter, 1998.) The cluster approach emphasises the common interests of a cluster in enhancing productivity and competitiveness. Clusters are continuously seeking new synergies and combinations.

The technology trajectories approach, again, is based on the importance of path dependency in firms' development trajectories (see Nelson and Winter, 1982; Dosi, 1988). Path dependency places limitations on the available future trajectories of a firm, because learned routines are often deeply embedded in an organisation. The innovation activities are quite similar among firms in the same technological sector. This indicates that the factors related to technological trajectories play a notable role in innovation processes (Carlsson and Stankiewicz, 1991; Carlsson, 1995) and, therefore, positive externalities can be achieved easier in the groupings of firms belonging to the same technological regime. Related to the technology trajectories approach, the concept of development block refers to "a sequence of complementaries which by way of series of structural tensions, i.e. disequilibria, may result in a balanced situation" (Dahmén, 1988: 5).

The regional development platform approach has somewhat different characteristics than the previously mentioned approaches. It has its intellectual roots in the frameworks of regional innovation systems and evolutionary economics. The concept of a regional development platform is strongly bound to the institutional set-up of a region and can, therefore, be a useful tool in exploring existing business potentials in manifold regional resource configurations. The concept of regional

development platforms is related to the concept of clusters. However, regional development platforms aim to describe the potential to form future regional clusters of the existing resource basis rather than describe existing clusters. Regional development platforms can be defined as regional resource configurations based on the past development trajectories, but presenting the future potential to produce competitive advantage existing in the defined resource configurations. Possible competitive advantage is based on the business potential of the actors working for the platform. The actors of a regional development platform are the firms, technology centres, expertise centres, research centres, education organisations, etc. contributing to the defined development platform. A regional development platform must be separately defined each time. A development platform is often based on an industry, area of expertise or future megatrend or combination of those. A development platform is connected with the past trajectories, but the concept describes the future potential of the platform. Technological development may create totally new platforms. However, they are usually based on the accumulated work done on the existing platforms.

5.2 The Regional Development Platform Method

In this present study, the Regional Development Platform Method (RDPM) is presented as an institutional and social innovation and a tool for a regional innovation policy. The tool is based on the resource-based view of regional development, but has been planned to make a region sensitive to adapting to the changes in the techno-economic paradigm. Another central basis of the tool is the recognition of the networked regional development environment. Particular attention is paid to the interactive manner of designing and running the regional innovation system. All the phases of the method are planned so they

can be conducted in a networked interaction where participation is possible, without forgetting the importance of the leadership role in the process. But first and foremost, the statements given at the end of Chapter 4 were guiding the planning process of the Regional Development Platform Method.

The Regional Development Platform Method helps to look for regional business potentials on which it is possible to build the future competitive advantage of a region. The dominating idea in developing the Regional Development Platform Method has been the importance of the individual regional development paths in designing development strategies. The strategies should be based on a thorough assessment of regional resources, capabilities and competencies, and future possibilities leading to business potentials able to give a region competitive advantage (Teece *et. al*., 1997; Scott, 2000; Harmaakorpi and Pekkarinen, 2003). An essential part of the method is the core process thinking, which is designed to form innovation networks aiming at exploiting the business potentials existing in the regional development platforms. Moreover, the Regional Development Platform Method can be seen as a network leadership tool helping the regional actors to interact during the development process and helping to promote social capital and dynamic capabilities in a region.

In Figure 8, the principle of industries and areas of expertise forming resource configurations in the Regional Development Platform Method is presented. Areas of expertise are formed by skills, capabilities and competencies considered to be important independent of industry. Industries are marked in the column and the areas of expertise chosen for each individual study are marked in the rows. The Regional Development Platform Method aims to define business potentials able to give regional competitive advantage based on the industries, areas of expertise and especially on their combinations.

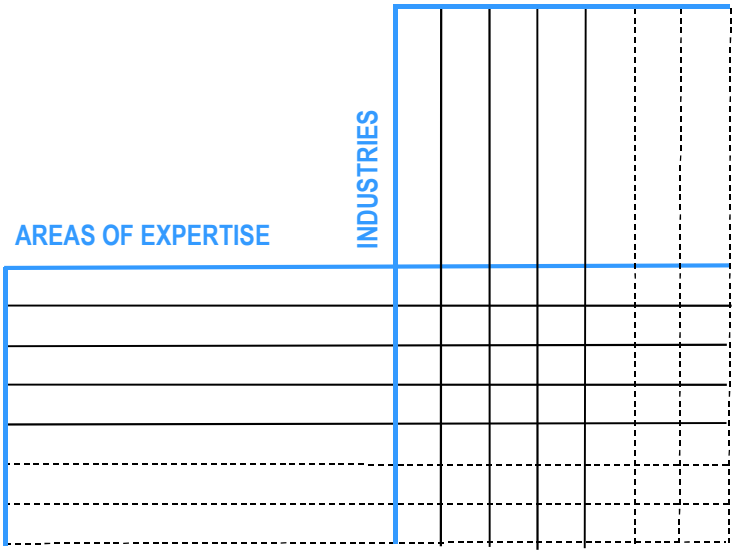

***Figure 8**. Principle of Industries and Areas of Expertise in the Regional Development Platform Method. Industries are marked in the column and the areas of expertise chosen for each individual study are marked in the rows.*

Some central criteria occur when assessing different industries as part of the regional development platform method. Such criteria help to evaluate the industries' potential for the region. These criteria are, for example: the growth potential of the industry, the quantity, quality and structure of the industry, internationalisation of the industry, the innovativeness of the industry, the ability of the management in the industry, the quantity of the research conducted in the region, the quantity and quality of the education given in the region and the ability of the technology transfer organisations in the region. The following criteria can be used when assessing the areas of expertise in the region: the quantity and quality of the knowledge intensive business services (KIBS), the innovative capability of the expertise, the interregional networks of the expertise, the quantity and quality of the education given in the region and the ability of the technology transfer

organisations in the region. As social capital can be seen as an increasingly important regional resource (see Tura and Harmaakorpi, 2003), the assessment of it in different regional development platforms should also be included in an advanced analysis.

The Regional Development Platform Method consists of eight phases:

- analysis of the changing techno-socio-economic paradigm and benchmarking through the assessment of regional innovation system theories and conventions,
- background study of the industries and areas of expertise in the region,
- expert panels,
- assessment of future scenarios,
- definition of potential regional development platforms,
- conceptualisation of the regional innovation system,
- search of core processes of the regional innovation system and
- definition of the knowledge creation and management system.

Business is adaptation, even at the regional level. Therefore, it is essential to understand how the surrounding world is changing. The roles and positions of a region and its actors are constantly changing providing opportunities for new future paths: a region must be sensitive to those changes. Therefore, one cannot overstress the comprehension of the changing techno-economic paradigm. It is also important to learn from the past, compare what has been done in other regions, and try to do some benchmarking. Even though each region is an individual case, it is worth trying to find which practices might best suit one's own region. A study of the mainstream theories and conventions of the regional innovation system gives a good basis for assessment of best practices. This first phase of the Regional Development Platform Method should be effectuated in interaction between the designers and the main players of the innovation system in order to form a sufficiently

shared vision and shared goals, or social capital, for the development network.

The background study of the industries and areas of expertise gives an idea of where the region currently stands. The main information source is the statistical data available. Supplementary information can be obtained, for example, from various reports and analyses. It is important to compare the information on one's own region with that of other regions to be able to get an idea of how the region is doing in competing with other regions.

Further on, there is often much tacit knowledge about the resource configurations in the region. Tacit knowledge cannot be found in the statistics or reports, for example. Therefore, it is valuable to organise expert panels to obtain the “hidden” information. Such a panel can be organised by inviting groups that have a broad overview of the business life in the region (see more Harmaakorpi and Pekkarinen, 2002). However, this phase is not just important for finding the tacit knowledge of the regional resource configurations. Its meaning is as important for regional collective learning, networking and building of social capital and shared vision. This phase provides a good basis for the later interactive visionary contemplations.

The rapid technological development in the innovation-driven society is constantly changing the regional business environment. Old technologies and methods are dying and new ones springing up. Therefore, it is essential to look at the future. Some potential resource configurations for the region, according to the statistical information, could be in great difficulty under the future technological trajectories. On the other hand, some seemingly weak platforms could provide a good basis for prosperity in the future taking into account the opportunities of some new technologies. Among development trends

that could be exploited in the future are, for instance: (i) change in material technologies, (ii) urbanisation, (iii) ageing of the population, (iv) increasing environmental awareness, (iv) changes in energy production, (v) increased use of biotechnology, (vi) change in production systems and methods, (vii) virtualisation and digitalisation and (vii) wireless data transfer. Each of these megatrends should be reflected in the regional entrepreneurial activity and the resource base of the regional innovation system in order to create new paths bringing regional competitive advantage. This phase should be effectuated in interaction between the main actors of a region using, for example, futures research methods, like the Delphi method (see, for example, Masini, 1993; Webler *et al.*, 1991; Woudenberg, 1991; Helmer, 1983; Cho, Jeong and Kim, 1991). Conducting futures research as an interactive process increases the regional visionary capability remarkably.

The fifth phase is to define the potential development platforms in the region. It is based on the statistical and empirical information including the futures research results. The analysis is concerned with comparing the statistical data with the empirical data gathered by the expert panels to see if the statistically promising industries also seem to have potential from the point of view of the panellists. The most challenging part of the process is to find promising combinations of industries and areas of expertise while taking into account the opportunities offered by the visible technological development. The aim is to find the most fruitful regional development platforms where the scarce resources are put to good use in order to create regional prosperity. The view in this present study is, however, very Porterian in the way that all the possible development platforms should be promoted and the markets should perform the task of choosing, which ones survive and prosper (Porter, 1998). However, the scarcity of regional resources sets, in

practice, strong limitations on regional innovation policies forcing them to prioritise the development incentives.

The sixth phase aims to conceptualise the regional innovation system. The concept of the regional innovation system is often fuzzy among the regional decision-makers and developers disabling a proper communication of the developed subject. This phase is important in building a certain level of shared understanding of the environment where innovation policies are conducted. The fuzziness of the understanding of the regional system often leads to decreasing social capital making it impossible for regional dynamic capabilities to evolve. A shared vision is especially important due the actual programme and process-based development environment, where manifold strategies and programmes simultaneously affect the regional development environment. The roles of the players, strategies and programmes should be defined at least at a general level. This phase could be called the “institutional resource configuration”. The institutional framework created is important in both intra-regional and inter-regional communication.

The seventh phase of the Regional Development Platform Method is the definition of the core processes of the regional innovation system, which are defined as processes aiming at exploiting the potential existing in the defined development platforms and enhancing dynamic capabilities and creative social capital in a region. The aim is to create and develop regional core competencies bringing sustainable competitive advantage to a region. The core processes are based on the identified potential development platforms in a region. They can also include some phenomenon or future megatrend seeming to bring business opportunities for the firms in the region. They must be defined by the main actors of the region, and the actors must also be willing to invest resources to develop the core processes. The core processes

include thematic or sectoral regional innovation networks where the central objective is collective learning.

The core processes must fulfil certain conditions:

- important regional enterprises must be among the exploiters of core processes,
- the core process must be able to create new business activity,
- there must be strong enough actors for each sector of the core process,
- it must be possible to name responsible organisations and people for each sector of the core process,
- the actors of the core process should be able to agree on common goals and a course of action,
- the actors of the core process should be able to name a credible "owner" for the process.

The role of the core process thinking is absolutely central in the Regional Development Platform Method. It lays the real foundation for the concrete actions in running the regional innovation systems after the most potential regional development platforms are defined. The potential regional development platforms based on the core processes as new institutions make it possible to prevent and unlock the possible lock-ins, as well as lead the way to new regional paths. The aim is also to create innovation networks with enough critical mass allowing the benefits of agglomeration to take place. The core processes form the basis for the development of bonding social capital in the thematic and sectoral innovation networks. These networks have their foundation in the regional innovation system, but they must be allowed to be developed independently from the fetters of the regional system whilst paying attention to the surrounding networks and using the opportunities given by the multi-level governance structure. Only if the core processes possess enough bridging social capital can they

develop sufficient absorptive capacity and avoid harmful lock-ins caused by collective blindness.

In Figure 9, a principle of a core process formed by a combination of industries, areas of expertise and future megatrends is described.

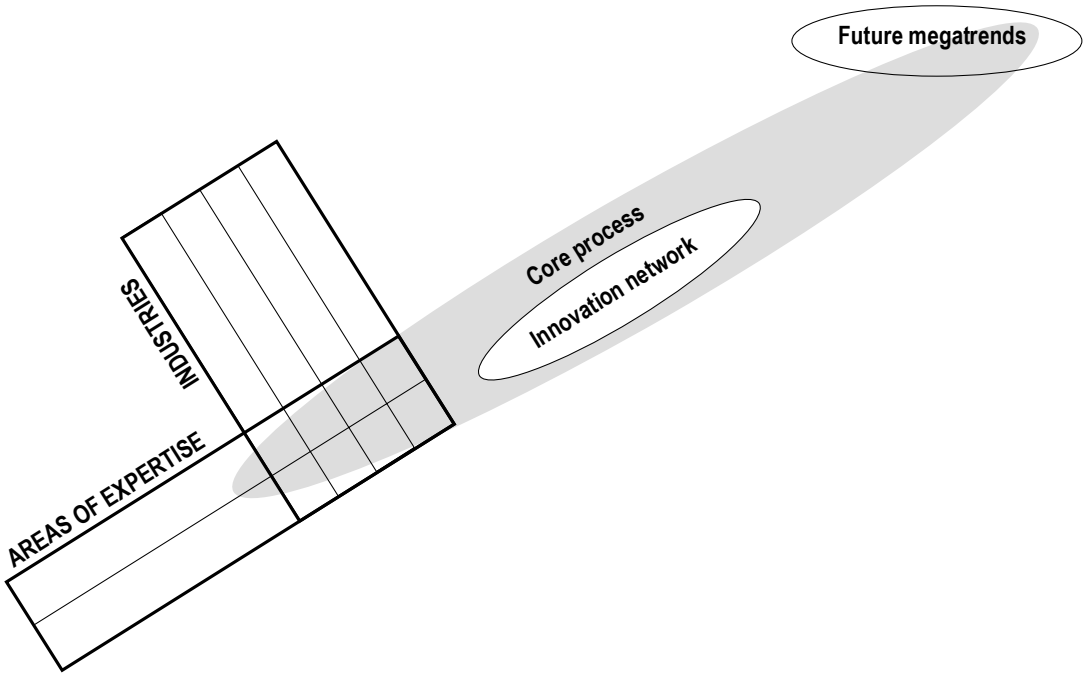

***Figure 9**. Principle Description of a Core Process. The core process exploits the potential formed by regional resource configurations and future megatrends. An essential part of the core process in the multi-actor innovation network.*

The core process thinking was said to be a central part of the Regional Development Platform Method by forming regional innovation networks on the basis of potential regional development platforms. However, although clustering and networking are important factors in creating regional competitive advantage, the real

competitive advantage of regional innovation networks is based on their ability to create knowledge in a collective and interactive learning process. These processes seldom occur totally spontaneously and they need to be aided by regional policy measures. Therefore, special attention should be directed at knowledge creation and management at the regional level. That task is fulfilled in the last phase of the Regional Development Platform Method where a concrete tool (the rye bread model) for knowledge creation and management in the core processes of the regional innovation system is applied.

The rye-bread model is essential in ensuring collective knowledge creation and innovation processes really to take place in the founded innovation networks. It is a tool for network leadership par excellence. The model has a strong emphasis on the future oriented knowledge creation enabling future trajectories to emerge in a region. Thus, the rye-bread model is indisputably enhancing the regional leadership, visionary, learning, networking and innovative capabilities. It is also a worthy tool for fostering the regional creative social capital.

One special task of the core process and the rye-bread model is to enable better co-operation between knowledge generation and diffusion sub-system and knowledge application and exploitation sub-system (Autio, 1998: 133–134) in regional innovation generation by bringing together the actors of both sub-systems in the same knowledge creation and innovation process.

6 CASE STUDY: APPLYING THE REGIONAL DEVELOPMENT PLATFORM METHOD IN THE LAHTI REGION

6.1 The Lahti Region and the Reasoning Behind the Application of the Regional Development Platform Method

The Lahti region is situated in Southern Finland, about 100 kilometres from Helsinki. The region comprises twelve municipalities, and has about 200,000 inhabitants, equivalent to four percent of the Finnish population. The population of the Lahti region doubled from 1940 to 1975. The Lahti region population slowly decreased from 1992 to 1999, but began to increase again in 2000.

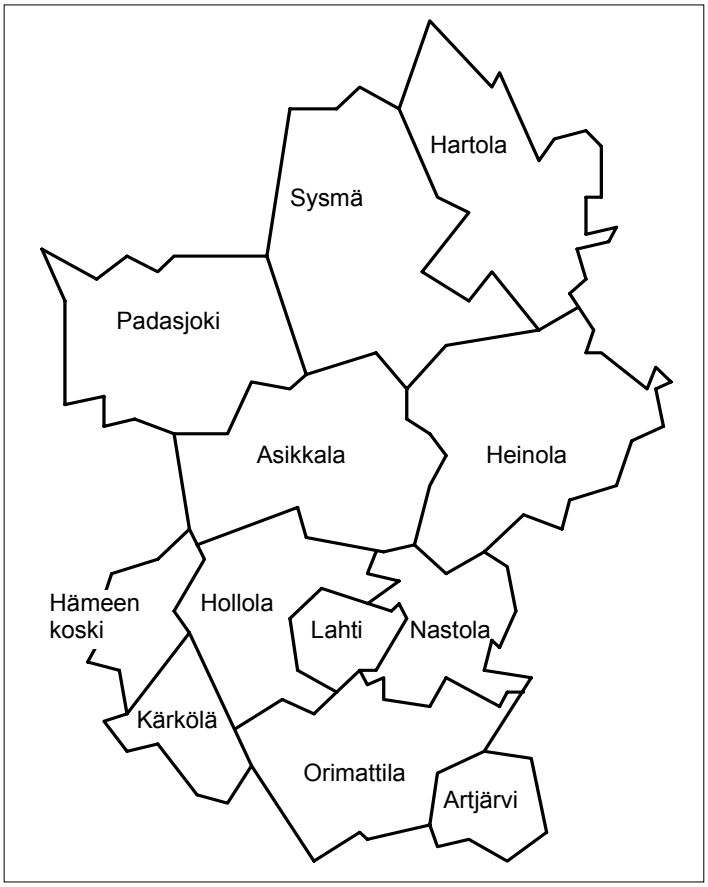

***Figure 10**. The municipalities of the Lahti region.*

The geographical and functional centre of the Lahti region is the city of Lahti with about 96,000 inhabitants, making it the seventh largest city in Finland. Among the municipalities in the Lahti region, the differences in, for example, surface area, population density, and industrial structure are considerable. The population and industries, especially manufacturing, are concentrated around the cities of Lahti and Heinola. The rest of the region is characteristically rural and is sparsely populated.

The Lahti region has a favourable geographic location. The traffic connections between Lahti and Helsinki improved as the Lahti–Helsinki motorway was completed in autumn 1999. The Finnish Government has decided to build a new, direct railway connection between Lahti and Helsinki. The travel time from Lahti to Helsinki will be about 50 minutes instead of the current 95 minutes. The construction began at the end of 2002 and the new railway will be in service in 2006.

Figure 11. *The geographical position of Lahti.*

The Lahti region was strongly affected by the collapse of the Soviet Union and the deep economic recession in Finland in the early 1990s. In 1990, there were 90,370 jobs in the Lahti region. The number of jobs dropped over the next couple of years, so that in 1993 there were fewer than 70,000 jobs in the Lahti region. Since then the number of jobs has slowly increased, and there were about 79,000 jobs in 1999.

In 1989, the unemployment rate in the city of Lahti (reflecting the whole Lahti region) was 3.8 %. Since then the number of unemployed rapidly increased, and five years later, in 1994, the unemployment rate was

26.8 %. Over a few years, the number of employed people decreased by over 20,000 in the Lahti region. Since 1995, the situation has been slowly improving. In March 2002, the unemployment rate was 16 %. Most of the unemployed are from industrial occupations. The region has traditionally been characterised by the manufacturing industry, and Lahti has suffered from the structural changes in the industry. There were considerable losses in the core manufacturing industries, that is, metal, textile and clothing, food and beverages, and wood.

The increased value of production in all industries was 2,400 million euros in 1989 (in 1995 prices). It was at its lowest in 1992, 1,900 million euros, and in 2000 it was 2,500 million euros. The increase in value is estimated to rise to over 2,600 million euros by 2004. During the recession of the 1990s, the value of production decreased, especially in the mechanical engineering industry and other manufacturing industries (e.g. the furniture industry). Production also decreased in the textile and clothing industry. The value of information communications, on the other hand, doubled its rate of growth from 1988 to 1999.

With a relatively high unemployment rate and a status as a declined industrial area, the Lahti region is one of the European Union Structural Funds Objective Two regions. The Lahti region will be eligible for Objective Two support measures until 2006. Public funding for Objective Two in the Lahti region will total 149.4 million euros in 2000–2006. EU funding will amount to 59.9 million euros and Finnish Government funding pledged for the programme will exceed 69.0 million euros.

By the end of the 1990s, it had become quite clear in the Lahti region that the region was having difficulty moving from the industrial era to the information era. Following the collapse of the national economy

at the beginning of the 1990s, the unemployment rate, in particular, has remained very high. Neither has industrial modernisation been sufficiently successful. Irrespective of the fact that Lahti is situated only 100 km from Helsinki, which is one of the most dynamic economic centres in Europe, Lahti has not been able to create enough employment in the knowledge-intensive sectors in the area.

Among the main problems in the Lahti region are the low number of highly educated people and the exceptionally low research and development spending in the region. Tertiary enrolment in education in the region was 38 per cent of the age group in 2000. The average in Finland was 66 per cent. In the Lahti region, the research and development expenditure was less than one per cent of the Finnish total when the Lahti region's population was about four per cent of the total national population. In 2000, the research and development spending in the Lahti region was about 280 euros per person, while Finland's average was about 890 euros per person. Furthermore, the gap between the different regions in the country is growing constantly. The amount of the National Technology Agency (Tekes) funding in the Lahti region grew 40 per cent during 2000–2002 while the corresponding average growth in Finland was 60 per cent. The low contribution to education and research retards business development in the Lahti region.

The Lahti region has been lacking the features producing science-based innovations as the source of regional competitiveness, productivity and economic growth. The regional competitiveness should originate from some other kind of innovation activities. Due the strongly industrial history of the Lahti region, it has been predicted that the region might be able to form competitive resource configurations based on the traditional industries and the regional areas of expertise if these resource configurations were modernised

and the demands of the changing techno-economic paradigm were taken into account. There was a clear need for new development tools and new socio-institutional arrangements so as to create new paths for regional development. The Regional Development Platform Method was considered suitable for developing the regional innovation system in order to define the most potential regional configurations, and enhancing the dynamic capabilities leading to the effective exploitation of these resource configurations.

In a small country, like Finland, it is necessary to ask whether a region is the right level to tackle such questions (see e.g. Bathelt, 2003)? Or should a region be developed as a part of national innovation system in order to guarantee the maximum use of scarce development resources? Even if the national innovation system's role is strong in Finland and it has a remarkable effect on regional innovation systems, it does not seem to secure development at the regional level. The disparities between the regions have been expanding due to the incapabilities in the national innovation system and the lack of adequate regional innovation policy tools – tools to enhance resource based and dynamic collective innovation processes including sufficiently creative social capital. Sub-national regions in small countries also seem to be in danger of declining if they do not try strongly to aspire to promote their regional innovation system from the local point of view. The development should, however, take place in the spirit of multi-level governance in which the resources and guidance of national and supranational level are used as part of the process.

6.2 Exploring the Potential Resource Configurations

The first six phases of the Regional Development Platform Method (RDPM) were implemented in the Lahti region in 2001–2002 (see more Harmaakorpi and Pekkarinen, 2002). As a first phase, a thorough analysis of the present and changing techo-socio-economic paradigm and theoretical assessment of regional innovation system theories and conventions was made. The assessment included a wide study analysing the values and attitudes of the regional decision-makers concerning the development environment and the regional circumstances in which the regional innovation system had to be developed (see more Harmaakorpi and Niukkanen, 2002).

In particular the study tried to tackle the level of

- understanding of the reigning techo-economic and socio-institutional paradigms
- shared vision of the substance areas to be developed in a regional system
- shared opinion of the development methods and evaluation of the development

in the Lahti region.

A questionnaire measuring overall attitudes, opinions and ideas about regional networks and working methods was used in the study. The questionnaire was sent out on 17 April, 2001 to 360 actors in the Lahti region 155 of whom responded. The response rate was 43 %, which might be considered rather good. The respondents were decision-makers and developers from the different public and private organisations, as well as politicians, in the Lahti region.

The main results of the study were as follows:

- the respondents had noticed the new demands of the information era
- the respondents thought the ways of acting in the region were incompatible with the new era
- opinions regarding funding the regional development process were not very unanimous
- although development of the regional innovation system was seen to be important, only a minority of the respondents knew about the initiating development process and were committed to it.

There had not been a proper science, technology and innovation policy in the Lahti region. This had resulted in a somewhat random formation of the regional innovation environment, making a strong need for conceptualisation and development of the environment. The relatively good level of understanding of the demands of the information era laid a good foundation for the development work and the concession that the regional ways of acting were very much incompatible made it clear that new development tools were needed. It was also clear that the developed tool had to be helpful in regional network leadership and had to be transparent and interactive enabling the creation of sufficient shared vision and creative social capital in order to exploit regional resource configurations and foster regional dynamic capabilities.

As a second phase all the possible statistical and qualitative information concerning the industries and areas of expertise in the Lahti region was gathered. The information consisted of statistical information and various reports. In this present study, the information gathered concerning the plastics industry, which appeared to have the most potential in the Lahti region according to this analysis, is given as an illustrative example in Appendix 5. The Appendix was

prepared in winter 2001–2002. Therefore, the data used is from that time period.

For assessing the industries and the areas of expertise in the region, three expert panels were organised with 30 participants. The idea was to assess the current situation of the industries, as well as the areas of expertise and the conditions they would offer for the regional innovation system. The panels were given four tables, each with two dimensions (see Appendices 1–4). The panellists were asked to grade each industry and each area of expertise from 1–10 according to each criterion. So, there were altogether 620 gradable items. The panellists could resort to the background material in the previous phase of the method as a basis for their evaluation work, and in the meetings with the panellists the aim was to form a common understanding of what was meant by each industry, area of expertise and criterion so that all would have the same understanding of the concepts.

The first task consisted of evaluating industries on the basis of given criteria. The definition of the industries was based on the TOL95 classification by Statistics Finland, which was applied to the special needs of the Lahti region by, for example, asking the panellists for suggestions of industries to be assessed. Most of the industries were traditional industries, but there were also newer industries, such as biotechnology and the media.

There were 15 industries to be assessed:

- plastics
- environment
- biotechnology
- construction

- electronics
- information technology
- mechanical wood products
- furniture
- machine and metal
- textiles and clothing
- food products and beverages
- media
- tourism and culture
- logistics
- commerce.

The industries were assessed on the basis of ten criteria:

- amount of entrepreneurial activity and employment capacity
- growth potential
- balance of the entrepreneurial structure
- internationality of entrepreneurial activity
- innovativeness of entrepreneurial activity
- value of production
- know-how intensity of entrepreneurial activity
- capability of the leadership in the top firms
- regional adequacy of educational opportunities
- regional research input
- regional technology transfer activities.

On the basis of the point averages for the different criteria given by the panellists, the plastics industry (7.72) and the machine and metal products industry (7.22) were among the most important industries. The plastics industry scored best in the leadership capability of the top firms in the region (8.43) and in the internationality of the entrepreneurship (8.37). Also the growth potential of the industry (8.27) and value of production (8.20) were considered good in the eyes of the panellists. In the machine and metal products industry, the

highest points were given to the amount of entrepreneurial activity and employment capacity (8.70) and the balanced entrepreneurial structure (7.90).

The environmental industry got a score of almost seven (6.84), with the highest points being given to growth potential (8.17) and the regional adequacy of educational opportunities (7.50). The lowest points were given to the construction industry (4.75). See Appendix 1 for more details.

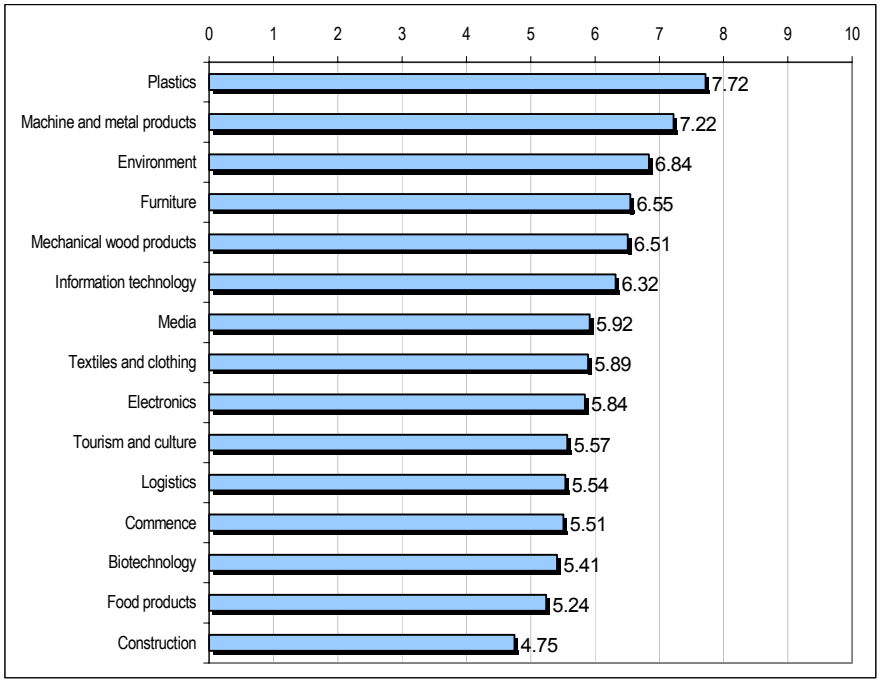

Figure 12. *Scores for the various industries in ten different categories.*

According to the standard deviations of the answers, the panellists agreed most on the plastics industry (standard deviation 1.58) and the machine and metal products industry (1.63), whereas the biggest

deviation occurred regarding the biotechnology industry (2.72) and commerce (2.33). See Appendix 1 for more detailed information.

Subsequently, the different areas of expertise were assessed. Expertise in this study is defined as expertise independent of the different industries, which is necessary or essential for many industries.

The thirteen assessed areas of expertise were

- design
- quality
- environmental technology and ecology
- biotechnology
- information technology
- mechatronics
- communication and content production
- economy and administration
- innovation management
- wellbeing
- assembly
- marketing
- internationalisation.

The criteria for assessing the areas of expertise were:

- quantity and quality of entrepreneurial activity (Knowledge Intensive Business Services – KIBS)
- regional pioneering quality and innovativeness in the area of expertise
- regional and interregional networking in the area of expertise
- regional adequacy of educational opportunities
- regional technology transfer activities.

Among the areas of expertise, the top scores were received by design (average 7.40) and environmental technology and ecology (7.07). The regional adequacy of the educational opportunities was considered an especially strong point of both design and environmental technology and ecology, with the panellists grading design on average with 8.47 points and environmental technology and ecology with 7.40 points. The areas of expertise of quality and mechatronics were almost 6.5 points, with the regional adequacy of the educational opportunities again being considered the most important strength.

The weakest areas of expertise were biotechnology (4.25), internationalisation (4.55) and innovation management (4.64).

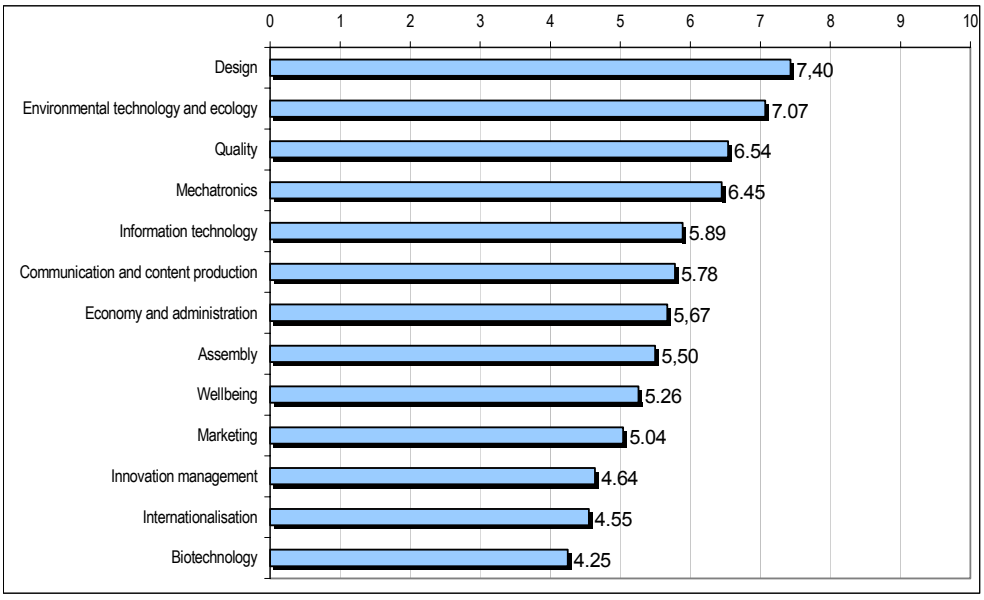

***Figure 13**. Scores given by the panellists to the areas of expertise.*

The smallest deviation occurred in the evaluations of mechatronics (standard deviation of the answers 1.53) and in communication and production of contents (1.73), whereas in biotechnology the deviation

was clearly the highest (2.50). This may partly be due to the fact that as a fairly new branch, biotechnology may still be understood in a number of different ways, at least with regard to environmental, pharmaceutical, genetic and food products technologies. See Appendix 2 for more details.

After the industries and areas of expertise had been assessed on the basis of different criteria, the panellists compared the industries and areas of expertise mentioned with each other. They were to assess the significance of each area of expertise for each industry, for instance, how the design expertise supported the plastics industry in the Lahti region.

The panellists considered plastics, machine and metal, and environmental industries to be the most prominent ones. From the point of view of the plastics industry, quality (8.13), design (7.73) innovations management (7.73) and internationalisation (7.63) were considered the most important areas of expertise. The areas of expertise that supported the plastics industry in the region the least were, according to the panellists, wellbeing (4.37), communication and content production (4.67) and biotechnology (5.45).

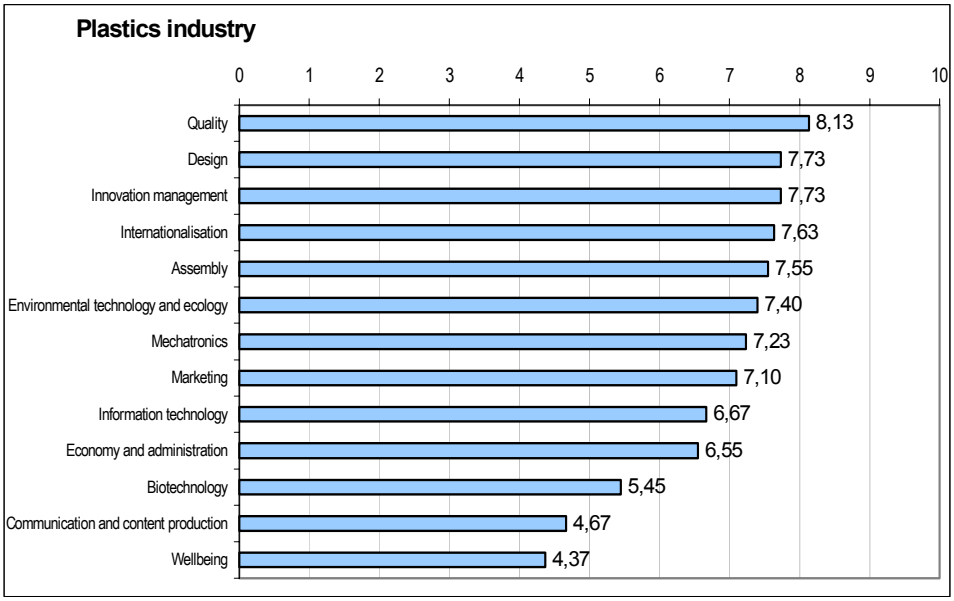

***Figure 14**. Scores given by the panellists to the importance of different areas of expertise in the plastics industry.*

For the machine and metal products industry, mechatronics (8.23), quality (7.90) and assembly (7.83) were considered to be the most important areas of expertise. Biotechnology (3.44), communication and content production (4.63) and wellbeing (5.04) were considered to have the least importance for the machine and metal products industry in the region.

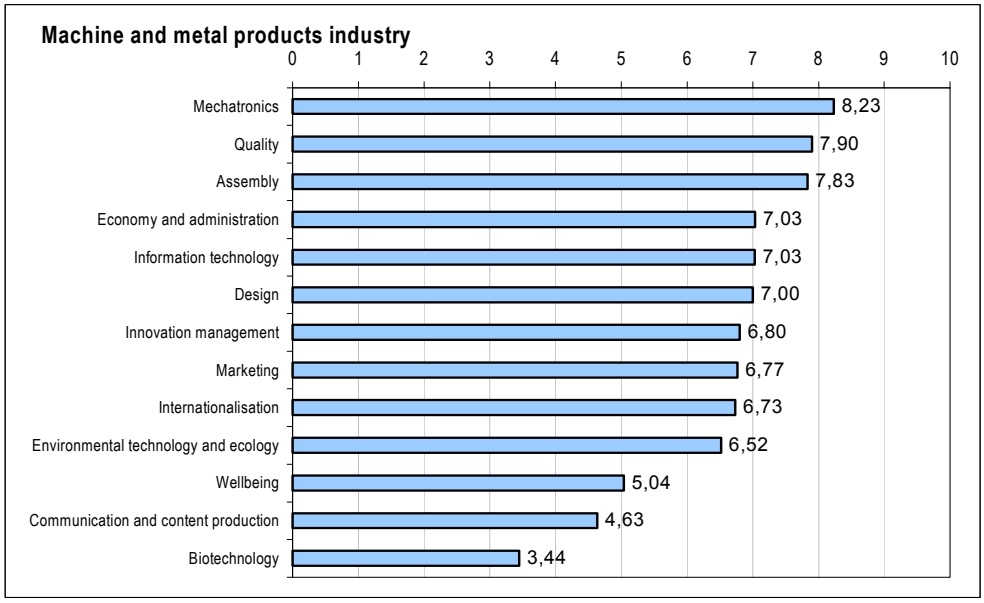

***Figure 15**. Scores given by the panellists to the importance of different areas of expertise in the machine and metal products industry.*

For the environmental industry, environmental technology and ecology (8.83) and biotechnology (7.67) were considered to be the most important supporting areas of expertise. The innovation management (7.60) and internationalisation (7.07) areas of expertise were also considered to be relatively significant and well mastered in the environmental industry. The design (4.61) and assembly (5.00) areas of expertise were considered to have the least importance.

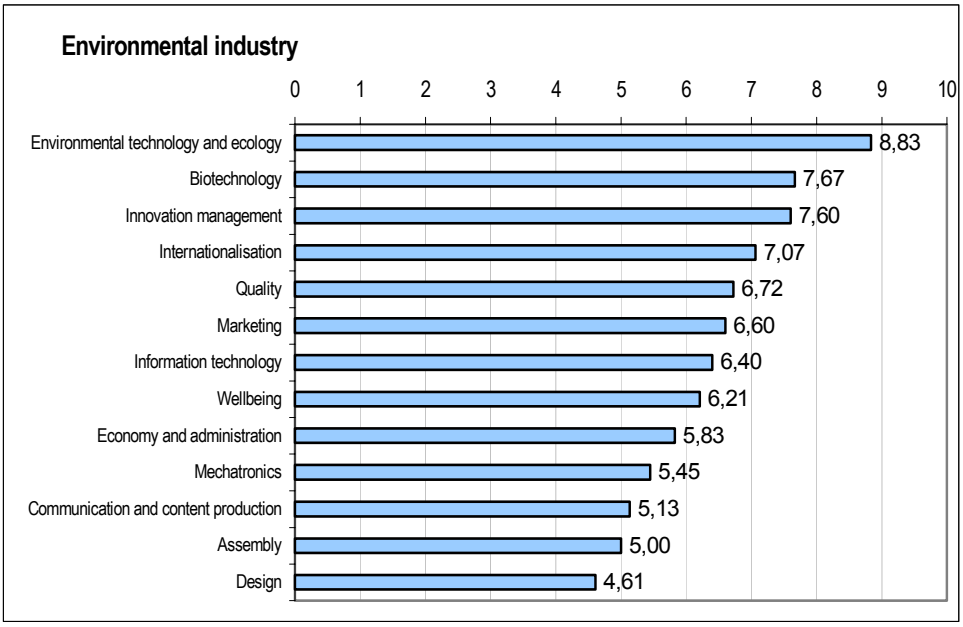

***Figure 16**. Scores given by the panellists to the importance of different areas of expertise in the environmental industry.*

See Appendix 3 for more detailed information on the relations between the industries and areas of expertise as assessed by the panellists.

Finally, the panellists compared the different industries with each other evaluating the mutual significance of the regional industries. The questions were formulated in a bidirectional way so that, for example, the support given to the environmental industry by the plastics industry was assessed, and by the same token, the support given to the plastics industry by the environmental industry.

In general terms, the panellists saw no significant connections between many of the industries. The highest points were scored by the support given to the electronics industry by the information

technology industry (8.23) and vice versa (7.67). The average score of seven points or more was also attained by the support given to the media industry by the information technology industry (7.57); the support given to the furniture industry by the mechanical wood products industry (7.57) and vice versa (7.43); the support given to the commerce industry by the logistics industry (7.53); the support given to the biotechnology industry by the environmental industry (7.43) and vice versa (7.27); the support given to the machine and metal products industry by the electronics and information technology industry (both 7.20); and the support given to the food products industry by the logistics industry. The least connections were deemed to exist, for example, between the food products industry and the mechanical wood products industry, between the textile and clothing industry and the mechanical wood products industry, and between the tourist and cultural industry on the one hand and the metal products industry on the other, where the averages were around two points. The mutual connections between all the industries on the basis of the points given by the panellists can be seen in Appendix 4.

The analysis of the statistical and empirical information was concerned with comparing the statistical data with the empirical data gathered at the expert panels. The regional statistical data of every industry was compared with the national data. The available statistical data consisted of the number of industrial units and personnel and the values of production and export in each industry in the Lahti region and nationwide. The study indicates that according to both the statistical and empirical information, the plastics, furniture and mechanical wood products industries are above the median. Textiles and clothing are statistically above the median and empirically on the median level. Biotechnology, tourism and culture, logistics and commerce are, from the point of view of the panellists, below the median, but as there was insufficient statistical data on these industries, they were excluded from

the four tables. Construction, electronics, as well as food products and beverages, are both statistically and empirically below the median. In the media industry, it is interesting to see that statistically it is below the median but the panellists valued it above the median. Machine and metal products are statistically on the same level as the median, and above the median according to the panellists. It is perhaps slightly surprising that the food products and beverages industry is both statistically and empirically below the median, as there are notable companies in this industry in the Lahti region.

In Figure 17, the field with two plus signs shows the industries in the Lahti region which both statistically, and, from the point of view of the panelists, are above the median of all the industries. The field with +- describes the industries that statistically seem to be above the national level, but which, from the point of view of the regional panelists, have not enough credibility. In this study, no industry could clearly be defined in this field. The field with two minus signs is below the median both statistically and from the point –of view of the panelists, whereas the industries with -+ are statistically below the median, but which the regional panelists, however, set higher. On the basis of the above, the positions of the industries in the four tables are as follows:

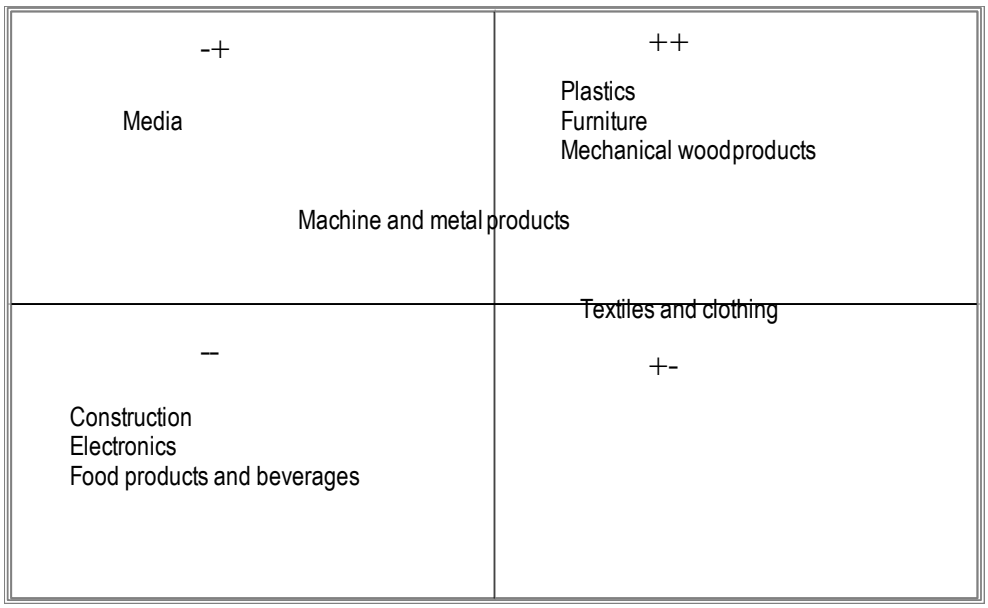

***Figure 17**. The analysis of the statistical and empirical information (Harmaakorpi and Pekkarinen, 2002).*

The results of the analysis were assessed through some visible megatrends (see Harmaakorpi *et al.*, 2002) and some interesting potential resource configurations could be found. The most important potentials might be found in the combinations of the “star” industries and areas of expertise combined with a justified view of the future techno-economic development. Interesting combinations in the case of the Lahti region are seen, for example: the plastics industry combined with design and environment expertise and the visible development in material technology, furniture industry combined with design expertise and ageing of people, machine and metal products industry combined with mechatronics and quality expertise and development in nanotechnology etc. There are a number of promising combinations whose development could be helped by promoting the existing or emerging innovation networks in the defined development platforms.

The crucial fact in the successful development of the platforms, however, is the ability to form creative social capital and dynamic capabilities in the multi-actor networks.

Following the analysis of the regional development platforms, the regional innovation system was conceptualised. It was seen to be extremely important in the Lahti region because of the random emergence of the organisations in the region due the lack of an innovation policy. The fuzzy picture of the regional innovation system was seen as a major obstacle in an interactive development process. The first conceptualisation of the regional innovation system is depicted in Figure 18.

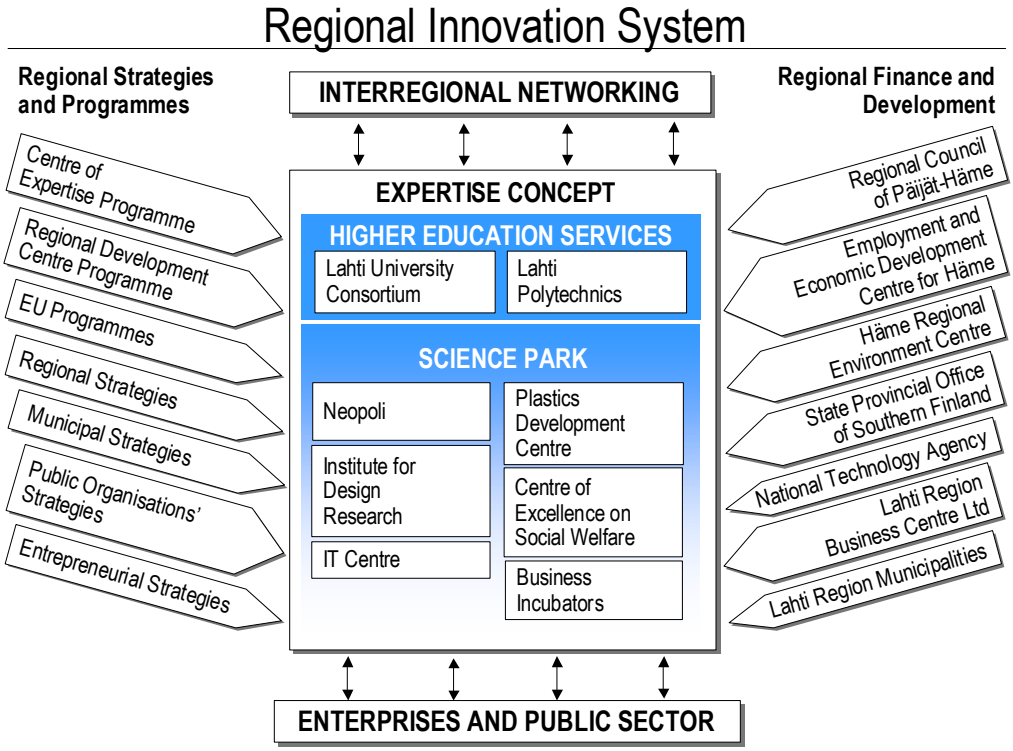

***Figure 18**. The conceptualisation of the Lahti regional innovation system.*

The “Lahti Expertise Concept” is an essential part of the regional innovation system. The higher education services constitute the most important part of this concept. The higher education services include the Lahti University Consortium made up of the University of Helsinki, Palmenia Centre for Research and Continuing Education, University of Helsinki, Department of Ecological and Environmental Sciences; Lappeenranta University of Technology Lahti Unit, Tampere University of Technology Lahti Unit and Helsinki University of Technology Lahti Center, together with the Lahti Polytechnics.

The expertise and technology centres constitute the second part of the expertise concept forming the future Lahti Science Park Concept. Currently, the science park concept is formed by Neopoli Oy, the Plastics Development Centre, IT-Centre, Institute for Design Research, business incubators and Centre of Excellence on Social Welfare. As the science park concept develops and its core processes take shape, there may be an increase in the number of expertise and technology centres. In the science park concept, Neopoli Oy has two roles. On the one hand, it is a technology centre of its own defined substance area, but on the other, it is a coordinator of the whole science park concept. Neopoli Oy is best suited for this role, because the majority of its stock is owned by the City of Lahti. Neopoli Oy is also a member of the International Association of Science Parks (IASP) and the Finnish Science Park Association (TEKEL).

Different strategies and programmes (depicted on the left in Figure 17) contribute to the development of the expertise concept. They include the Centre of Expertise Programme, the regional development centre programme, the EU’s Structural Funds Objectives 2 and 3, the regional programme, the EU’s research and development (R&D) programmes and the regional and the regional organisation

strategies. In Figure 17 on the right are the regional general development organisations and the funding organisations of the regional innovation system, whose support for the science park concept is indispensable. They include the Employment and Economic Development Centre of Häme, the state provincial office of Southern Finland, the Regional Council of Päijät-Häme, the Häme Regional Environment Centre, Lahti region Business Centre Ltd, the National Technology Agency (TEKES), ministries and the municipalities of the Lahti region.

Aside from endogenous production of information, an important task of the expertise concept is to bring forward and process research work carried out elsewhere. Therefore, its different actors must be integrated in a network with the foremost experts worldwide. The essential idea is to enhance the distribution of information.

6.3 Defining and Starting a Core Process. Case: The Age Business Core Process[3]

After exploring the potential development platforms, the core processes to exploit the potential in the platforms were defined. This phase was seen to be crucial also in the Lahti region. The Regional Development Platform Method fails if a region is unable to build core processes and innovation networks including actors from the knowledge generation and diffusion sub-system, as well as from the knowledge application and exploitation sub-system.

[3] *This chapter is based on the article (Harmaakorpi and Pekkarinen, 2003). The knowledge of ageing of population originates from the work and expertise of Satu Pekkarinen.*

In the Lahti region, a total of 13 core processes were founded (see Harmaakorpi *et al*., 2003). In this present study, the definition process of the “age business core process” is used as a case example.

6.3.1 The Megatrend of Ageing

The ageing of the population is such a powerful megatrend that it must be taken into account when planning for the future competence and production structure. As a consequence of the ageing of the population, the demand for welfare services and products will both increase and change. By 2040, it is estimated that the child population will drop a little less than 30 %, at the same time, the proportion of people over 65 will double so that they will be 13 % of the world population. It is estimated that there will be five times more people over 80 in 2050 than now. (Rauhala, 1999: 6.)

At present, the majority of the Finnish population are of working age, but the situation will change rapidly in the 2010s when public expenditure will also start to increase rapidly (Uusitalo, 1999: 4). On the other hand, fewer and fewer elderly people are merely consumers of society's resources and a growing number of them actively participate in the economy and other activities just like other citizens (Sonkin *et al.,* 1999: 24). The pension purchasing power will grow considerably, so that even pensioners receiving an average pension will be able to pay for a larger share of the production costs of the social and welfare services. (Hjerppe *et al.,* 1999.)

Those who are used to consuming when young and healthy will continue doing so as they get old and sick. The former lifestyle guides the consumers' behaviour (Sonkin, *et al.,* 1999: 58). Sonkin *et al.* predict that in 2030 there will be “an individual mass market” in the

home environment. The markets will need information on the needs and consumer habits of the elderly, in order to create space and opportunities for new entrepreneurial activity, in which the elderly are seen as consumers and target groups better than before. There is emerging the third age between the active working age and late old age, where the healthier and wealthier people are forming a new consumer group. The increase of individuality leads to a need for individual services, and mass products will no longer be of such interest as before.

In Finland the wellbeing cluster is, according to ETLA's (Research Institute of the Finnish Economy) forecasts, one of the national key clusters of the future. The applications of data and communication technology seem to be the most promising. Experts consider other promising product groups to be various instruments, equipment and technology making the work of care-taking personnel easier, as well as utensils, instruments and equipment for homes. There is also likely to be a growing demand for high-level products of low-level technology and integral accessible solutions will increase in value. (Savela and Hakulinen, 2001: 40.)

In the market of wellbeing technology and services, the client is still, today, mainly the public sector that grants assistive facilities to those who need them. The client is often a complicated clientele chain, which includes a separate orderer, service provider, financier and end user. All these parties can be considered clients, but their representatives generally have quite different motives and interests regarding development work. (Anttila, 2000: 15.) Optimistic evaluations, however, have been forwarded on the evolution of the markets towards a market of consumers, in which the client will not only be the service system, but also the end users themselves (Savela and Hakulinen, 2001: 7).

Many large firms in the service sector will establish service development systems made up of their clients. With their help of such systems, firms aim at developing their services to correspond to the differing needs. The service firms will learn to turn their services into increasingly individualised products. They will put together service packages that include different work, fitness, hobby and cultural services. (Sonkin *et al.,* 1999: 31.) The product development of information technology and assistive equipment must be carried out together with various actors. The analysis and planning tools of the marketing sector, as well as those of the welfare sector, must be applied in parallel. The markets will differentiate between the different parts of Finland, by city neighbourhoods, life-styles and requirement levels, and on the basis of the economic resources available to the users. When developing new solutions, their management and organisation must be taken into account. This, in turn, presupposes new administrative and organisational models in which the entrepreneurs, organisations and municipalities participate. (Sonkin *et al*., 1999: 55–56.) For instance, intermediation based on a service database plays a central role as a marketer and intermediary. (Sonkin *et al*., 1999: 58.)

Firms have not so far been too keen to target their products at movement-impaired people, because the markets have been considered limited and for fear the image of the firms would suffer. Designing accessible products does not, however, mean that they should be marketed as special assistive equipment. Everybody would profit from well-designed accessible technology. (Hyppönen 2000: 15.) Furthermore, it would be harmful for the image of the firm if it were perceived to be a producer of complicated technology, which does not take into account all users, especially if the competitors design products fit for all. So the question is ethical (Hyppönen: 15), as well as commercial.

As the population gets older, a decreasing number of people fit the mould of an average user. Putting into practice an accessible world requires many practical measures, aside from a social policy commitment. Central actors are, for example, decision makers, research and development institutes, data and communication technology industries and assistive equipment industry. The aim should be Design For All. The environment must respond to the needs of as many user groups as possible without the need for adaptation or specialised design. (Rauhala-Hayes *et al.,* 1998: 71.)

Age business means business and service activity that serves the needs of elderly people without treating and labelling them as a special group. The term could as well be “age sustainable business” taking into account the needs of customers and consumers of all age groups. Age business includes all the technology, services and business that promotes, supports and maintains a person’s everyday life, health, social wellbeing and communication with the environment. An elderly person evaluates new services and products from the point of view of his or her personal life experience. People differ from each other because of their individual life histories, education and health, and thus the expectations about the services and products are different. (See also Harmaakorpi, Pekkarinen and Serkkola, 2002: 30.)

Elderly people can benefit from the age business in maintaining their physical, cognitive and psychological abilities, in their household duties, in their free-time activities, and so on. Age business means both the production of goods and technologies, as well as various types of services. The technological basis can be, for example, in nutrition, textile and construction technologies, as well as in information technology, nanotechnology, biotechnology, intelligent materials, or robotics. The service sector of age business includes various types of services from social and health services to culture and travel services.

People can have various types of domestic help from public and private service producers. Health care can be organised by a visiting nurse and it is also possible to have cleaning services, shopping services, meal services, hairdressing services, massage services and other physiotherapy services in the home environment. The customers of the age business can be both private end-users and the public sector that grants wellbeing products to those who need them or that uses wellbeing technology in the production of public services. (Harmaakorpi, Pekkarinen and Serkkola, 2002: 31.)

New markets for technology and service products are emerging to promote and support health and independent living for the elderly and to complete and substitute the traditional social and health services. These markets are developing, and reactions to them are seen all over the world. The level of know-how is very high in Finland in the firm, research and user sectors, but it is very scattered. The challenge is to achieve better co-operation between the sectors (see e.g. Saranummi 2001). Developing new technology and service solutions can be described as a network made up of producer and client parties and social actors who participate in making the rules of the game for the industry (Figure 19). Developing successful wellbeing products requires all kinds of know-how that combines research in the social and wellbeing sector, management of production and services, etc. The development work requires actors both from the social and health sector and traditional industrial production.

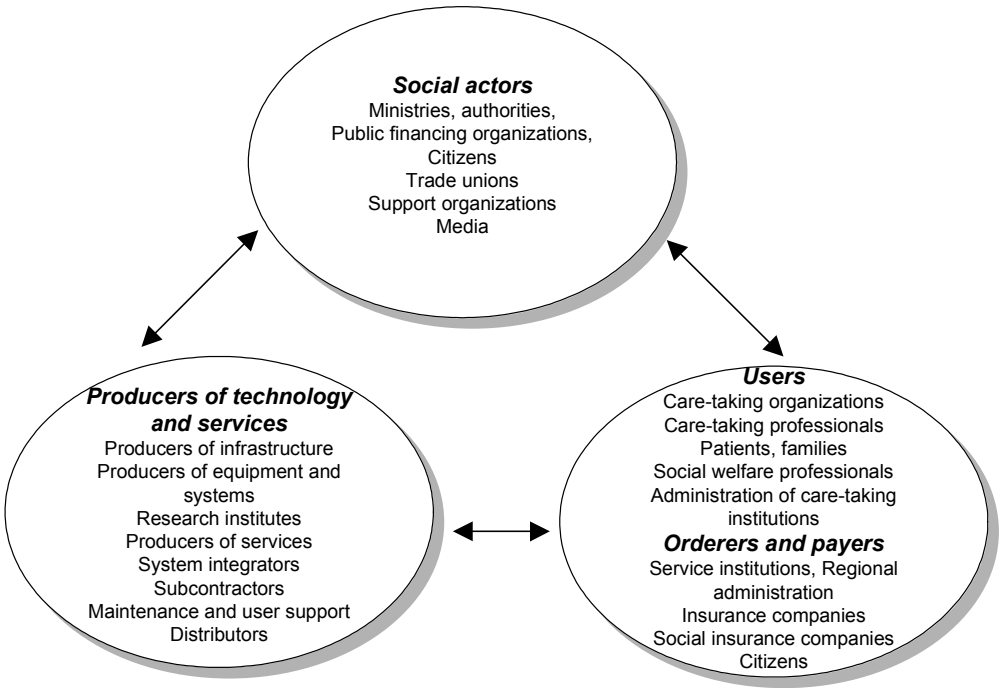

***Figure 19**. Parties to the wellbeing market network (Saranummi 2001: 3).*

6.3.2 Age Business and the Lahti region

In building the wellbeing cluster for the Lahti region, it is well worth taking advantage of the already existing industrial structure, in which traditional manufacturing industries still hold a steady position: the Lahti region rises above the national averages when contemplated through different indicators in plastics, metal, as well as furniture industries. (See Harmaakorpi and Pekkarinen, 2002.)

In the Regional Development Centre Programme for the Lahti region, wellbeing has been accorded the status of an area of emphasis, and according to this vision, ”By 2010, the Lahti region will be the centre of

wellbeing production and the wellbeing industry, internationally renowned for its expertise in design, quality and environmental issues". What is meant by wellbeing production and a wellbeing industry centre is a production and service culture specialised in knowledge intensive technology and high-level know-how. The aim is to develop regional business ideas or service concepts for the wellbeing industry markets, for example, in developing welfare services, intelligent living, communication and logistics services, tourism and leisure time services, environmental technology, and the use of wood, metal and plastic in wellbeing related products. The product and service concept consists of the products and services of the regional firms and related product development. The intention is to establish and develop technology and development centres to support regional business ideas.

The preplan made by the Päijät-Häme Hospital District, the Lahti region Centre of Expertise Programme, and Lahti Polytechnic (Hiltunen, 2000) already discussed the opportunities of a wellbeing cluster in the Lahti region. A wellbeing cluster is defined as "a co-operation network in social and health services, industry, and research, as well as education, through which products, services, and people's wellbeing are produced ". (Hiltunen, 2000: 15.) The preliminary investigation shows that there is not yet an actual cluster of many different actors in the Lahti region, but it is worth developing a cluster in the region, especially as a co-operation cluster in research and education. It is also worth systematically transferring wellbeing expertise for the use of welfare service producers of the region. It is also recommendable to enhance the conditions for entrepreneurship and the emergence of service alternatives in the region both in the care-taking sector and in goods products. (Hiltunen, 2000: 17, 41.)

In order to lay a basis for a regional age business core process Helsinki University of Technology Lahti Center conducted a survey in April 2002. The object of the survey was to map the organisations working in the wellbeing sector, the know-how they possessed, their co-operation networks and their development suggestions for intensifying co-operation. The survey also mapped new ideas for products and willingness to participate in developing wellbeing products together with actors from other industries.

A questionnaire was sent to 35 different organisations operating in the Lahti region that mostly represented the public and third sectors and were considered to be, one way or another, connected with the ageing of the population. The questionnaire was sent, for example, to the social and health authorities of different municipalities, educational organisations in the region. 24 organisations or 68.6 % in all, replied.

According to the section on projects in the survey there are at least fifty projects being implemented in the region regarding wellbeing and the ageing of the population. The projects include research, education and development of work with the elderly, home help service, rehabilitation, product and service concepts, service intermediation, accessible environment and wellbeing technology. There is plenty of other know-how and activities related to ageing in the region, of which an example is the professorship in social gerontology at the University of Helsinki. There is also know-how derived from projects already carried out, of which many are continued in some other form. There is also an extensive amount of new planning activity in progress.

One of the objectives of the survey was to explore the mutual co-operation networks among the wellbeing sector actors. The questionnaire asked which co-operation partners the wellbeing organisations of the region had and what was the nature of the co-

operation and how intensive it was. The question produced data on the relationships between the actors, and the material can be analysed through the network analysis methods (Lehikoinen, 2002). With the help of the analysis, the material can be used to define the amount of interaction between the organisations, search for clusters that are active in development work and recognise central and leading actors. These objectives are reached by means of three key elements: density, centralisation and centrality. (Lehikoinen, 2002) The co-operation networks were analysed using the Ucinet IV network analysis program (see Harmaakorpi and Pekkarinen, 2003).

Various interaction patterns could be deduced from the material using the Pajek Programme. In Figure 19, an interaction network between the actors is depicted regarding interacting that was reported to be taking place at least once a month. The nature of the interaction can be joint projects, planning of joint projects, representation in the steering group or administrative bodies, or exchange of information or other co-operation. Contacts as a whole take place quite seldom: over half of the respondents told that co-operation takes place only a few times a year or less. In order to make a clear pattern, only the answers in which co-operation was reported to take place at least once a month were taken into account. So, some of the organisations seem to have no co-operation relations, which in reality may mean that their contacts are less frequent than once a month. There were also contacts almost daily. In Figure 20, the organisations in the middle are, so to speak, in the middle of all the co-operation and, thus, they are nodal points and key actors of the network.

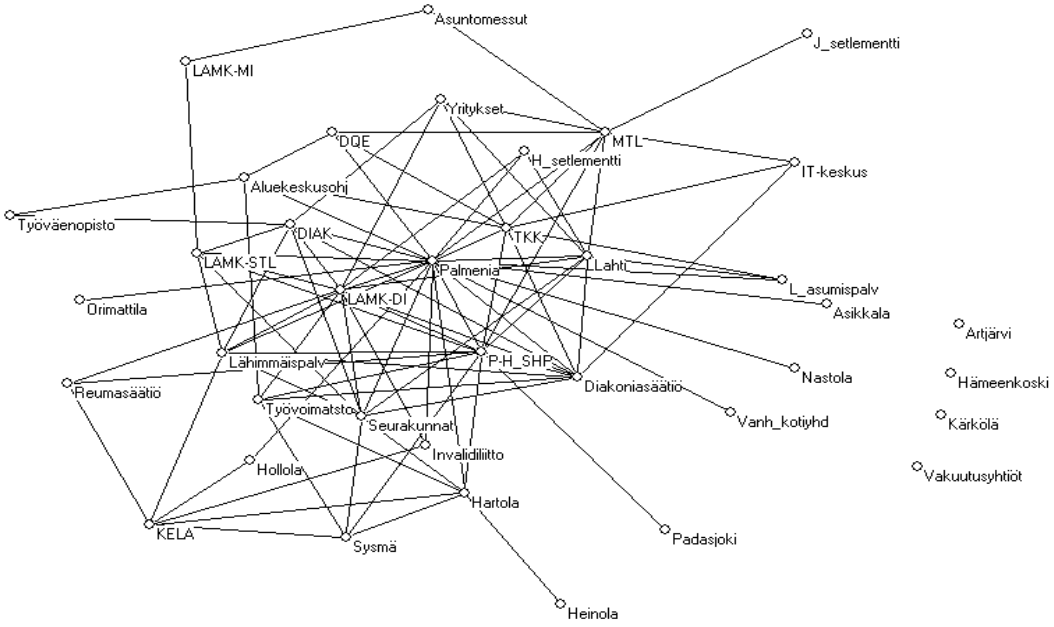

***Figure 20**. Network of actors in different forms of co-operation (Harmaakorpi and Pekkarinen, 2003).*[4]

[4] *Explanations of the abbreviations of the figure:*

LAMK-MI = Lahti Polytechnic,Institute of Design
J_Setlementti- Settlement movement of Jyränkölä
DQE = Design, Quality, Ecology, Centre of Expertise Programme
IT-keskus = Lahti IT Centre
Aluekeskusohj = Regional Development Centre Programme of the Lahti region
TKK = Helsinki University of Technology, Lahti Center
Palmenia = University of Helsinki, Palmenia Centre for Research and Continuing Education And Centre of Excellence on Social welfare in Southern Finland
LAMK-DI = Lahti Polytechnic: Institute of Parish Social Services
Orimattila = Social and health service of the City of Orimattila
Artjärvi = Social and health service of the Municipality of Artjärvi
Hämeenkoski = Social and health service of the Municipality of Hämeenkoski
Hollola = Social and health service of the Municipality of Hollola
Sysmä = Social and health service of the Municipality of Sysmä
Heinola = Social and health service of the City of Heinola
P-H SHP = Päijät-Häme Hospital District
Diakoniasäätiö = Lahti Deaconry FoundationSeurakunnat = The Congregations in the region
Invalidiliitto = Adaptation Training Centre for the Disabled
KELA = The The Social Insurance Institution of Finland, Lahti Office
Asuntomessut = Housing Fair in Heinola
Yritykset = Enterprises in the wellbeing sector
MTL = Institute for Design Research
Työväenopisto = Lahti Adult Institute
L_Asumispalv = Liipola Residential Services
LAMK-STL= Lahti Polytechnic: Faculty of Social and Health Care
Lahti = Social and health service of the City of Lahti
Asikkala = Social and health service of the Municipality of Asikkala
Nastola = Social and health service of the Municipality of Nastola
Kärkölä= Social and health service of the Municipality of Kärkölä
Padasjoki= Social and health service of the Municipality of Padasjoki
Lähimmäispalv= Lahden Lähimmäispalvelu, registered accociation
Reumasäätiö= Finnish Rheumatism Foundation in Heinola
Työvoimatoimisto= Lahti employment office
Vanh_kotiyhd= Old people's home association of Lahti
Vakuutusyhtiöt = Insurance companies
DIAK = Diaconia Polytechnic of Lahti

The key actors of the network – organisations that have the most contacts at least once a month with other organisations – seem to be: the University of Helsinki Palmenia Centre for Research and Continuing Education, the Päijät-Häme Hospital District, Lahti Deaconry Foundation, Diaconia Polytechnic of Lahti and Lahti Polytechnic Institute of Parish Social Services.

In the opinion of the majority, the co-operation has worked well, even though it must be borne in mind that many are just in the initial stage of co-operation. In some of the answers, the respondents hoped that the co-operation would take a concrete form and complained about a lack of resources. They hoped that regional co-operation would increase regarding the exchange of information (for example, disseminating the results of basic research) and regarding awareness of the activities of other entities in order to avoid overlapping. The wishes for the future concerning the contents of co-operation had to do, for instance, with creating a service system for the elderly, quality projects, product development, other development work research, testing, education and enhancing user friendliness.

The last part of the questionnaire had to do with the points of view of the wellbeing organisations concerning co-operation with other industries. The analysis of regional development platforms (Harmaakorpi and Pekkarinen, 2002) showed that the industries with most potential in the Lahti region were still considered to be the traditional manufacturing industries, such as plastics, wood, and metal industries. In the discussion of development platforms, wellbeing was handled as an expertise crossing various industries, and not as an industry of its own.

The wellbeing sector actors were asked in the questionnaire, if they saw a chance of co-operation in developing new products or services

together with the traditional industries of the Lahti region. The answers to this question were as follows:

	Yes	No
a) Plastics industry	9	3
b) Wood and furniture industry	12	3
c) Metal industry	8	4
d) Textile industry	9	3
e) Other suggestions: Transport	1	
Commerce	1	
Social sector	1	
Services	2	
IT sector	3	

***Table 1**. Perception of possibilities of co-operation with other industries.*

In general terms, developing new products and services in co-operation with other industries was conceived as being very possible. The suggestions for products and services included things that would make it easier to cope with everyday life, such as assistive technology, intelligent furniture and, in general, supporting living at home with technology (information transfer, control and monitoring), dressing, flexible domestic services, as well as new specific services and coordinated service packages. With one exception, all the organisations that answered the questionnaire were willing to participate in developing new products and services, including products connected with the transformability of homes, developing computer and other technology in the care of the elderly (for instance a wrist care).

The last question in the questionnaire was about how to organise the development work among the different actors. There was, for instance,

a suggestion to get the actors to develop new product concepts, so that there would be a continuation around the products already made and those in the making in the form of new projects. Good coordination was considered an important factor: there should be one clear actor that would direct the development and put the co-operation into practice. This was mentioned in many of the answers. Geographical closeness of the actors was also considered important in enhancing co-operation.

It is the task of the regional innovation system to increase regional innovative capability. Since innovations are mostly carried out in firms of the region, the key question is having the firms commit to the objectives of the core process. As part of this process, ten people in eight of the regional firms were interviewed. The sample is very small in comparison with the number of the firms in the region that could possibly exploit age business. However, the sample was considered big enough to give an idea of the regional potential of the core process of the age business. The firms interviewed represented the plastics, construction, furniture, vehicle, medical furniture and indoor climate product industries. The firms will be gone through more thoroughly when the core process is started. The question put to the firms in the interview was: ”Can you see any business development opportunities for your firm by means of products and services produced for the elderly, and will the core process described be able to help your firm in exploiting these opportunities?”

The firms had clearly recognised the trend of the ageing population, and everywhere the phenomenon had been reflected on. The core process described was felt to be sensible and its further development was encouraged. On the other hand, in such a short encounter it was not possible to give the matter concrete form, so the real degree of commitment of the firms will be seen when the core process gets

underway. Some of the most important matters that needed development in the age business, according to those interviewed, were design, ergonomics, developing norms and standards, and studying consumer habits, for instance, by means of research on behaviour and lifestyles.

6.3.3 Defining and Starting the Age Business Core Process in the Lahti Region

According to the studies conducted, the age business core process seems to be a potential core process in the Lahti region. This is supported especially by taking the wellbeing industry as the core of the Regional Development Centre Programme in the Lahti region. This creates the basis for both human and financial resourcing of the core process. Indeed, it is quite a natural solution that the Regional Development Centre Programme, and, in practice, its director, be the owner of the age core process. The location of the Regional Development Centre Programme at the Neopoli Oy Corporation further supports this solution. Neopoli Oy is in charge of coordinating the Lahti region science park.

In the Lahti region, the start-up seminar for the core process was organised in August 2002. The number of participants was 66, and they came from different actor groups. In the seminar the core process thinking was presented and the opportunities offered the Lahti region by the age business were discussed. The participants considered the future of the age business to be promising and agreed to put the age business core process into practice in the Lahti region. The participants were also asked to complete a questionnaire that surveyed their opinions about core process thinking and the development of the age business core process. 32 questionnaires were returned.

The participants were asked to evaluate on a scale of 1–5, 1 being the worst and 5 the best score, how well the core process thinking works in creating the age business network. The average value of the answers was 4.2. They were also asked, using the same scale, to evaluate the opportunities of the age business in the Lahti region. The average of the answers to this question was 4.3. Based on this, the age business core process got a favourable reception among the actors. All the respondents were willing to actively participate in the development of the age business core process or at least to follow the development of the process.

The success of the core process is strongly dependent on the owner of the core process. The leadership capability of the owner, in particular, should be emphasised. Therefore, the participants were asked to choose from nine important qualities the three most important that the owner should have, and likewise the three least important qualities. The alternatives given were: understanding the needs of the elderly, willingness to spread information openly, ability to prepare things independently, ability to acquire resources, expertise in wellbeing technologies, ability to form a common will, ability to administrate decisively, skill in handling conflicts of interest, ability to think in a visionary manner, ability to act in a goal-oriented manner and skill in creating an encouraging atmosphere.

According to the respondents, the three most important qualities for the owner of the core process were: ability to think in a visionary manner, understanding the needs of the elderly and ability to act in a goal-oriented manner. The three least important qualities were: expertise in wellbeing technologies, ability to administrate decisively and skills to handle conflicts of interest.

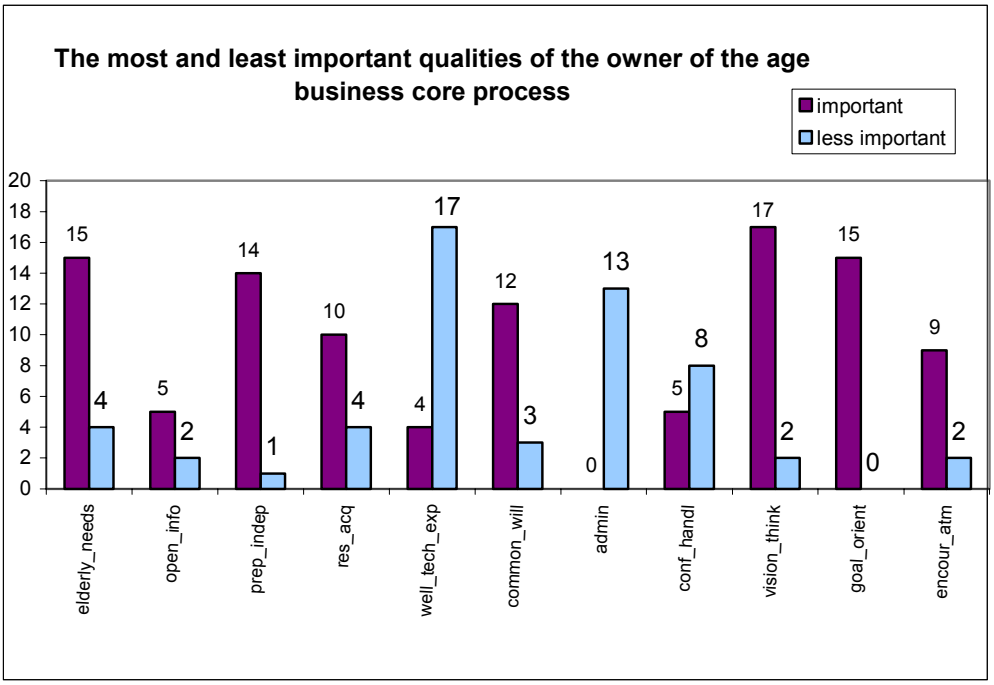

***Figure 21**. The most and least important qualities of the owner of the age business core process.*[5]

The questionnaire also mapped out the participants' ideas for good ways to further develop the age business core process. The respondents recommended developing the education and training possibilities in the field of welfare and ageing, also including awareness of the business potential that the phenomenon of ageing brings. Market research about the needs of the elderly should be

[5] *Abbreviations:*
elderly_needs = Understanding the needs of the elderly
open_info = Willingness to spread information openly
prep_indep = Ability to prepare things independently
res_acq = Ability to acquire resources
well_tech_exp= Expertise in wellbeing technologies
common_will= Ability to form a common will
admin = Ability to administrate decisively
conf_handl= Skills in handling conflicts of interest
vision_think= Ability to think in a visionary manner
goal_orient= Ability to act in a goal-oriented manner
encour_atm= Skill in creating an encouraging atmosphere

carried out, and the voice of the elderly themselves must be included in the age business core process.

According to the respondents, it would be especially important to arouse the interest of the firms in the region by pointing out their opportunities to create new business with the age business core process. The age business thinking would be worth expanding into new types of firms, like co-operatives and social. In general, it is important to encourage and maintain the co-operation between actors from different sectors to attract diversified expertise for this multi-disciplinary phenomenon. Regular meetings – especially working in small groups – must be arranged.

The central actors of the age business core process are presented in Figure 22.

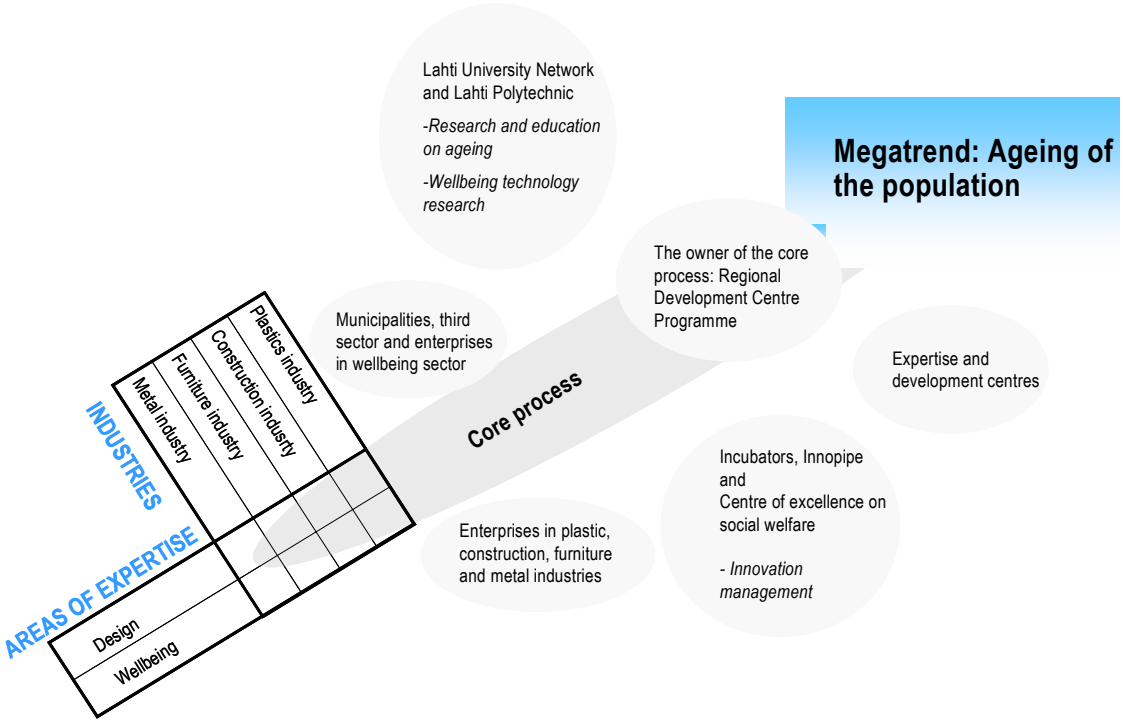

***Figure 22**. The central actors of the age business core process.*

6.4 The Knowledge Management System of the Age Business Core Process

The actors of the age business network and core process are continuously producing information needed to promote age business in the Lahti region. Public research and educational organisations produce valuable research knowledge about ageing as a phenomenon and its consequences, as well as organise education to disseminate the knowledge achieved through the research. The public sector and private sector actors within the ageing sector gather experiences mostly by methods of learning-by-doing and learning-by-exploring, with the aim of improving their services and products.

Unfortunately, the manifold knowledge and information underlying the age business core process is fragmented and does not reach the members of the innovation network in the right amount, at the right moment and in the right form to enhance collective learning sufficiently. The main actors have clearly seen the need to promote the collective learning creation and management to reach the objectives set for the process. Therefore, during the starting phase of the core process, a knowledge management system was designed to aid knowledge creation in the innovation network. The knowledge creation and management approach is based on the “rye bread model”.

Knowledge vision of the age business core process

A knowledge vision has to be created by the actors of the core process. In the case of the Lahti age business network, the vision is being created in an interactive process. At this stage, the vision is defined as a structured knowledge management environment, into which knowledge related to ageing is collected that is accessible to

the actors and that enables collective learning in order to create different kinds of innovations.

Visualisation / Imagination *ba*

Within imagination *ba,* different types of futures studies are argued to be central. Browsing the vast literature of the field, three main categories may be identified: forecasts, scenarios and expert-based statements. Forecasting is perhaps the most traditional approach to the future. Typically, a historically observed trend is projected into the future. Assuming underlying factors of causal relationships, a forecast of a phenomenon's future development can be made. Scenarios are another popular technique for studying the future. Often scenarios use more qualitative data, for describing observed trends and project them into the future. Scenarios are often open-ended and have the advantage of stimulating an open debate. Expert-based statements are also popular among the futures studies methods. Delphi is a method whereby a consensus and position of a group of experts is reached after eliciting their opinions on a defined issue. It relies on the "informed intuitive opinions of specialists" (Helmer, 1983: 134). This collective judgement of experts, although made up of subjective opinions, is considered to be more reliable than individual statements – and thus more objective in its outcomes (Johnson and King, 1988; Masini, 1993). On becoming used more widely, the technique has become modified to the point where there now is a group of 'Delphi-inspired techniques' (Martino, 1973; van Dijk, 1990). Of the conventional, policy and decision Delphi types (Woudenberg, 1991; van Dijk, 1990), the Policy Delphi seems well suited. Its objective is for it to act as a forum for ideas and expose the range of positions advocated and the pros and cons of each position (Bjil, 1992). When using the Delphi method, it is considered important to include experts also from outside the age business network – an unprejudiced selection of different experts. As Gummesson (1991: 97–98) notes:

“Innovations in industries are often introduced by those who do not have knowledge of a particular industry, those ’without history’ who are not committed to a ’this is what we do in our industry’ approach but are instead prepared to meet and adjust to the requirements of the present marketplace”. (Harmaakorpi and Melkas, forthcoming.)

Socialisation / Originating *ba*

The objective of originating *ba* in the age business core process is to create a trustful atmosphere between the actors of the core process. This is considered to be extremely important in such a heterogeneous multi-actor innovation network. Promoting entrepreneurship and taking care of elderly people may be seen as contradictory when sharing the scarce public sector resources. The backgrounds of the networked actors are also very different: achieving a fruitful co-operation between, for instance, a social worker and an engineer in electronics can be quite a challenging task. Originating *ba* consists of various activities where the different actors of the core process come together and socialise in a relaxed atmosphere aspiring to increase social cohesion in the innovation network. The meetings can also be thematic involving participation of clients, users and other related interest groups. The activities under originating *ba* are covered by the concept of “Inspiration forest”. “Inspiration forest” refers to events arranged in a leisurely atmosphere. The aim is to utilise the Finnish outdoors to break the barriers between people in common sauna evenings, sports events, experience trips or role games.

Externalisation / Interacting *ba*

The aim of interacting *ba* is to promote productive learning. One way to do this is to organise thematic seminars where the members of the core process receive the newest information and knowledge concerning a selected theme. The Professional Forum seminar series in Lahti is a means to do this. One of the main arenas of interacting *ba*

is the "inspiration centre". It is provided by Helsinki University of Technology Lahti Center as a place for people to meet and generate ideas, engage in brainstorming and develop further innovative product, service or process ideas. The sessions at the inspiration centre are assisted by a professional "creativity operator", and they are documented in order to facilitate collective learning. The participants of the sessions can continue their collaboration in a "virtual inspiration centre" regardless of time and place. Within the "Age Business Dynamo", again, the students of Lahti Polytechnic create ideas in a multi-actor networked environment. Interacting *ba* includes, in addition, an age business chat where the members of the innovation network can exchange opinions.

Combination / Cyber *ba*

Cyber *ba* offers a virtual platform where explicit knowledge created in the age business core process can be combined into new forms. This combination phase takes place in an Internet-based extranet. The extranet consists of, *inter alia*, project plans, minutes of meetings, research reports, action models and best practices that are important for the age business core process and enhance the collective learning within the innovation network. Importantly, it is also a channel for the information from the outside of the network to get into the process. Securing the flow of information from the outside world into the collective learning process of the age business innovation network can be seen as the most challenging element of the cyber *ba*.

Internalisation / Exercising *ba*

Exercising *ba* lays the basis for converting explicit knowledge back into the tacit mode. Within the age business core process, this is planned to be facilitated by thematic group education with a strong emphasis on practical exercises. The groups consist of actors with different backgrounds and different levels of expertise and experience.

In these groups, the more experienced participants mentor the less experienced ones – and vice versa, to avoid a hierarchic and 'stiff' atmosphere – and participants from different substance areas transfer their knowledge to practice in co-operation. Another way of internalisation is to exchange experts between organisations and expertise centres. For example, social workers may exercise learning-by-doing in technology companies, whereas engineers can learn about the problems of elderly people by working in the health care sector.

Potentialisation / Futurising *ba*

With regard to futurising *ba,* the Delphi techniques may be of use here also. It needs to be kept in mind that the knowledge creation process does not take place in a chronological order, but all the different *bas* exist simultaneously. The process continuously produces weak signals for the future. The central question is how to bring to the fore the weak signals elicited throughout the process – to document them for utilisation as the basis for Delphi. (Harmaakorpi and Melkas, forthcoming.)

6.5 Questions of Regional Development Strategy

In the previous chapters an enhancement process for the regional innovation system was described. It was based on the resource-based view on regional development and the need to promote aggregate competitiveness of the region. Still a brief look is taken at the facts, which might ease implementation of the facilitating policy measures in the competition between the regions. The remaining question is, which might be the special characteristics of the Lahti region, and how it should position itself in the mosaic compound of regions?

In the study of Finnish urban network (Vartiainen and Antikainen, 1998), the Lahti urban region was classified to the group of ”medium size industrial urban regions, having rather diverse industry structure and passable preconditions for development”. Accordingly, the Lahti region is characteristically an industrial region being diversified enough to enable several alternatives for strategic development. Lahti is also an acknowledged culture and sports town able to offer a pleasant living environment for its citizens.

Moss Kanter (1995) has developed a framework of different kinds of regional strategy alternatives leading to success in a global economy. She called the framework 3C-model referring to three alternative strategy options: concepts, competence and connections. Concepts refers to the strategy option where a region focuses on creation of new knowledge and ideas. Competence refers to the option where ability to produce artefacts filling the highest standards and quality is decisive. Connections refers to the option where an extraordinary contact network is the crucial element of the strategy. Therefore, a region can base its development strategy on being developers, producers or traders of high quality products and services. In practice, however, it is a matter of how a region is putting relative emphasis on these different options.

Designing regional development strategies can be classified into three kinds of industries that are important for regional competitiveness: Research intensive industries (research and development (R&D) expenditure is more than 4 % of turnover), expertise intensive industries (research and development (R&D) expenditure is less than 4 % of turnover, but including much expertise and know-how) and knowledge intensive business services. The audit of industry and firm structure understanding the different nature of innovation processes and their demands (see more Schienstock and Hämäläinen, 2001) in

these firm types is essential when planning regional development strategies and positioning a region in the worldwide competition. In the Lahti region, the expertise intensive industries seem to have a clear dominance. According to the regional development platform analysis, the development of these traditional industries can most potentially be supported by regional expertise in the fields of quality management, design, environmental management and mechatronics.

In Figure 23 the 3C-model and the classification of different industries is combined.

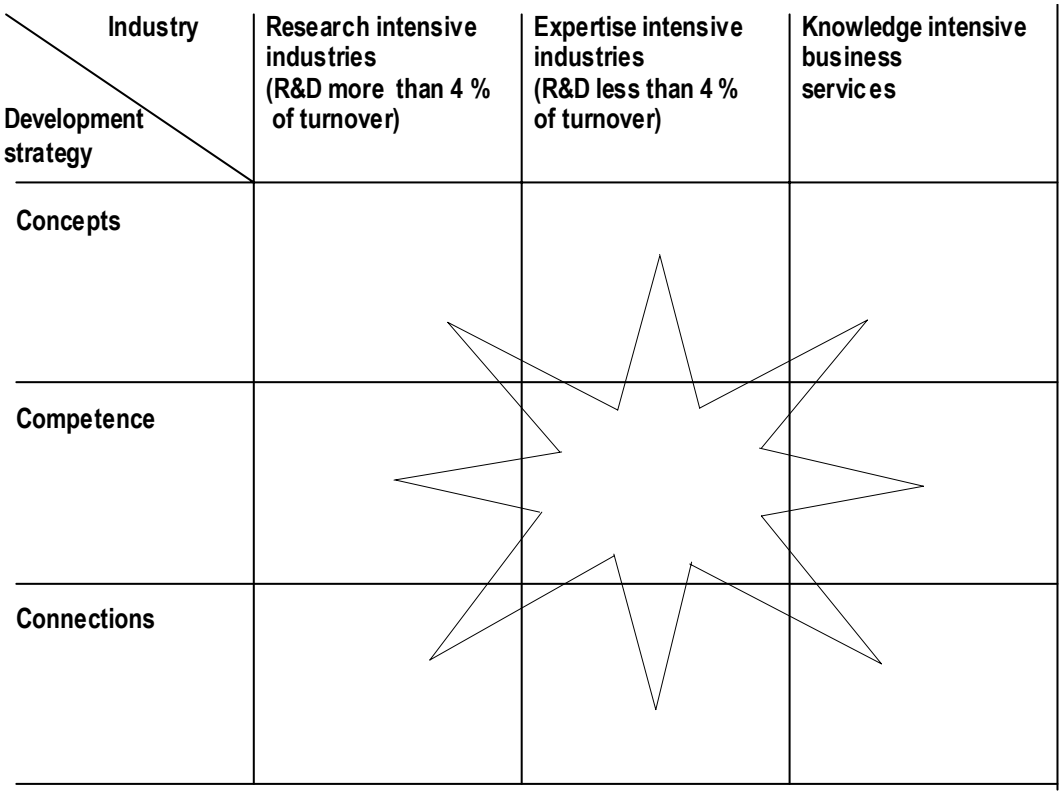

***Figure 23**. Focus of the strategic development in the Lahti region.*

According to the studies, Lahti could find its place in the square of the matrix that combines the competence development strategy and the development of expertise intensive firms. This combination might enable the Lahti region to be a region of high quality production that adds value to the products especially by design, environmental and mechatronics expertise. This is, however, only possible if the innovative, networking, learning, leadership and visionary capabilities in the regional innovation system are on a high level and enough creative social capital exists in the region.

This present study has a highly endogenous approach to developing a regional innovation system. Nevertheless, it is worthwhile remembering that the regions are not isolated islands: they are parts of a global mosaic of regions. They are in continuous interaction with other regions and can profit remarkably from each other. Such interaction should not be understood as a purely exogenous factor in the regional assessment. It should be assessed as a normal interaction process between two endogenously developed actors in the network society.

The location of the Lahti region provides special opportunities for developing its regional innovation system. The Lahti region belongs to the Helsinki metropolitan area (OECD, 2002) and Lahti is situated only 100 km from the heart of the metropolitan area. The Helsinki region can, without doubt, be classified as one of the most innovative and dynamic centres in the worldwide network of regions and, thus, offering special opportunities for the Lahti region. A recently opened motorway and a new fast railway connection bring the Lahti region even closer to one of the engines of the economic world.

The Lahti region filling, but only if filling, the described endogenous demands might start an evolution that leads to a strengthening

symbiosis between the Helsinki and Lahti regions: The first one being profiled as a research intensive innovation centre, nodal point of worldwide innovation system, diverse metropolis and the motor of national economy. Whereas the latter would be profiled as a region of high quality production with a high proportion of incremental innovations and where the focus is on a sustainable and comfortable environment being an attractive and safe alternative for skilled workers. Such a system of ”the twin regions” is depicted in Figure 24.

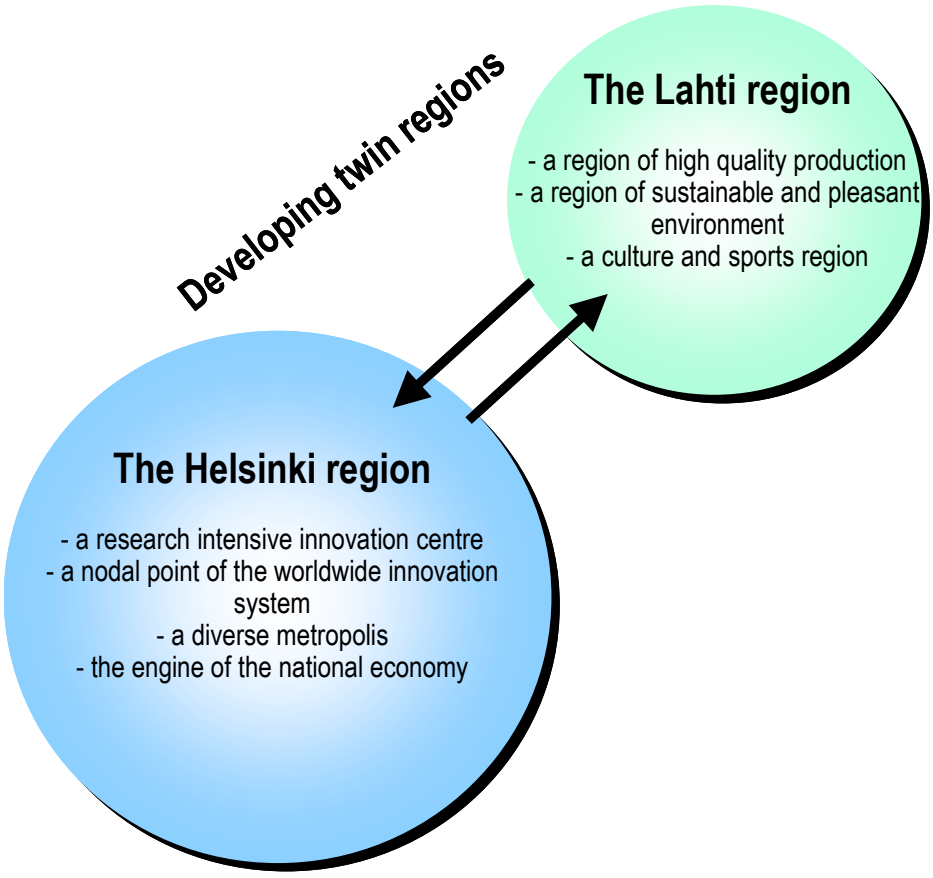

Figure 24*. Relationship between the Lahti region and the Helsinki region.*

7 DISCUSSION

7.1 Problematic Questions in Designing a Regional Innovation Policy Tool

The first problematic question in designing a regional innovation policy tool is whether the territorial aspect is sufficiently adequate to conduct innovation policy measures. Since territorial competitiveness is accused of being a dangerously misleading idea is reason enough to consider that question. This study suggests that it depends very much on the measures taken as to whether they have a harmful effect on the markets and fair allocation of resources. The measures taken by the old fashioned industrial policies might indeed have quite a few detrimental side effects. However, it is hard to imagine what kind of dangerous consequences a territorial network-facilitating innovation policy tool might have for the aggregate economic development. If the regional resources configurations are used reasonably and dynamic capabilities are enhanced, it should be beneficial for the entire economy.

The second problematic question is what is the right territorial level for innovation policy measures. This is a very good question. In spite of the recent hype surrounding regions in the past ten years, the regions often lack the critical mass to be a really independent actor as a regional innovation system. This is, however, a matter of definition: that is, how we define a regional innovation system. A small functional region might not fulfil the narrowest definitions of regional innovation system, but even small regions have to innovate in order to stay competitive or even survive. The national innovation policies do not especially reach the less favoured regions if the regions do not

actively develop their innovation systems. Even if this present study takes a highly endogenous view for developing a regional innovation system, it willingly admits that regional innovation systems are far from being closed systems. The actors and innovation networks in a regional innovation system are mostly parts of national, sectoral and supra-national innovation systems. If they were not it might result in fatal consequences. Designing a proper regional innovation system demands a highly multi-level governance point of departure as part of the planning process.

This study took a resource-based view followed by the framework of dynamic capabilities as a starting point for designing a regional innovation environment. The approach is developed for business organisations and it is fair to ask, how well it is suited to territorial units like regions. This study suggests that the resource-based view is a worthwhile way of assessing the development of a regional innovation system, since regions are much more sluggish and path dependent than ordinary business organisations. The path creation of regions takes a long time and their competitiveness is strongly dependent on the existing resource configurations. Because of the changing techno-economic paradigm, there is also a strong need for regional dynamic capabilities. At the regional level, competitive advantage may originate in idiosyncratic dynamic capabilities and they need to be constantly promoted. The real nature and characteristics of dynamic capabilities still need to be analysed necessitating thorough further research.

Regional development is, however, a complex matter and one should not just look in one direction when designing the development strategies. Besides assessing the resource base, the relative position of a region should be analysed and an attempt should be made to explore where the regional competitive advantage might exist compared with other regions. Regional development should also be

visionary. One should, however, be aware of the risk of the black hole of strategy making if unclear visions begin to steer the strategy process too much. The black hole refers to the possibility that the visions might be too far from the actual regional resource configurations thus making them impossible to realise. This danger can be avoided by using a combination of the resource-based regional strategies and resource-based futures research.

One problematic question is, naturally, what form should a regional innovation policy tool take in practise. Particular attention should be paid to the applicability of the tool created. The risk is that even if the tool is based on a respectable theoretical assessment and is the result of justified reasoning, it may not work in practice. The Regional Development Platform Method, designed in this present study, is a result of an intensive experimental learning cycle. The learning cycle included in addition to a thorough theoretical assessment gives a chance to continuously test the tool in practise. The aim was to design a tool that is applicable in different kinds of regions. In such a single case study this aim might be considered as endangered. In order to avoid this the tool was designed to be as insensitive to the existing institutional setting as possible. The created tool could be characterised as a network-facilitating innovation policy tool. The tool tries to enhance the quality and functionality of regional innovation networks making its application practical in any kind of region.

7.2 The Regional Development Platform Method and the Lahti Region

Creating the Regional Development Platform Method as part of a practical development process has been an interesting task. In the beginning of the 1990s the Lahti region was in an awkward situation because its regional competitiveness was significantly threatened. As

an old industrial region it had begun to decline and the region had serious problems transforming itself from the industrial era to the information era. During the 1990's a large consensus that knowledge creation and innovativeness should be heavily promoted in the region had emerged. The development process of the Regional Development Platform Method started when I was named the project director of a regional project called "Development of higher education services and science park activities in the Lahti region". The aims of the project were widely approved, but the operational ways of acting were very unclear. Because of the lack of a regional innovation policy, the regional innovation system had been formed randomly and nobody really knew what it was and where it should be steered. I realised right at the outset that a step-to-step development tool was needed in the process and I was not aware of the existence of such a tool.

The regional development process and the process to design a suitable innovation policy tool began with asking basic questions like: What are the characteristics of the changing techno-economic paradigm and what are its effects on socio-institutional systems? How can a region build sustainable competitiveness? What is the role of history and resource-base in building competitiveness? How can an innovation policy be carried out in a networked regional development environment? What are the origins of innovativeness in the present world? How could learning processes be enhanced in a region? What is the role of social capital and how could it be promoted in such a fragmented environment? These questions paved the way for the development process and the tool that was created.

One might ask why did the Lahti region choose the Regional Development Platform Method as a tool for innovation policy and not some other method? Actually, the Lahti region never chose the tool. It is the baby of the development process in the region. I acted as both

father and midwife. The development process began with a thorough theoretical assessment including benchmarking the existing regional innovation system conventions. This assessment outlined the shape of the Regional Development Platform Method. The method was carried out phase by phase in an interactive process with the central players in the region. The method was improved by discussions with those players and by further theoretical assessments. The practical work was guided by the theoretical assessments, and they in turn were guided by the practical work making the theoretical and empirical parts sufficiently compatible in this work. However, sometimes it was slightly difficult to make room for the theoretical work because of the intensive practical work.

What are the actual effects of the tool on the Lahti region? The main effects are the changed patterns of acting and increased awareness of the regional innovation system and its importance for the region. Earlier there were some randomly working organisations trying to enhance the entrepreneurial activities of selected sectors. The old-fashioned industrial policy measures were dominant. However, the Lahti region lacked dynamic strong industries and clusters. This led to the idea of regional development platforms as a concept to describe the business potential in the region by making promising combinations of industries, areas of expertise and future megatrends. It was considered to be an innovative way in creating new paths from existing resource configurations. Perhaps the main change from the earlier situation has been the active creation of regional multi-actor innovation networks by the core processes. The knowledge creation and management in those networks are strongly emphasised in those networks. The knowledge creation tool, the rye-bread model, included in the innovation policy tool has been well received in the region.

The Regional Development Platform Method has changed the strategy work in the region remarkably. The recent strategies are based on the regional development platform and core process thinking (see Korkeakoulutyöryhmä, 2002; Päijät-Hämeen liitto, 2003a, Päijät-Hämeen liitto, 2003b; Harmaakorpi *et al.*, 2003; Harmaakorpi *et al.*, 2004). Because the core processes are the main method of funding the development of the regional innovation system, a good foundation is laid for further development. The realisation of the Regional Development Method in the Lahti region is so recent that it is too early to say what are its effects in terms of concrete success. Many of such indicators have been favourable to the region in the past two or three years, but it would be naïve to try to estimate what is the role the Regional Development Platform Method in this process. It is certain, however, that the method has changed the innovation policy in the region and in that sense it has responded well to the demands placed on it.

The Regional Development Platform Method can also be criticised based on the experiences gained in the Lahti region. It is a systemic and unconventional tool and, therefore, is quite vulnerable in practical use. It takes a long time to conduct all the phases making it quite demanding to use. It is particularly difficult to realise the formation of the core processes of the regional innovation system and to begin the collective knowledge creation process. In the Lahti region some of the core processes have started very well while some are still struggling in the starting phase. It needs much shared vision and will power from the central developers of the regional innovation systems to make the necessary institutional changes happen. If a region lacks will power and shared vision it is better to use some more conventional methods. The tool can also be criticised as it tries to change too much in too short a time. It is quite a leap from conventional industry based development strategies to the Regional Development Platform Method

and it has obviously been difficult to assimilate in some circles. There has also been some criticism that it is somewhat difficult to explain to outsiders how this new type of innovation policy in the Lahti region works because of the very many new terms and concepts.

How could the Regional Development Platform Method be developed further? I think it needs to be developed further in every aspect. All the phases of the tool need to be refined and will be refined when more empirical information is gathered in coming years. In the Lahti region, the assessment of the future scenarios were conducted in too hasty a manner due the tight schedule. The phase should be emphasised and carried out in a more interactive process and give it the time it needs. The tool should be developed so that it is a long-term method for regional innovation policy. The first six phases of the tool should be conducted at regular intervals, perhaps once every five years, in order to check the changes in regional resource configurations. Developing the functioning of the core processes and the innovation networks in them is a continuous process that needs much effort. There is still much work to be done to create methods, which will help to continuously improve the core processes.

8 VALIDITY AND RELIABILITY OF THE STUDY

The validity and reliability assessment is conducted using the validation criteria of Kasanen *et al*. (1993).

Relevance

Relevance of a study refers to the importance of the topic, relation to an issue of public importance and the contribution of the conclusions to the existing knowledge. A vast amount of material produced both in the fields of science and policy-making shows the topic to be on the focal point of social science and one of the main topics in practical policy measures. The scientific justification was presented in the theoretical assessment of the study and, in addition, there is plenty of evidence in the statements of several organisations at the global (e.g. OECD), European (e.g. the EU), national (e.g. Finnish National Agency of Technology) and regional (e.g. The Regional Council of the Lahti Region) level that fostering regional innovativeness is considered an extremely important matter. To my knowledge the approach taken in the development of the construct (RDPM) is new and, therefore, the contribution of the present study is evident.

Construct validity

Construct validity refers to the correct operational measures for the concepts being studied. The assessment of the phenomenon studied is based on the experimental learning cycle. A thorough theoretical analysis was conducted in order to secure the right scientific approach to the study. Combining the wide theoretical basis with the action part

of the research including hundreds of reflective discussions with the actors of regional development network is considered to assure the construct validity of the research.

Internal validity

Internal validity refers to the establishment of a casual relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships. The study design was based on a combination of a thorough understanding of the theoretical background and wide experimental knowledge concerning the research problem, as well as the objective of the study in order to secure the internal validity of the study.

External validity

External validity refers to establishing the domain to which a study's findings can be generalised. The Lahti region and its development network were successfully used as a domain, where the construct could be tested.

Reliability

Reliability refers to demonstrating that the operations of a study, such as the data collection procedures, can be repeated with the same results. I have tried to delineate the research and the creation of the construct in as much detail as possible. In that respect it should be relatively easily repeated. In this kind of constructive action research, the influence of researcher-actor might be somewhat difficult to repeat. My role during this work has been also that of a consultant in the Lahti region, which has affected the actual development, established strategies and emerged institutional settings in the region. This action might be hard to repeat, but it has been the actual cornerstone of the whole research. However, I have tried to explain

my thinking carefully in order to enable repetition of the actions taken during the research process.

Experience

Experience refers to the researcher's own experience supporting the deep understanding of the phenomenon under the research. My long experience as manager, consultant and regional developer has been a great help in designing the study and in achieving the construct built. It would not be possible to conduct such a study without a deep and experimental understanding of the phenomenon. The research problem and objective of the study have emerged out of practical problems encountered in the fieldwork as a regional developer during the last five years.

Market based validation

Market based validation refers to the market test of the "truthfulness and usefulness" of new constructs. Kasanen *et al*. (1991) define a two phase market test. They point out that the first phase is already an extremely demanding test that only very few constructs pass. The first phase is the weak market test, asking if any responsible actor (in this case regional development network) has been ready to use the construct in its development and decision-making. The second phase is the strong market test, asking if the results of the actors are better after using the construct, and especially if the results are better than those of comparable actors that do not use the construct.

The regional development platform method has been constructed simultaneously with practical regional development processes in the Lahti region during the last three years. Since the time perspective is still very short, it is hard to evaluate the soundness of the method with the criteria of the strong market test. However, it has been well received in the region. In the start-up seminar for the age business

core process, the evaluation indicated that the regional development platform method, core process thinking and the age business core process got an extremely favourable reception among the actors, showing wide acceptance of the development tool used (Harmaakorpi and Pekkarinen, 2003). Especially encouraging was the fact that all the respondents were willing to actively participate in the development of the age business core process or at least to follow the development of the process. The other core processes defined have also started their work to form interactive regional innovation networks.

Happily for this present study, the most recent regional strategies in the Lahti region are based on the regional development platform method. For example, the provincial development strategy for 2003–2006 (Päijät-Hämeen liitto, 2003a), the regional higher education and research strategy written for the Finnish Ministry of Education (Lahden korkeakoulutyöryhmä, 2002) and the regional science park strategy (Harmaakorpi *et al.,* 2003) are based on development platforms and core processes. The Lahti region belongs to the European Union Objective 2 regions. Therefore, its development activities are largely resourced by European structural funds. The “expertise programme agreement” (Päijät-Hämen liitto, 2003b), signed by the regional development actors, steering the Objective 2 funding until 2006 is based on regional development platforms and core processes. The final phase of implementation of the knowledge management system, the rye-bread model, for the core processes of the Lahti regional innovation system is in its final phase (Harmaakorpi *et al.,* 2004). Therefore, the Regional Development Platform Method has notably influenced the development in the Lahti region and the weak market test can be considered successfully passed.

9 CONCLUSIONS

This present study emphasises the crucial importance of the individual assessment of each region in building regional innovation policies and strategies. No patent recipes or undisputed best practices for regions can be given due to the strong path dependency of the regions and due to the turbulent techno-economic development. Regions have to build their competitive advantage under the changing techno-economic paradigm based on absolute competitiveness rather than comparative competitiveness. Absolute competitiveness is notably non-price competitiveness including very abstract factors being deeply embedded in the culture, history and institutions of a region.

Regional competitive advantage is based on valuable, rare, inimitable and non-substitutable resource configurations, but these resource configurations have to be renewed over time in order to remain competitive. The framework of dynamic capabilities focuses on these processes aiming at renewing resource configurations over time. At the regional level, dynamic capabilities are defined as the region's ability to generate in interaction competitive development paths in a turbulent environment. Dynamic capabilities aim to reform regional resource configurations based on the history of the region and opportunities emerging from the techno-socio-economic development. The present paper focused on five dynamic capabilities considered to be important in a networked regional innovation environment: (i) innovative capability, (ii) learning capability, (iii) networking capability, (iv) leadership capability and (v) visionary capability.

The present study emphasises the interactive nature of the innovation process. Innovation is often a consequence of many kinds of learning processes embedded in various ordinary economic and social activities and, therefore, interaction seems to be crucial in promoting innovations. Future innovation policies should place more emphasis on the nature of these interaction processes than the old science and technology policies have done. The old policies have been relying more on fostering scientific activities and building infrastructure. The sunrise innovation strategies should include: (i) understanding the effects of the changing techno-economic-paradigm on the regional innovation environment (ii) understanding the phenomena of regional path-dependency and agglomeration, (iii) avoiding regional lock-ins, (iv) defining competitive regional resource configurations, (v) forming multi-actor innovation networks to exploit the resource configurations, (vi) enhancing the absorptive capacity of the innovation networks, (vii) creating sufficient creative social capital, (viii) promoting regional dynamic capabilities, for example, innovative, learning, networking, leadership and forecasting capabilities and (ix) understanding the multi-level governance environment in forming innovation policies and strategies.

The demand for new innovation policies and strategies has been clear and widely accepted. It is, however, far from clear which kind of practical form these new policy applications should take. The regional policy-makers have been lacking practical step-to-step methods in reforming regional innovation environments in order to respond better to the demands of the new techno-economic paradigm. In the present study, a new innovation policy tool and corresponding concept for regional development was developed. This is the concept of a regional development platform. It is designed as a tool for assessing the regional development potential. Regional development platforms were defined to be regional resource configurations based on the past

development trajectories, but presenting the future potential to produce competitive advantage existing in the defined resource configurations. Therefore, the concept gives a new, regional perspective on building agglomeration economies.

The Regional Development Platform Method (RDPM) offers an institutional innovation for tackling the new demands for innovation policy. The method helps to look for regional business potentials on which it is possible to build the future competitive advantage of a region. The dominating idea of developing the Regional Development Platform Method has been the importance of the individual regional development paths in designing development strategies and tackling the above-mentioned challenges for regional innovation policies. An essential part of the method is the core process thinking. It is designed to form innovation networks aiming at exploiting the business potentials existing in the regional development platforms and at promoting regional dynamic capabilities. In the last phase of the Regional Development Platform Method, special attention is directed to regional knowledge creation and management.

The Regional Development Platform Method has been piloted in the Lahti region in Finland during the last three years. The development of the Lahti region had been relatively stagnated since the economic collapse at the beginning of the 1990s. New methodological approaches were needed to get a new boost for the successful bath creation process in the region. This set-up started an interactive experimental learning cycle including intensive phases of practical work and theoretical analysis. This interactive process led to the creation of the Regional Development Platform Method and its concrete application in the Lahti region. The experiences of the process have been encouraging. According to the surveys conducted, the actors of the pilot core process have been pleased with the

Regional Development Platform Method. The most recent strategies and programmes in the Lahti region, like the provincial development strategy for 2003–2006, the regional higher education and research strategy, the regional science park strategy and the expertise programme agreement are based on development platforms and core processes.

As a final conclusion, an illustration of the modern regional innovation environment is presented in Figure 25. The illustration may look complex, but that is what developing a regional innovation system is all about: managing complexity. A regional innovation system is affected by techno-economic change creating demands for renewal of regional resource configurations in interactive, networked and cumulative development process. This process needs to be promoted by an adequate policy tool leading the way to regional innovativeness, productivity, competitiveness, economic growth and wellbeing of citizens. The Regional Development Platform Method offers such a tool.

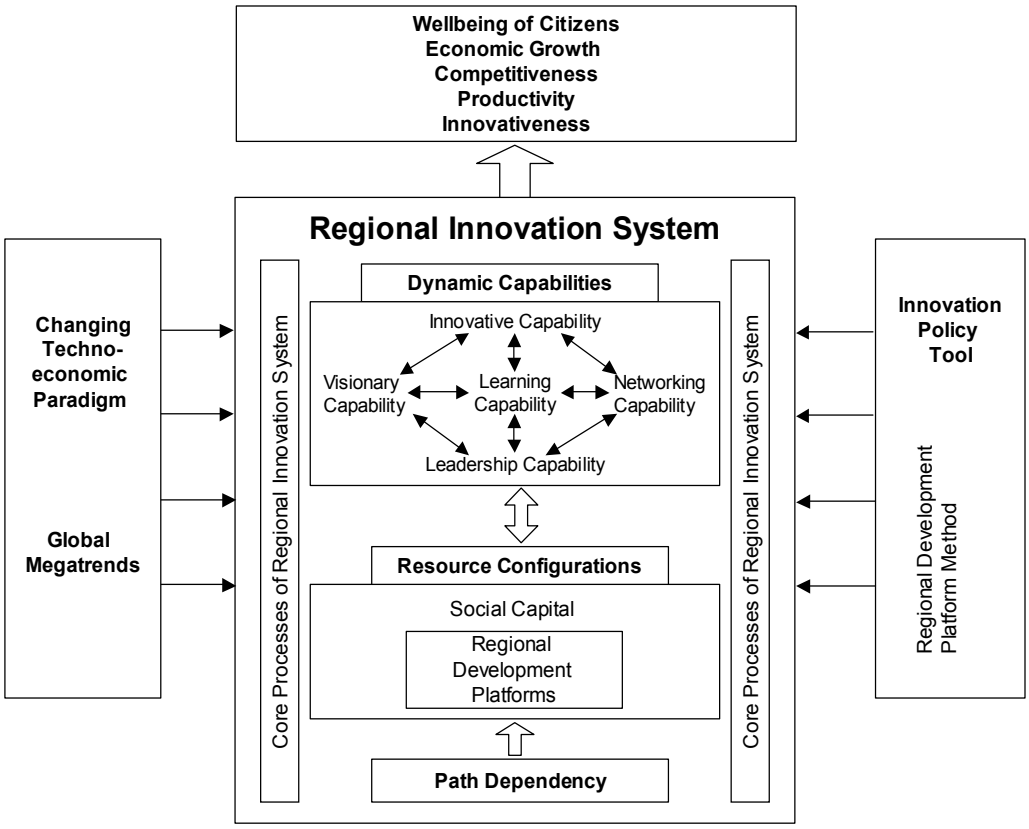

Figure 25. *Systemic framework for development of a regional innovation system.*

10 DIRECTIONS FOR FURTHER RESEARCH

The complex character of regional innovation systems makes the research of them a very challenging task. The research should combine theories and methods from many different disciplines. The interdisciplinarity is, thus, the dominating character in the research in this field. This present study has revealed the necessity of asking at least the following questions in the future research.

- How could social capital be measured in a regional innovation system? The importance of social capital as a regional resource was emphasised in this present study. However, its specific role in the innovation processes has to be studied more carefully. Social capital is hard to estimate and measure because of the undeveloped methods for empirical research. So far the measures of social capital have focused on a wide institutional environment and on such community-level indicators that are hardly applicable to the research of regional innovation systems.

- What really are the regional dynamic capabilities? The characteristics of the dynamic capabilities in a regional context must be analysed more thoroughly. They must be analysed with more varied data.

- What is the role of dynamic capabilities in reconfiguring social capital as a regional resource? Social capital is a form of capital that is all the time in danger of becoming stagnated and, thus, preventing innovativeness. The role of dynamic capabilities, especially leadership capability, should be analysed in the reconfiguration process of social capital.

- How to conceptualise and measure information quality in regional innovation networks? Good information quality was claimed in this present study to be a crucial factor in the successful regional knowledge creation and collective learning.

The subject has been studied very little in general and especially in multi-actor innovation networks.

- How could futures research be used more effectively in exploring potential regional development platforms? This present study applied futures research methods in the knowledge management and creation system in a core process of a regional innovation system. The benefits of these methods could, however, be even bigger in exploring the potential regional development platforms.

- What policy measures could be taken in order to make the multi-level governance environment more effective at the regional level? The emerging multi-level governance environment is seemingly causing inertia, collisions and inefficient use of resources at the regional level. New policy implications are needed in this environment.

- How could enough shared vision be built in a region? The regional development network consists of actors with very different backgrounds and aims. An important question is how to build a portfolio of strategies in a region to enable a successful future development path to take place.

- What kind of leadership is needed in different kinds of regional development networks? Network leadership has been emphasised in today's regional environment. The demands for leadership vary, however, depending on the actual nature of the networks.

- What is the role of regional innovation networks in the aggregate system of innovations? The significance of regional innovation networks should be thoroughly analysed as part of regional, national, supra-national and sectoral innovation systems.

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Industries →

The criteria for assessing the industries ↓

The criteria for assessing the industries	Plastics	Environment	Biotechnology	Construction	Electronics	Information technology	Mechanical wood products	Furniture	Machine and metal	Textiles and clothing	Food products and beverages	Media	Tourism and culture	Logistics	Commerce
Amount of entrepreneurial activity and employment capacity	7,77	5,90	3,23	6,27	5,00	4,57	7,70	8,87	8,70	6,83	6,27	5,07	5,87	5,67	7,37
Growth potential	8,27	8,17	7,20	5,23	6,30	7,27	6,50	6,43	7,30	5,00	5,40	6,97	6,97	7,47	6,57
Balance of the entrepreneurial structure	6,10	5,62	3,63	6,10	5,66	4,93	6,93	7,00	7,90	5,66	5,48	5,40	5,34	6,15	6,86
Internationality of entrepreneurial activity	8,37	6,00	5,52	2,87	6,00	5,90	6,97	6,07	7,80	7,47	4,34	4,60	6,13	6,30	3,79
Innovativeness of entrepreneurial activity	8,03	7,03	6,88	4,27	6,10	6,77	5,47	5,00	6,53	5,41	4,76	6,63	5,79	5,31	4,17
Processing value / know-how intensity of entrepreneurial activity	8,20	7,23	6,86	4,45	6,23	7,13	6,27	6,20	7,33	6,00	5,33	6,57	5,20	5,28	5,15
Capability of the leadership of top enterprises	8,43	7,07	6,50	5,62	6,38	6,70	7,00	6,97	7,43	6,97	6,52	6,61	5,79	6,31	6,46
Regional adequacy of educational opportunities	7,13	7,50	4,83	5,07	5,79	6,83	7,03	7,73	7,10	6,60	5,59	7,00	6,37	4,64	6,62
Regional research input	7,63	7,03	5,29	3,80	5,37	6,37	5,83	5,77	6,27	4,57	4,63	5,11	4,20	4,17	4,27
Regional technology transfer activities	7,29	6,76	4,33	3,86	5,59	6,72	5,38	5,45	5,76	4,25	3,89	5,28	3,89	4,00	3,74
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Average	7,72	6,84	5,41	4,75	5,84	6,32	6,51	6,55	7,22	5,89	5,24	5,92	5,57	5,54	5,51
Standard deviation	1,58	2,00	2,72	2,15	2,10	2,15	1,94	2,00	1,63	2,08	2,10	2,01	2,12	1,92	2,33

APPENDIX 1. *Assesment of industries.*

HELSINKI UNIVERSITY OF TECHNOLOGY

Areas of expertise →

The criteria for assessing the areas of expertise ↓

The criteria for assessing the areas of expertise	Design	Quality	Environmental technology and ecology	Biotechnology	Information technology	Mechatronics	Communication and content production	Economy and administration	Innovation management	Wellbeing	Assembly	Marketing	Internationalisation	0	0
Quantity and quality of entrepreneurial activity (Knowledge Intensive Business Services - KIBS)	6,37	5,63	6,37	3,67	5,27	6,53	5,80	6,48	4,83	5,21	5,90	5,57	4,77		
Regional pioneering quality / innovativeness in the area of expertise	7,87	6,90	7,13	4,63	5,10	6,27	5,77	4,79	4,50	4,83	5,57	4,66	4,50		
Regional and interregional networking the area of expertise	6,80	6,13	7,14	4,52	5,93	6,31	5,59	5,04	4,71	4,93	5,69	4,59	4,79		
Regional adequacy of educational opportunities	8,47	7,20	7,40	4,23	6,67	6,93	6,17	6,97	4,27	6,62	5,23	5,97	4,60		
Regional technology transfer activities	7,66	6,86	7,34	4,22	6,52	6,17	5,54	5,04	4,90	4,62	5,10	4,36	4,07		
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Average	7,43	6,54	7,07	4,25	5,89	6,45	5,78	5,67	4,64	5,26	5,50	5,04	4,55		
Standard deviation	1,87	1,81	1,85	2,50	1,96	1,53	1,73	1,92	1,89	1,93	1,84	1,95	1,88		

APPENDIX 2. *Assesment of the areas of expertise*.

HELSINKI UNIVERSITY OF TECHNOLOGY

Areas of expertise \ Industries	Plastics	Environment	Biotechnology	Construction	Electronics	Information technology	Mechanical wood products	Furniture	Machine and metal	Textiles and clothing	Food products and beverages	Media	Tourism and culture	Logistics	Commerce
Design	7,73	4,61	3,64	5,71	5,60	4,55	5,69	8,47	7,00	8,34	4,93	5,93	5,03	3,39	5,18
Quality	8,13	6,72	6,21	6,31	7,47	7,03	7,48	7,70	7,90	7,34	7,55	6,38	6,11	6,18	6,55
Environmental technology and ecology	7,40	8,83	7,70	6,14	5,66	5,21	6,37	6,53	6,52	6,24	7,28	4,37	6,37	5,83	6,13
Biotechology	5,45	7,67	8,63	3,50	3,54	4,07	4,41	3,89	3,44	4,15	7,21	2,96	3,33	2,77	4,22
Information technology	6,67	6,40	6,62	5,28	8,53	9,00	6,55	6,20	7,03	5,97	6,03	7,57	5,17	6,73	6,43
Mechatronics	7,23	5,45	4,68	4,86	7,40	6,43	6,97	6,80	8,23	5,52	4,93	3,77	2,36	4,79	3,67
Communication and content production	4,67	5,13	4,38	4,32	5,10	6,60	4,17	5,53	4,63	5,97	5,10	8,50	7,07	5,00	6,33
Economy and administration	6,55	5,83	5,50	6,71	6,62	6,90	6,59	7,14	7,03	6,82	6,79	6,39	6,10	6,69	7,62
Innovation management	7,73	7,60	7,29	5,07	7,48	7,57	6,43	6,47	6,80	6,07	5,52	6,21	5,59	5,14	5,00
Wellbeing	4,37	6,21	5,34	5,34	4,76	5,24	4,48	5,97	5,04	6,07	6,32	4,52	6,30	4,19	5,50
Assembly	7,55	5,00	4,11	6,39	7,71	5,71	6,55	7,97	7,83	5,50	4,28	3,19	2,75	5,12	4,32
Marketing	7,10	6,60	5,55	5,86	6,27	6,33	6,77	7,87	6,77	7,62	7,07	6,90	7,20	5,87	7,60
Internationalisation	7,63	7,07	6,17	4,41	6,23	6,70	6,77	7,23	6,73	7,52	5,48	5,60	6,83	6,30	5,34
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APPENDIX 3. *Significance of the areas of expertise for the industries*.

HELSINKI UNIVERSITY OF TECHNOLOGY

Industries ↓ / Industries →	Plastics	Environment	Biotechnology	Construction	Electronics	Information technology	Mechanical wood products	Furniture	Machine and metal	Textiles and clothing	Food products and beverages	Media	Tourism and culture	Logistics	Commerce
Plastics		5,83	4,69	5,73	6,93	5,34	3,62	6,17	5,70	4,03	6,13	3,03	2,24	3,69	4,83
Environment	6,30		7,43	6,30	5,23	4,55	5,90	5,67	5,73	5,20	6,73	3,25	5,55	4,97	5,24
Biotechnology	5,07	7,27		2,89	3,93	3,96	3,86	2,71	3,36	3,32	6,93	2,64	2,46	2,39	3,31
Construction	5,72	5,80	3,21		4,10	4,00	7,30	6,00	5,70	2,93	2,93	2,97	3,90	4,52	5,33
Electronics	6,70	5,47	4,97	4,90		7,67	4,97	4,66	7,20	4,03	4,10	5,00	3,24	4,57	4,93
Information technology	6,40	6,17	5,83	5,33	8,23		5,87	5,77	7,20	5,40	5,37	7,57	5,13	6,40	6,50
Mechanical wood products	3,17	4,76	3,43	7,30	4,04	4,29		7,57	5,14	2,29	2,21	2,86	3,07	4,68	3,43
Furniture	5,25	4,36	2,70	6,00	4,00	4,43	7,43		4,82	4,21	2,00	3,61	3,46	5,43	5,29
Machine and metal	5,33	5,27	3,10	6,50	6,37	5,68	6,23	5,90		3,48	3,90	3,41	2,41	5,45	4,45
Textiles and clothing	3,57	4,00	3,21	3,04	3,22	4,11	1,96	5,33	3,11		2,04	3,83	3,76	4,61	5,83
Food products and beverages	4,72	5,00	6,41	2,70	3,00	4,25	1,93	2,57	3,74	2,11		4,00	4,54	5,55	6,66
Media	3,50	4,17	3,25	3,59	4,79	6,55	3,27	4,30	3,43	4,37	4,10		6,80	3,82	6,07
Tourism and culture	2,04	4,70	2,34	4,37	2,54	4,11	2,61	3,59	2,15	3,79	4,66	5,71		4,61	6,24
Logistics	5,63	4,93	3,25	6,66	5,03	5,34	6,07	6,63	6,48	5,87	7,07	3,69	5,38		7,53
Commerce	4,93	4,55	3,10	4,63	4,00	5,00	4,52	5,97	4,93	6,30	6,77	5,34	6,24	6,34	

APPENDIX 4. *Mutual significance of the industries*.

APPENDIX 5 (Harmaakorpi and Pekkarinen, 2002)

Plastics industry: Growth potential, global and national trends

The growth of the plastics industry follows the social and technological development, because the communications industry is an important client industry for the plastic products industry. For example, the fact that as telephones get smaller, the proportion of mechanics in the telephones increases, is of significance for the plastic products industry. In the present telephones, plastic parts constitute about one half. As production and competition become more international, the supplier of plastic parts is faced with great challenges. The producers of mobile phones expect their suppliers to be prepared to develop their production globally, because the parts supplier must be located as close to the telephone factory as possible.

The entire industrial production is predicted to grow in 2001 at a continuous growth rate of 4.0–4.5 %. The production of the plastics industry grew in 1999 0.8 % with respect to the previous year. In 2000, the growth is expected to pass this percentage, but to slow down in 2001. Of the industrial branches in Finland, the chemical industry has risen to third place, after the forest and metal industries.

The profitability of firms making plastic products has remained reasonably stable in recent years. It is believed that profitability and solidity will improve in the future. Profitability, especially in technical plastic products, is believed to be developing positively, and the industry has indeed become important in Finland. This is due to the positive development of the most important client industries of technical plastic products, namely the electric and electronics industry, the automobile industry and the furniture industry in recent years. The further success of the electric and electronics industry will indeed be crucial for many suppliers of plastic parts. According to the small and medium size industry barometer in the spring of 2001, about 30 % of the firms expect their personnel to increase during the following quarter. The expectations regarding the development of the personnel are more cautious compared to the situation the previous autumn.

Due to the fact that the plastics industry is based largely on parts suppliers and dependant on their client industries, networking is a central factor in the success of the industry. The tendency is to give the subcontractors bigger responsibility units so that the wide and varied expertise of the parts supplier is emphasised. A successful plastic parts supplier is expected to invest repeatedly in top technology and the development of production methods. Aside from a comprehensive know-how, specialisation is also a success. There is room for improvement in the co-operation among the suppliers themselves. The enterprises have also had difficulty in marketing and finding competent personnel.

Amount of entrepreneurship and employment creation

As of September 30, 2000, there were 60 industrial units in the Lahti region engaged in the production of rubber and plastics. Of all the industrial units, this industry accounted for 3.8 % of all the industrial units while the national average was 2.5 %. Accordingly, proportionately there are more places of business in this industry in the Lahti region than there are nationwide. There were 1,978 people working in the plastics industry in 1999 in the Lahti region, or 8.6 % of people employed in industry. In the whole country, the plastics industry personnel represented 3.5 % of people employed in industry.

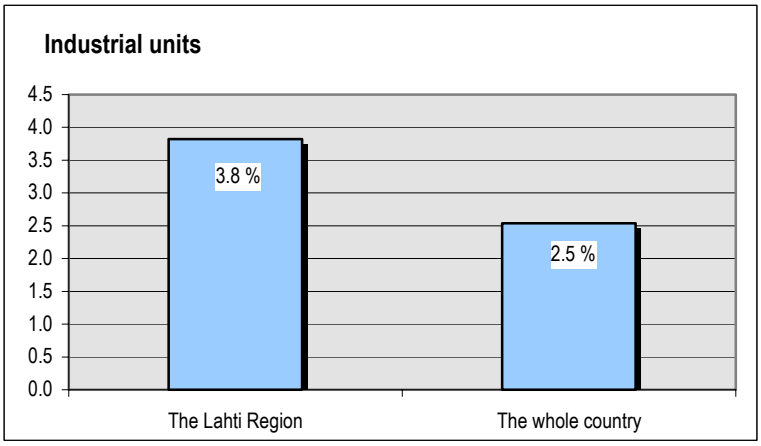

***Figure 1**. The proportion of the rubber and plastics industry of all industrial business units in the Lahti region and in Finland in 2000.*

Structure of entrepreneurial activity

In the plastics industry in the Lahti region, 59 % of all firms employed less than 10 people, 23 % employed 10–49, 13 % employed 50–249 and 5 % employed more than 250.

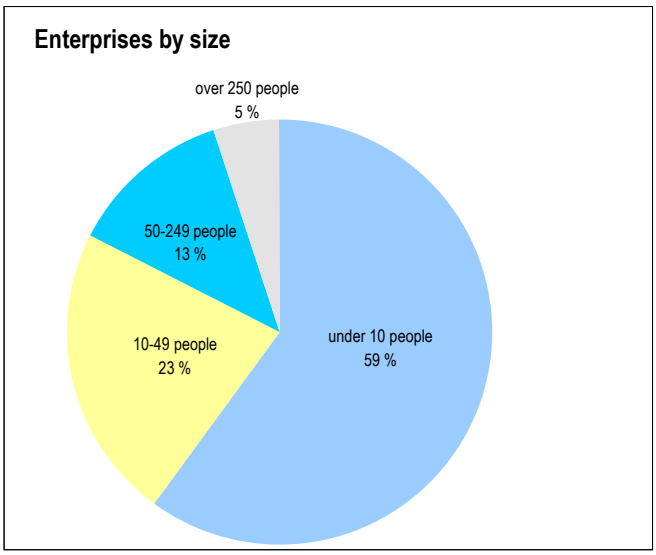

***Figure 2**. The plastics industry firms by size in the Lahti region 2001.*

Innovative capability of the industry

The plastics industry is a research-intensive industry. The plastic products industry in Finland holds a leading position in the world in technology. In the area of work methods (to which the plastics industry belongs in the international patents classification), 29 patents were applied for in the Lahti region in 2000, which represents over half of all patents applied for in the Lahti region. The amount is considerable in light of the general average in Finland, where the patents in this industry accounted for only 20 % of all patent applications.

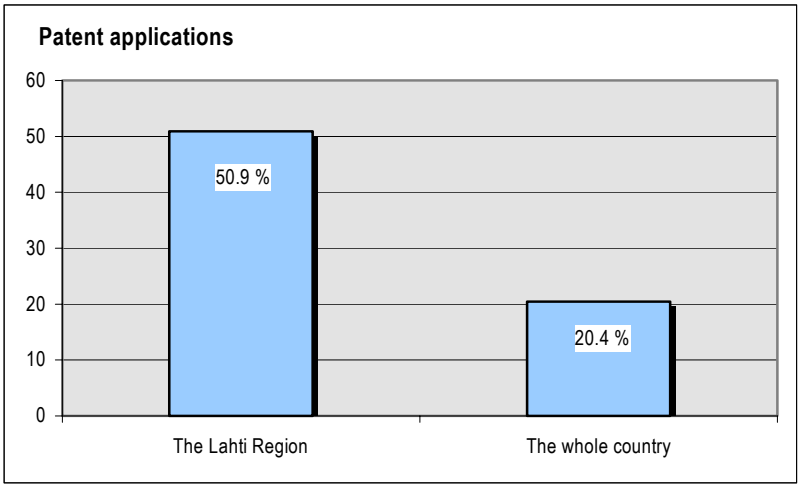

Figure 3. *Patent applications for work methods and the transport industry of all patent applications in the Lahti region and Finland in 2000.*

Value of production

In 1999, the value of production of the plastics industry was 117.3 million euros in the Lahti region, representing 11.8 % of the value of production of all industry in the region. In the whole country, the share corresponding to the plastics industry was only 3.0 % of the industrial value of production.

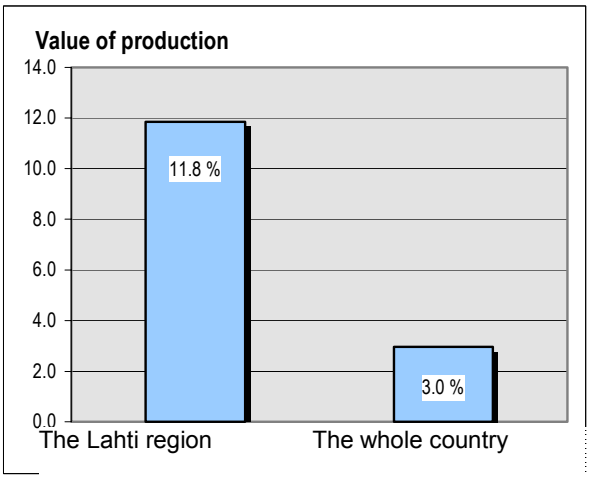

Figure 4. *The share of the plastics industry of the value of production of the whole industrial production in the Lahti region and in Finland in 1999.*

Internationality of entrepreneurial activity

The value of the exports of plastic products manufacture in the Lahti region in 1999 was 121.7 million euros, which was 11.8 % of the whole industrial export value of the Lahti region. In Finland, plastic product exports were only 1.7 % of industrial products.

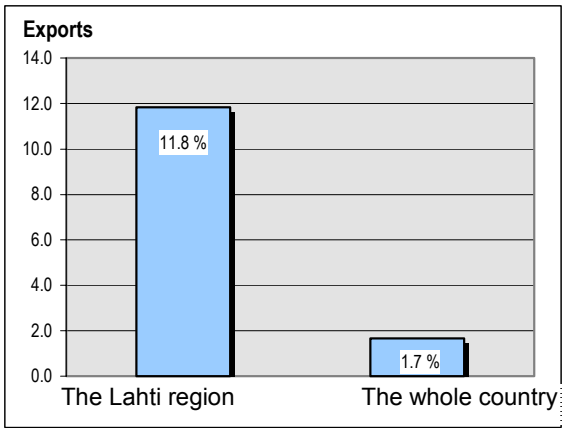

***Figure 5**. Plastics industry exports of all industrial exports in the Lahti region and in Finland in 1999.*

Educational opportunities

In plastics and materials technology, The Plastics Development Centre trains both company personnel and new people for the industry. The training for the professional title of 'plastics mechanic' includes three lines: thermoplastic, thermosetting plastic and plastic

According to the prediction concerning starting places in studies in the plastics and materials technology industry in the Lahti region for 2001–2005, an annual total of 45 students of higher education and 30 students in secondary education will start their studies.

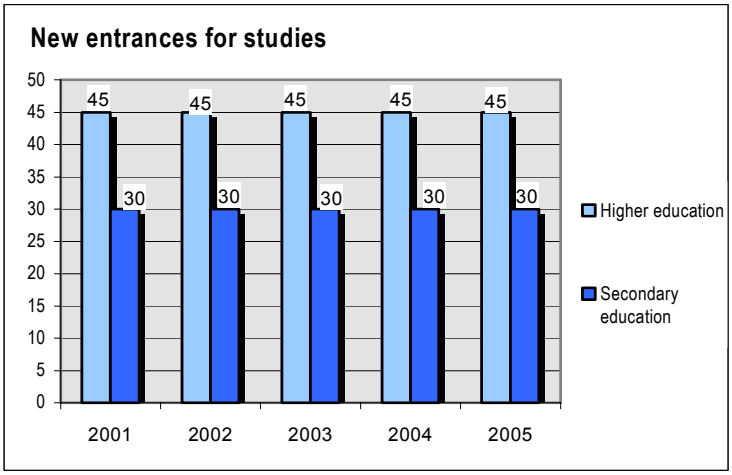

Figure 9. *New entrances for studies in plastics and materials technology in the Lahti region for 2001–2005.*

Technology transfer activities and research

The Plastics Development Centre in Nastola was founded to support the development of the Finnish plastics industry. It produces support services that improve the competitive capability of the plastics industry. The Plastics Development Centre offers product development, training, export and laboratory services, as well as services for creating new entrepreneurial activity in the plastics industry.

Supporting industries

It is typical of the plastics industry that the companies work as sub-contractors for other industries. The most important client industries are the foodstuffs and chemical industries. For the producer of plastic products in the Lahti region, the thriving, traditional metal and furniture industry and, for instance, Asko's household appliance manufacture, constitute a good local source for increasing orders. The motor industry is one of the biggest clients of the plastic parts industry. The Western European motor industry buys 1.4 billion tons of plastic in parts every year.