JYVÄSKYLÄ STUDIES IN BUSINESS AND ECONOMICS
99

Kirsi Mukkala

Essays on Regional Development and Labor Mobility in a Knowledge-based Economy

JYVÄSKYLÄN YLIOPISTO

JYVÄSKYLÄ STUDIES IN BUSINESS AND ECONOMICS 99

Kirsi Mukkala

Essays on Regional Development and Labor Mobility in a Knowledge-based Economy

Esitetään Jyväskylän yliopiston taloustieteiden tiedekunnan suostumuksella
julkisesti tarkastettavaksi yliopiston vanhassa juhlasalissa S212
toukokuun 13. päivänä 2011 kello 12.

Academic dissertation to be publicly discussed, by permission of
the School of Business and Economics of the University of Jyväskylä,
in auditorium S212, on May 13, 2011 at 12 o'clock noon.

UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2011

Essays on Regional Development and Labor Mobility in a Knowledge-based Economy

JYVÄSKYLÄ STUDIES IN BUSINESS AND ECONOMICS 99

Kirsi Mukkala

Essays on Regional Development and Labor Mobility in a Knowledge-based Economy

UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2011

Editor
Tuomo Takala
Jyväskylä University School of Business and Economics
Pekka Olsbo, Sini Tuikka
Publishing Unit, University Library of Jyväskylä

URN:ISBN:978-951-39-4305-9
ISBN 978-951-39-4305-9 (PDF)

ISBN 978-951-39-4284-7 (nid.)
ISSN 1457-1986

Jyväskylä University Printing House, Jyväskylä 2011

ABSTRACT

Mukkala, Kirsi
Essays on regional development and labor mobility in a knowledge-based economy
Jyväskylä: University of Jyväskylä, 2011, 127 p.
(Jyväskylä Studies in Business and Economics
ISSN: 1457-1986; 99)
ISBN 978-951-39-4284-7 (nid.), 978-951-39-4305-9 (PDF)
Finnish summary
Diss.

This thesis focuses on phenomena that are closely linked to regional development and increasing importance of knowledge. The concentration of economic activity and agglomeration economies, innovation activity and networking, and the labor mobility of knowledge workers are the main topics of four empirical studies. The empirical studies are preceded by an introductory chapter in which the background, outline and main results of the thesis are presented.

The first study considers the role of agglomeration economies - localization and urbanization economies - in three Finnish manufacturing sectors in 1995 and 1999 based on regional (NUTS 4) level macro data. The results indicate sector-specific differences in the role of agglomeration economies. Regional specialization seems to contribute more to labor productivity than diversification does, particularly in the manufacture of wood, paper and pulp and in printing and publishing.

The second study deals with the need for regional policy interventions intended to develop networks and innovation activity within high-tech firms. The interviews reveal that young, small high-tech firms in particular appreciate a customized support and fast reaction capabilities on the part of regional developers. Business knowledge and commercial perspectives on regional development activities are especially important.

The third study concentrates on the regional mobility of highly educated high-technology (HEHT) workers in 1999-2001, using individual-level data from Finnish Longitudinal Census. The results show that worker flows are heavily concentrated in urban regions, whereas other regions experience significant losses in the number of workers with high amounts of human capital resources. The propensity of HEHT workers to switch work regions seems to be slightly higher than among other workers, and this distinction contributes to the effective transfer of knowledge.

The fourth study pays special attention to the inter-industry mobility of skilled workers and worker flows toward the high-technology (HT) sectors and knowledge intensive business services (KIBS) that occurred in 2003-2004. Young workers are the most mobile, whereas earlier work experience, high education and high income level decrease mobility. These findings indicate that skilled workers are not necessarily the most mobile. However, highly educated workers move to KIBS sectors more often than to other sectors on average, and HT sectors attract workers with high incomes. Inter-industry mobility in the capital area and in other urban regions is frequent, whereas in one-sided industrial centers, opportunities to move are few.

Keywords: regional development, high-technology, knowledge, labor mobility

Author's address

Kirsi Mukkala
Jyväskylä University School of Business and Economics
kirsi.mukkala@jyu.fi

Supervisor

Professor Hannu Tervo
Jyväskylä University School of Business and Economics

Reviewers

Professor Heikki Eskelinen
Karelian Institute
University of Eastern Finland

Professor Franz Tödtling
Institute for the Environment and Regional Development
Vienna University of Economics and Business

Opponent

Professor Heikki Eskelinen
Karelian Institute
University of Eastern Finland

ACKNOWLEDGEMENTS

The studies reported in this PhD thesis were carried out during the years I worked as a researcher in the School of Business and Economics at the University of Jyväskylä. For financial support I would like to thank the Academy of Finland, the Foundation for Municipal Development (Kunnallisalan kehittämissäätiö), the University of Jyväskylä and the Yrjö Jahnsson Foundation.

This project took shape over the course of several years that were full of both enthusiasm and despair. I owe my greatest gratitude to my excellent supervisor Professor Hannu Tervo. His comments, suggestions and encouragement at all stages of this process have been very valuable. Without his patient support this dissertation would not have been finalized. I am also grateful for the important contributions of my official pre-examiners Professor Heikki Eskelinen and Professor Franz Tödtling. It is a great pleasure to have Professor Eskelinen as my official opponent.

I thank Timo Tohmo not only for his collaboration on one of the studies, but also for our interesting and useful discussions. Jari Ritsilä deserves special thanks for his innovative ideas and valuable talks. He has also provided me an excellent opportunity to participate in several research and development projects that have allowed me to expand my knowledge in new ways. I would also like to thank all my colleagues at the School of Business and Economics. The working atmosphere has been extremely positive all these years. I wish to thank my colleague and friend Sanna-Mari Hynninen especially for the first years of my PhD studies. We were roommates, and shared unforgettable experiences while studying in the Finnish Postgraduate Program in Economics (KAVA).

Many thanks also to my friends for sharing a long-lasting friendship that has provided a good counterbalance to my academic work. I am deeply grateful to my parents Hilkka and Heikki. They have given me a very loving and supportive foundation for life, and in the last four years their help in caring for my children has been indispensable. Finally, I wish to thank my husband Pasi and our lovely children Jenny and Jimi. They are the most important and most precious things in my life!

Jämsä, April 2011

Kirsi Mukkala

LIST OF ORIGINAL PUBLICATIONS

Article 1 pp. 35-51
Mukkala, K. 2004. Agglomeration economies in the Finnish manufacturing sector. *Applied Economics* 36, 2419-2427.

Article 2 pp. 52-76
Mukkala, K. 2010. The role of regional policies in promoting networking and innovative activity: Evidence from small Finnish high-tech firms. *European Planning Studies* 18, 1057-1076.

Article 3 pp. 77-93
Mukkala, K. 2008. Knowledge spillovers: Mobility of highly educated workers within the high technology sector in Finland. In J. Poot, B. Waldorf & L. van Wissen (eds.) *Migration and human capital*. Edward Elgar Publishing, 131-149.

Article 4 pp. 94-125
Mukkala, K. & Tohmo, T. 2010. Inter-industry job-mobility in the knowledge-based economy. (In referee process)

CONTENTS

1 INTRODUCTION

1.1 Background of the thesis

It is widely recognized that globalization and technological advances have led to considerable economic changes. The competitiveness of both regions and firms is strongly influenced by the creation and exploitation of new knowledge, innovation activity and networking ability. As production becomes more knowledge-based, advantages such as a well developed research infrastructure, a highly qualified work force and an innovative culture are becoming more important than natural resources. This change highlights the importance of human capital (Barro 1991; Aghion and Howitt 1998; Simon 1998). The new growth theory assumes technological progress to be endogenous, thereby paving the way for a new kind of thinking based on the contribution of accumulated knowledge and human capital (e.g., through education) and technological change (e.g., through innovations) to economic growth (see Romer 1986; Lucas 1988).

Countries and regions are increasingly defined by the same criteria that are essential to a knowledge-intensive firm: continuous improvement, new ideas, knowledge creation and organizational learning (Florida 1995). This connection encourages us to consider the concept of the knowledge economy. The knowledge economy is envisaged as a world in which the creation of increasingly complex and knowledge-intensive goods and services requires continuous innovation activity and learning capability on the part of the actors involved.

Many countries, including Finland, are attempting to increase education levels to ensure economic competitiveness[1]. Apart from that, economic features such as knowledge spillovers[2], networking and agglomeration externalities that

---

1 Education is typically considered an indicator of human capital.

2 Knowledge spillover is the exchange of information and ideas among individuals. The importance of knowledge spillovers has been emphasized by Grossman and Helpman (1991), Glaeser et al. (1992), Griliches (1992), Henderson et al. (1995),

benefit firms and individuals located in each others' neighborhoods, increase the efficiency of human capital use. The growing importance of such factors leads to greater spatial concentration of economic activity and population. A number of studies have investigated the relationship between economic growth and the concentration of people and firms, clarifying why firms benefit from their geographical concentration (the role of agglomeration economies). Indeed, in recent decades, Finnish regional development has been characterized by strong inter-regional migration and centralized economic activity that has spread into the capital area and other university regions. The rapid economic growth that has occurred in these regions is presumably based in large part on their knowledge capacity and knowledge-intensive (high-tech) sectors.

Agglomeration externalities, which are divided into localization and urbanization economies, are closely related to the process of knowledge creation and diffusion. The spatial concentration of economic activity facilitates interaction between individuals (through face-to-face contacts and labor mobility) and integration into innovative networks. Communication and interaction among individuals with different skills, knowledge, competence, incentives and values increase the probability that unforeseen new combinations and discoveries will occur (Kaufmann and Tödtling 2001).

My thesis focuses on different elements of knowledge-based economies: geographical concentration and agglomeration economies, technology intensity and innovativeness, and the labor mobility of skilled workers (Figure 1). The transfer of knowledge is connected to all of these phenomena, though it is possible to approach these topics from different perspectives by using diverse data. More specifically, I first investigate the role of agglomeration economies in Finnish manufacturing sectors. I use this region-specific analysis of three industrial fields to shed light to the topic of localization and urbanization economies in Finland. Knowledge spillovers are one of the most important factors in agglomeration economies, and their role continuously increases in tandem with the shift toward a knowledge economy. Knowledge-intensive sectors also tend to be clustered geographically and benefit from agglomeration economies. Next, I proceed by considering high-tech cluster and regional policy interventions. This firm-level approach provides insight into the concrete actions needed to support innovation activity and networking within high-tech firms. Finally, I address issues of regional and inter-industry labor mobility. Labor mobility is a crucial indicator of labor market flexibility and adaptability. Moreover, highly educated and skilled mobile workers are considered potential channels of knowledge spillovers. Labor mobility is investigated from the perspective of knowledge-intensive sectors and the creation of knowledge spillovers.

Anselin et al. (1997), Almeida and Kogut (1999), and Audretsch and Feldman (2004), among others.

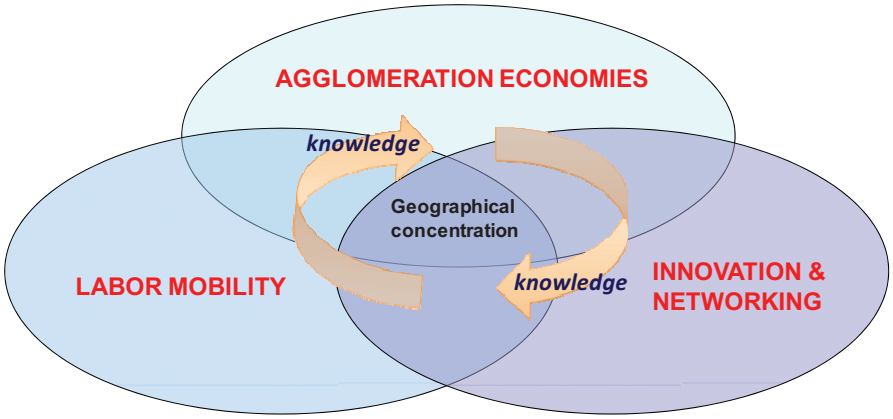

FIGURE 1 Framework of the thesis

The structure of this introductory chapter is as follows. Section 1.2 introduces the agglomeration economies and focuses on the increasing importance of knowledge and innovations. It first presents the basic characteristics of localization and urbanization economies and provides a short overview of earlier results. Then, it discusses innovations, knowledge spillovers, the high-tech and KIBS sectors and labor mobility. Section 1.3 presents the characteristics of regional and industrial development in Finland. The last section provides an outline of the four empirical studies included in this thesis. The studies are summarized based on the data used, main objectives and the results.

1.2 Overview of agglomeration economies and the increasing importance of knowledge

1.2.1 Localization and urbanization economies

The new economic geography (NEG), developed by Fujita (1988), Krugman (1991) and Venables (1996), aims to explain the concentration of industries and workers in geographical space (agglomeration). To some extent, economic activities are spatially concentrated because of dissimilarities in their natural features (first nature). NEG focuses on the concept of second nature, which emerges as the outcome of endogenous actions intended to improve upon first nature. Agglomeration is determined by the location decisions made by individual economic agents facing a trade-off between various forms of increasing returns and mobility or transportation costs (centripetal vs. centrifugal forces). Centripetal forces (or agglomeration economies) are those effects that foster the geographical concentration of firms and workers. Centrifugal forces, in turn, include increased costs resulting from transportation, higher wages driven by competition among firms for skilled labor, higher rents due to increased

demand for housing and land and various negative externalities such as congestion.

The role of agglomeration economies in spatial clustering and economic growth has long been a central theme in urban and regional economics. The concept of agglomeration economies suggests that spatially concentrated economic activity generates positive effects on the productivity of the firms located in the area in question. Thus, agglomeration economies are considered external economies. It has been demonstrated that agglomeration economies can arise from labor market pooling, sharing inputs, a well developed infrastructure and knowledge spillovers. Such economies can be further divided into two types: specialization or localization economies (Marshall externalities) and diversity or urbanization economies (Jacobs externalities). The former refers to the geographical concentration of specific industries, and the latter to the industrial diversity of local economies.

The concept of localization economies originates with Marshall (1920) and is later formalized by Arrow (1962) and Romer (1986). Localization economies are based on the scale of a particular industry, and they benefit all companies in a particular industry in a single location. Thus, they are internal to the industry but external to the firm. Marshall (1920) defines three sources of localization economies: scale economies for intermediate inputs, pooled labor forces with special skills and spatial knowledge spillovers.

As firms and workers become concentrated in a certain area, the local market expands. The proximity of suppliers and customers allows for effective forward and backward linkages. High local demand attracts producers of intermediate inputs and supporting services, which, in turn, makes the production of final products more efficient. Labor-market economies are a much-emphasized source of localization economies. By concentrating employment in a specific industry within one area, firms can quickly find the skilled workers they need, and workers develop better opportunities to advance their careers and they can easily change employers (e.g., in the case of layoffs). This reduces expected search costs and generates positive technological externalities. The role of knowledge spillovers is related to the idea of communication economies: firms in the same industry arrange to be located close to each other to reduce the cost of obtaining information (Eberts and McMillen 1999). Such an arrangement also makes it easier for firms and workers to benchmark each other's performance (Krugman 1998; Ottaviano and Pinelli 2004). For example, these externalities may be created through job mobility. In the context of localization economies, knowledge is assumed to be predominantly sector-specific, and spillovers are limited to the relevant industry. Thus, technological homogeneity and specialization broaden the sources of industry-specific knowledge.

Urbanization (diversity) economies are based on the scale of an entire urban economy, and they are available for all companies in all industries at a single location (external to the firm and industry). Urbanization economies emerge in cities with high population density on the individual, firm and industry level. A developed labor market and basic facilities (e.g., transportation, welfare and

education services), the supply of private services (e.g., financial, legal or recreation services), considerable local market capacity and diverse opportunities for face-to-face interaction (knowledge spillovers) are typical examples of positive urbanization economies (Kolehmainen 2003).

Whereas localization economies restrict knowledge externalities so that they occur only within the industry, urbanization economies assume inter-industry knowledge spillovers that come from outside the core industry. Technological heterogeneity and a diversified surrounding environment favor this kind of knowledge spillover (Lamorgese 1998). According to Jacobs (1969), a common foundation of scientific knowledge facilitates the exchange of existing ideas and the generation of new ones across disparate but complementary industries. The exchange of complementary knowledge across diverse firms and economic agents encourages greater returns on new economic knowledge. The diversity of economic activity and knowledge sources in cities creates higher growth and innovation activity given that many ideas developed by one sector can also be fruitfully applied in other sectors. Arrow (1962) has indicated that knowledge developed for any particular application can easily spill over and have economic value in very different contexts.

Even if the importance of agglomeration economies is widely recognized, there is no clear agreement on the role of localization and urbanization economies. The usual approach used to investigate agglomeration economies is the production function method[3]. This is the preferred method for authors such as Sveikauskas (1975), Segal (1976), Moomaw (1981; 1986), Nakamura (1985) and Henderson (1986). According to Segal (1976) the agglomeration effects in US metropolitan areas (those with more than two million people) contribute to the increase in total factor productivity by 8%. Sveikauskas (1975) suggests that doubling the US city size tends to increase labor productivity by 6%. However, Moomaw (1981) adds a capital-intensity measure to Sveikauskas' equations and finds only a 2.5% increase in productivity. In his later study, Moomaw (1986) finds that localization economies are dominant in some industries, whereas urbanization economies dominate in others. Nakamura (1985) examines nineteen two-digit manufacturing industries in Japan and finds that urbanization economies tend to dominate light manufacturing industries, whereas localization economies are dominant in heavy manufacturing industries. Henderson's (1986) results focusing on manufacturing industries in Brazil and the US support the existence of localization economies across manufacturing in general. However, Henderson (1988) also finds that urbanization economies are most important in the early stages of an industry's development, causing the industry to be located in the largest cities. As an industry grows, it may move to smaller cities, with localization economies becoming the dominant force (Eberts and McMillen 1999). Thus, while urbanization economies are important in attracting new industries (and high-tech sectors in particular), localization

[3] A literature survey and an extensive overview of the agglomeration economies are provided in Selting et al. (1994), Eberts and McMillen (1999) and Rosenthal and Strange (2004), among others.

economies are important for retaining industry (Henderson et al. 1995). The results of Capello (2002) indicate that localization economies are dominant for small firms in particular, whereas urbanization economies might be more beneficial for large firms.

Moreover, in some studies (e.g., Cortright and Mayer 2001), the specialization of high-tech employment in metropolitan areas is considered an indication of innovative competitiveness, whereas in others (e.g., Frenkel 2001), a negative relationship between specialization and high-tech R&D intensity emerges. Florida (2001) and Feldman and Audretsch (1999) find economic diversity across complementary economic activities with a common scientific foundation to be more conducive to technological development in metropolitan areas, and Paci and Usai (2000) find that both concentration and diversity indicators are important determinants of firm-level innovation intensity in labor market areas in Italy[4]. The effects of agglomeration economies may also vary from region to region, as the factors affecting them, like labor mobility, industrial structure and local policy activities, differ from one region to another (Raspe and van Oort 2008). In Finland, there has been no direct analysis of agglomeration economies.

1.2.2 Knowledge intensity and innovations

Innovation, knowledge and learning have become key factors in technological development and competitiveness for national and regional economies, indicating the emergence of a 'knowledge economy'. The knowledge economy is envisaged as a world in which new knowledge and ideas are created and incorporated into equipment and people (Trippl and Tödtling 2008). It is argued that human capital (and education in particular) is a crucial feature of a knowledge economy (Raspe and van Oort 2008).

The comparative advantage of developed countries has continuously shifted toward knowledge-based activities and innovation. Economic growth has been the most rapid in fields and regions in which innovations have a solid scientific basis. International competition, the speed of technological development and the increasing technological complexity of products and processes have made firms more receptive to external sources of innovation that complement their internal knowledge base (Müller and Peters 2010). They are actively seeking out new knowledge and externalizing formerly in-house research activities.

New knowledge (research results and service ideas) need to be absorbed and disseminated, and its commercial applications need to be identified to strengthen subsequent economic growth. Instead of the aim being the development of some specific industry, the focus becomes the role of new types of innovations (e.g., cultural and social innovations) and their horizontal exploitation as a prerequisite for regional growth and competitiveness. The traditional boundaries between different industries are breaking apart, and the ability of

---

4 See more on agglomeration economies and location of information and communication technology (ICT) firms in, e.g., van Oort and Atzema (2002).

regions and firms to combine knowledge from different fields and to operate innovatively in their interfaces has become more and more important (Mukkala et al. 2006). To create and commercialize innovations, cooperation and networks are needed at all levels of the production chain, including that of other firms, universities, funding bodies, consultants, service providers and government agencies. According to prior studies (e.g., Simmie 2001; Cooke and Morgan 2002), it is not just the existence of a skilled labor force, information, or suppliers that makes a region or firm innovative; the interaction between individuals and various institutions in the private and public sectors is also essential. Knowledge spillovers occur when people meet, interact, trade or cooperate. Thus, an innovative atmosphere requires repeated creative interaction and cooperation by individuals with different skills.

In a knowledge economy, workers do not just produce products in a traditional sense. Rather, they increasingly participate in knowledge processes with a strong emphasis on conversation and interaction (Van der Laan et al. 2000). It is widely known that an important part of human knowledge is context-bound, highly firm-specific and tacit in nature. Furthermore, there are limits to how knowledge can be effectively articulated, transferred and exploited. Marginal cost of transmitting knowledge, especially tacit knowledge, rises with distance. Tacit knowledge is inherently non-rival in nature, and knowledge developed for any particular application can easily spill over and have economic value in very different applications. Dense urban agglomerations of individuals, occupations and industries facilitate communication and learning and accelerate the flow of information that leads to innovations (Oerlemans et al. 2001; Patrucco 2003). Almeida and Kogut (1999) state that important aspects of the diffusion of knowledge include not only the inherent qualities of knowledge (tacit or easily imited) but also whether there is a regional labor market for engineers, scientists and workers.

1.2.3 High tech and KIBS sectors

The role of knowledge-intensive sectors as indicators of the state of the knowledge economy and drivers of economic and employment growth is clear (Cortright and Mayer 2001; Tödtling et al. 2006). Those sectors typically include the high- and medium-high-tech manufacturing sectors and knowledge-intensive business services (KIBS). Strong technology intensity is related to know-how and innovative activity. Such knowledge-oriented development has required firms to adjust their operations and restructure their organizations. From the perspective of production and employment growth, the ability of regions to renew and restructure their firms and industrial structures plays an important role.

There is broad agreement regarding the general characteristics of high-tech firms. Those characteristics include the following: involvement in innovative activity, R&D intensity, having a high proportion of 'technology-oriented' personnel, intensive use of technology, high technology content (patents, licenses and know-how) and leading-edge products or services (Glasson et al.

2006). Most high-tech firms are likely to be both producers and users of technology. The OECD has classified the manufacturing sectors according to their R&D intensity. That classification system provides a basis for a widely used high-technology classification scheme in which the high-technology and medium-high-technology sectors are included in the high-tech (HT) sectors[5].

The KIBS sectors are believed to be ones of the main drivers of technological change and economic progress. They provide non-material, intangible services (e.g., specialized expert knowledge, R&D competencies or problem-solving) that require highly skilled employees and in-depth client-supplier interaction. The KIBS sectors include traditional professional services, such as legal, accounting and marketing, and strongly scientific and technology-based services like R&D and computer services[6]. KIBS firms increasingly play the role of 'converters' of technological information within the economy (providers, purchasers or partners in the context of innovation). The role of KIBS can be seen as two-fold: these sectors act as external knowledge sources and contribute to innovations at their client firms while simultaneously also introducing internal innovations, providing mostly highly qualified workplaces and contribute to economic performance and growth. KIBS firms act as 'knowledge interfaces' between the different kinds of knowledge-producing institutions (Muller and Zenker 2001; Lith 2003; Patrucco 2003).

Industry characteristics affect the propensity to agglomerate. Because knowledge is created and transmitted more efficiently via local proximity, innovative economic activity based on new knowledge and R&D has a high propensity to cluster geographically (Audretsch 1998). Tacit knowledge, which is best transmitted via face-to-face contacts and through frequent interaction, is a key factor in explaining spatial clustering in knowledge-based sectors, especially in the early phases (Tödtling 1994). Face-to-face contacts among knowledge workers easily takes place in agglomerated environments, and thus, knowledge workers also benefit from being located near each other. In regions that are well endowed with knowledge-based actors, such as knowledge-intensive firms, universities and science parks, the production, diffusion and application of knowledge can improve. Knowledge agglomerations and dense networks can be strengthened through appropriately targeted political interventions.

---

5 High-technology: Aircraft and spacecraft; Office machinery and computers; Electronic and communication equipment; Pharmaceuticals, medicinal chemicals and botanical products; Medical, precision and optical instruments, watches and clocks. Medium-high-technology: Electrical machinery and apparatuses; Motor vehicles, trailers and semi-trailers, railway and tramway locomotives and rolling stock; Chemicals and chemical products; Machinery and equipment.

6 Typically the KIBS sectors comprise: Computer and related activities; Research and development; Legal, accounting, book-keeping and auditing activities; tax consultancy, debt collecting; Market research and public opinion polling, advertising, trade fair and product demonstration activities; Architectural and engineering activities and related technical consulting, technical testing and analysis, industrial design; Business and management consulting activities, labor recruitment and provision of personnel.

1.2.4 Mobility of workers

Power and Lundmark (2004) mention several reasons for the mobility of labor: that the availability of a young and growing population is a prerequisite for economic development; that mobility plays an important role in changes in industrial structure; and that mobility is assumed to have a considerable impact on the distribution of knowledge and the supply of tacit or non-standardized knowledge. Labor mobility may occur at different levels as a change in occupation, firm or industry. It may also take place within a specific region or between regions. Thus, job mobility and migration can be closely related to each other, but they can also be fully separate decisions. Migration[7] is an extensively studied field in Finland, whereas job-mobility[8] has been given less attention. Mobility decisions can be approached by using a human capital framework based on a process of utility maximizing[9]. Consequently, individuals are assumed to maximize their economic utility when making the decision to be mobile. In the labor mobility context, a person changes jobs if the expected utility from being mobile exceeds the economic utility gained from staying.

The movement of people between labor markets, sectors and firms has important consequences for industrial functioning and innovation. It can be argued that labor mobility is likely to create bonds and links between firms, workplaces and institutions and thereby encourages networking (Power and Lundmark 2004). High mobility is expected to facilitate the process of filling vacancies with suitable workers as quickly as possible in a continually changing, flexible labor market (Stambol 2001).

The emergence of the knowledge economy, which demands that people spend more time maintaining and renewing their human capital during their overall working career, has had a significant effect on job mobility on the internal labor market (in terms of in-work transitions, multi-skilling, and multitasking) and the external labor market. Moreover, the globalization of the economy and the resulting pressure on employers to adapt their workforces more rapidly to changes in aggregate demand (flexibilization) has increased the turnover in the labor market. Traditional long-term employment relationships are increasingly being replaced with more heterogeneous and volatile service sector jobs, which may have a positive impact on the job mobility. There has also been a rise in non-traditional work arrangements, including increases in the proportion of part-time workers, self-employed workers and casual/temporary hires.

---

7 For the Finnish migration studies, see e.g. Tervo (2000), Kauhanen and Tervo (2002), Haapanen (2003), Pekkala (2003) and Nivalainen (2005). Ritsilä (2001) and Ritsilä and Ovaskainen (2001) in particular are focused on migration and the spatial concentration of human capital.

8 Maliranta et al. (2009) consider inter-firm labor mobility as a channel of knowledge spillovers based on Finnish plant-level data. In the study by Virjo et al. (2007), the characteristics of mobile workers are analyzed. Ilmakunnas and Maliranta (2005) focus on job mobility measures and definitions, whereas the effect of mobility on earnings is the main topic in Eriksson and Jäntti (1995).

9 The human capital framework which is based on the models presented in Sjaastad (1962), Weiss (1971) and Schaeffer (1985), is widely used in migration studies.

Innovation activities require new ways of working, including project-work, flexibility and knowledge outsourcing (de Laurentis 2006). Due to the more rapid spread of knowledge, the demand for low-skilled labor decreases in favor of demand for better educated and more highly skilled workers (Muffels and Luijkx 2004).

From the labor market perspective, human capital can be defined as a set of skills (based on education, training and work experience) embodied in individuals that can be 'rented out' to employers through those individuals (Ehrenberg and Smith 2009). Human capital can be divided into three types of knowledge: firm-specific, occupation-specific and general (Dolton and Kidd 1998). The embodiment of knowledge in the workforce is one of the primary mechanisms through which processes of learning and knowledge transfer occur (Hommen and Doloreux 2003). Knowledge is developed and diffused through work-related interactions and spills over between firms via informal contacts among employees or because employees switch jobs and take their knowledge with them. Hiring specialists who have previously worked for one's competitors seems to be one of the most effective available mechanisms for acquiring some of the tacit knowledge of one's competitors (Saxenian 1994; Tödtling et al. 2004). Most potential workers from the knowledge spillover perspective are those with considerable human capital, including formal (high) education, working skills, tacit knowledge and suitable personal characteristics. Knowledge spillovers induced by labor mobility can be connected to agglomeration economies. Saxenian (1994) is among the first to have pinpointed high rates of mobility as a source of agglomeration economies in Silicon Valley. The mobility of labor within a specific industry may generate localization economies, whereas knowledge spillovers due to inter-industry mobility may create urbanization economies. In cases in which the mobile worker moves across regional borders, the receiving region may also benefit from knowledge spillovers. Labor mobility may involve long geographical distances and thus may actually reduce the localization effects of knowledge (Simonen and McCann 2010).

1.3 Regional development in Finland

Finnish society has undergone rapid change, transitioning from a traditional agricultural and industrial to a modern service- and high-tech-oriented, knowledge-based society. After the rapid growth of the 1980s, Finland was hard hit by a significant recession at the turn of the 1990s. A recovery period began in 1994, and the sectoral specialization of the economy changed dramatically. Rapid economic growth, together with structural change, has had the effect of centralizing both economic activity and the population (Tervo 2005; Eskelinen and Hirvonen 2006).

The development of regional structure is dependent on how strong the effects of agglomeration economies are and how mobile individuals are (Eskelinen 2001). Regional development in Finland has been marked by relatively

late but rapid urbanization. The trend has been from the northern and eastern part of the country toward the southern and central regions, where the capital area of Helsinki and most of the other urban growth centers are located. The average population density of Finland is approximately 17 persons per km^2, and one-fourth of the population (the total population in Finland is nearly 5.4 million) is living in the capital region (NUTS 4) (Figure 2).

The 1990s were a time of great economic flux, and regional competitiveness varied considerably, with the most competitive regions those that contained an urban center and especially those with a university (Huovari et al. 2001; Piekkola 2006). The urbanized south(west) of Finland, together with a few university centers in other parts of the country, is associated with an increasingly large share of all economic activity and experiences more rapid employment growth.

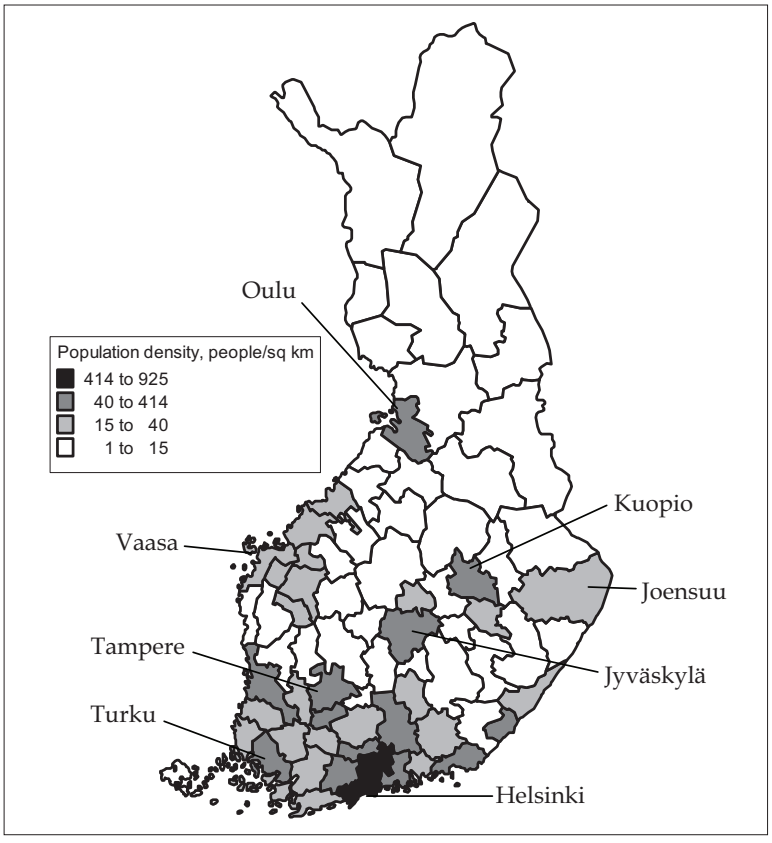

FIGURE 2 Population density in Finland in 2008 at the NUTS 4 level; the large multisided university regions are identified

The new growth period following the recession was mainly based on breakthroughs in the ICT sector (especially for Nokia) and its subcontractors (Antikainen and Vartiainen 2006). The success of the ICT sector continued until the beginning of the 2000s, after which time, growth ceased; the number of

employees has remained stable since then. Beginning in the mid-1990s, the increase in employment in the Finnish manufacturing sector was mainly based on the extension of the high-tech (HT) sectors. The application and development of high technology and strong R&D intensity have provided a foundation for the growth of certain manufacturing sectors, whereas employment in other manufacturing sectors has remained stable or decreased. In 2006, employment in HT sectors covered about one third of all manufacturing employment, or approximately 6% of all employment in Finland (Figure 3).

Along with the increase in knowledge intensity in the manufacturing sector, the service sector is rapidly growing. The significance of KIBS in particular is clear: the number of KIBS employees has more than doubled since 1995, and in 2006, approximately 6% of employees were working in the KIBS sectors (Figure 3). The outsourcing of private and public sector activities is often connected to the rapid growth of the KIBS sectors[10]. However, outsourcing covers only a part of the KIBS sectors. Some knowledge-intensive businesses are entirely new ones generated through technological developments and the emergence of new forms of economic activity. Moreover, the content of and modes of action prevalent in traditional KIBS fields have become more knowledge- and ICT-focused (Lith 2003; Nivalainen et al. 2009).

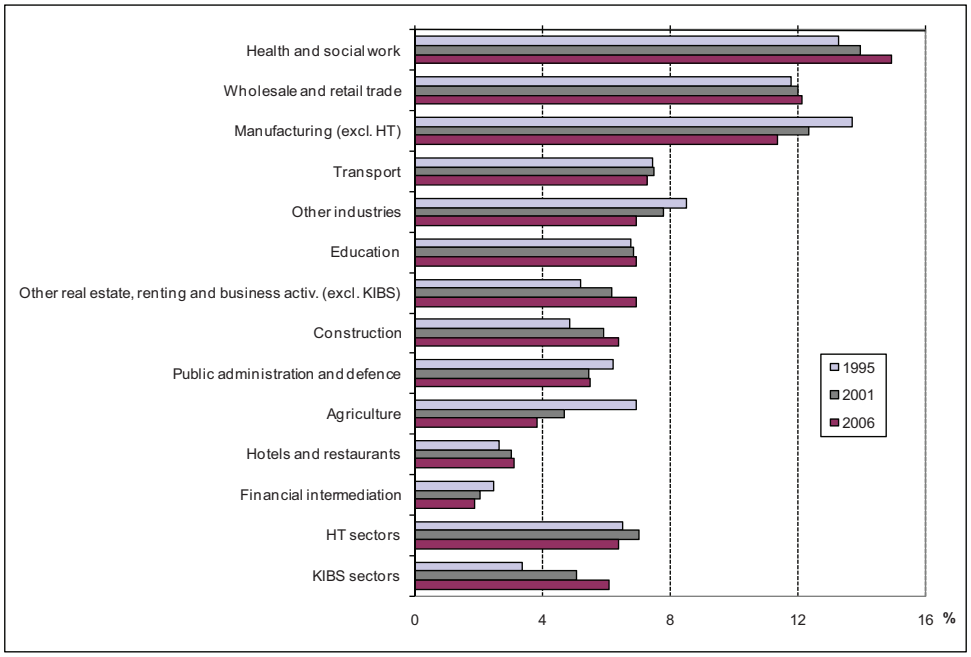

FIGURE 3 Employees by sector in 1995, 2001 and 2006, as a percentage of all employees

10 There is no exact information on the magnitude of the role of outsourcing within KIBS sectors in Finland.

The role of the operational environment is important for knowledge-intensive industries. The HT and KIBS sectors are strongly concentrated in a few regions in Finland (Figure 4). As many as half of all KIBS workers are working in the capital region of Helsinki. KIBS firms benefit from the proximity of customers and the skilled labor force. HT firms, in turn, are most often located in university regions in which a skilled labor force, R&D resources and international networks and connections are available. The distribution of the high- and medium-high-tech sectors reveals that the more technology intensive the sector is, the more likely it is to cluster.

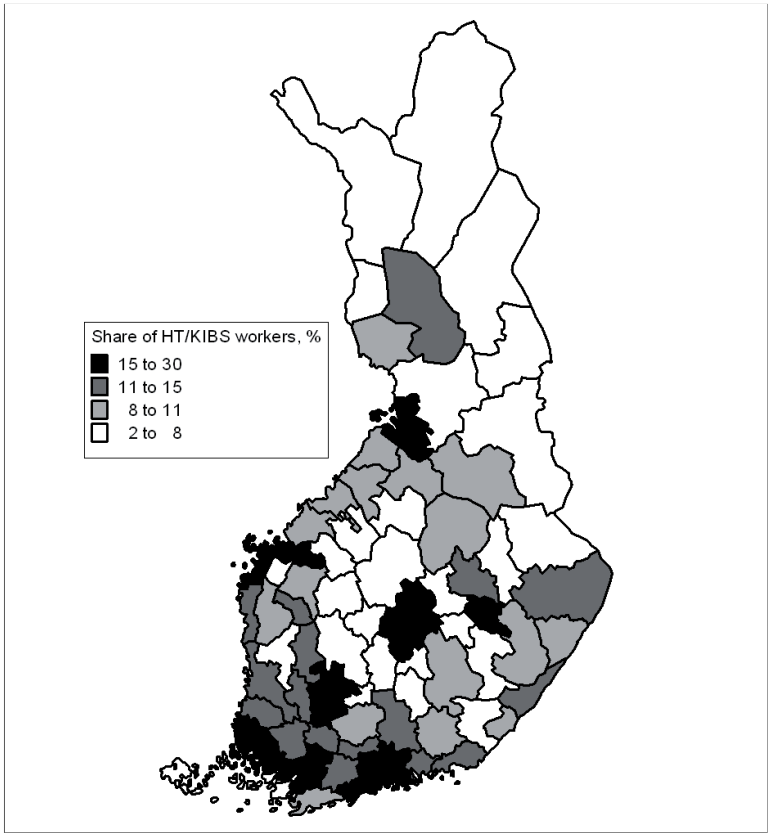

FIGURE 4 Share of high-tech and KIBS workers[11] relative to the overall number of workers in 2006 at the NUTS 4 level

At the same time as the structural changes in the Finnish economy, the rate of migration accelerated at a level that had not been witnessed in nearly three

11 Due to the limitations of the statistical data, the classification of the HT and KIBS sectors differ slightly from that represented in Footnotes 5 and 6. The manufacture of railway way and tramway locomotives and rolling stock and the manufacture of aircraft and spacecraft are excluded from the HT sectors. The KIBS sectors also include the maintenance and repair of office, accounting and computing machinery and holding company management activities.

decades. For example, between 1995 and 2000, about 1.5 million Finns migrated between municipalities (on average, 5% of the population per year), whereas the respective figure for the 1985 to 1990 period was 1.2 million (Nivalainen 2003). Migration has also continued at a high level in the 2000s. Migrant destinations, particularly for highly educated migrants, include just a few areas (in large cities and their surrounding areas), whereas many of the smaller or peripheral areas have even suffered from a net loss in (skilled) population. Thus, migration strengthens the accumulation of human capital in a few centers of education and research. Labor mobility can be connected with regional migration to a certain degree. The tendency to migrate is highest among workers in the private service sectors and trade (Figure 5).

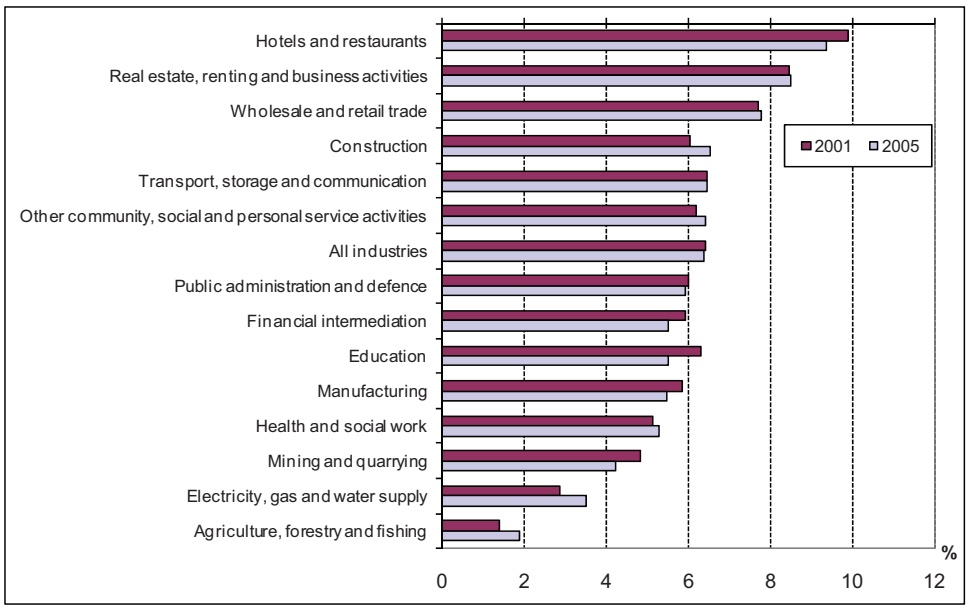

FIGURE 5 Regional mobility (NUTS 4 level) of workers by industries in 2001 and 2005

Labor mobility in Finland is more frequent than regional mobility. The rate of inter-industry mobility was approximately 8% annually from 2000 to 2007. The inter-industry mobility is strongly concentrated in the capital region and in the other large, many-sided university regions, whereas in one-sided industrial centers, the propensity of workers to change industries is the lowest. The regional in- and out-flows (in 2003-2004) reveal that approximately 90% of those capital region's workers who changed industries moved within the capital region. The large university regions (outside the capital) attract workers from the industrial centers and rural areas in particular. Thus, inter-industry movement also strengthens the accumulation of knowledge in only a few large regions in Finland.

Finland's former development has indicated that the economic performance of a region can be positively influenced by its initial endowment of highly

educated people and firms active in dynamic sectors as well as by access to national and international markets (Ottaviano and Pinelli 2004). During recent decades, Finland has established a successful strategy for promoting a high level of educational attainment and the movement of production toward high technology and knowledge intensity (Figure 6). However, the investments in higher education have mainly had an impact on large university regions. The importance of innovations as a prerequisite for competitiveness is stressed in all relevant national and regional strategies and in the operations of numerous organizations in the field of science and technology. Knowledge-based development policies have been supported both by national programs and by the EU Structural Funds. The Finnish Funding Agency for Technology and Innovation (Tekes) provides companies and research units with funding for research, development and innovation. There are also numerous regional organizations in Finland that facilitate and encourage the commercialization of innovations and technology transfer[12]. The Finnish innovation policy activities aim at seeking innovative potential in all regions by building networks, developing capacities and favorable environments for innovations and coordinating local and regional actors. One particular development program – the *Centre of Expertise Program*[13], was established to encourage different actors in the regions to pool their resources together to develop their chosen fields of expertise (Mukkala et al. 2006). With the aim of generating top-level R&D expertise, the centre of expertise –policy has mainly focused on the largest cities (Eskelinen 2001). The innovation policy of Finland is inherently national. However, there are large similarities and overlaps between innovation policy conducted regionally and regional policy focused on innovativeness and renewal ability (Ottaviano et al. 2009; Viljamaa et al. 2009).

12 Science Parks, among the others, are so-called regional intermediate organizations that aim to generate business activity based on new knowledge and expertise. They help to stimulate and manage the flow of knowledge and technology among universities, R&D institutions, companies and markets. They also provide other value-added services together with high-quality space and facilities that allow firms located in technology poles to focus on their core activities.

13 The Centre of Expertise Program represents one of the main tools of Finnish innovation policy. It seeks to develop top-level expertise, attract investment and talent to the region and improve the regions' ability to generate R&D funding. The principal objective of the program specifically is the development of sub-regional cooperation by bringing together municipalities, higher education institutions, research units and enterprises within a joint network. The assumption is that urban regions are functional entities in terms of development and that the core city and the surrounding municipalities must cooperate closely.

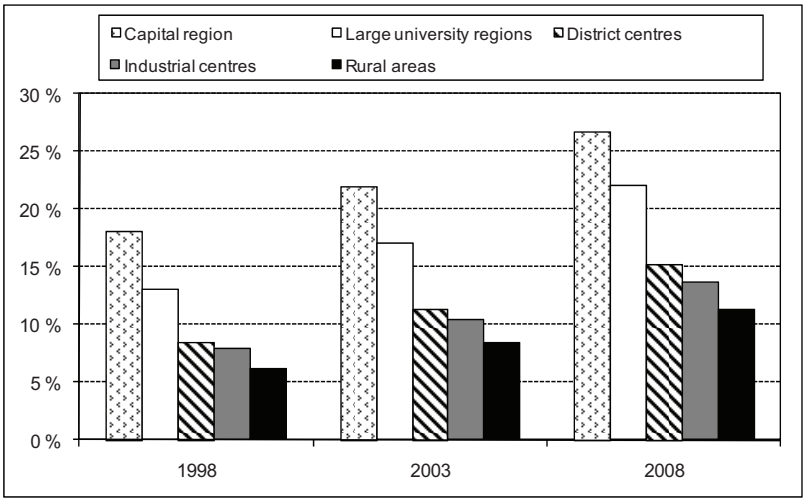

FIGURE 6 Share of highly educated people (lowest level tertiary education excluded) within the working-age population (15 to 65 years)[14]

Economic growth in Finland has been most rapid in industries and regions with a strong scientific basis for innovations. From 1995 to 2000, R&D spending increased by close to 16% annually, whereas from 2000 to 2008, the annual increase was approximately 6%. In 2008, R&D expenditure as a proportion of GDP stood at 3.7%, the highest rate in the EU after Sweden's (the EU mean was 1.8%). R&D activity is heavily concentrated in just a few regions in Finland. The capital region of Helsinki, four other university regions (Tampere, Oulu, Turku and Jyväskylä) and the ICT-driven region of Salo cover 84% of the total R&D expenditure in the country. In 1995, those regions accounted for 76% of the total R&D. Also, patenting activity mainly occurs in these same regions.

1.4 Outline of the study and main results

This thesis includes four studies that focus on phenomena related to the concept of the knowledge-based economy. The topics covered are as follows: agglomeration economies, innovations and high technology, and labor mobility and potential knowledge spillovers. The studies seek to answer the following questions:

- What is the role of agglomeration economies in the geographical concentration of manufacturing industries (region- and industry-level approach; Chapter 2)?

[14] The regional groupings are based on numerous region characteristics such as fields of strength, knowledge base, internationalization and development opportunities (Study by Urban Network and Urban Regions by Antikainen et al. (2006)).

- How can policy interventions contribute to innovation activity and networking in high-tech clusters (firm-level approach; Chapter 3)?
- How do skilled workers differ from the other workers with regard to their propensity to switch work regions, and in which regions is mobility high (individual-level approach; Chapter 4)?
- Are skilled workers moving between industries, and what are the characteristics of workers moving toward knowledge-intensive sectors (individual-level approach; Chapter 5)?
- Do the characteristics of mobile workers support potential knowledge spillovers (Chapters 4 and 5)?

A summary of the studies is presented in Table 1. Initially, the study is focused on the region and industry levels (three manufacturing sectors) (Chapter 2), after which it switches to the firm level (Chapter 3) and finally to the individual level (Chapters 4 and 5). The topics to be explored here are addressed using various data and methods, including both macro- and micro-econometrics and qualitative analysis of interviews.

Chapter 2 considers the existence of agglomeration economies in three manufacturing sectors in Finland. The analysis is based on regional-level macro data covering the manufacturing sectors in the 83 sub-regions (NUTS 4 level) of Finland in 1995 and 1999. The production function method is used, and the model is estimated separately for (1) the manufacture of food, beverages and tobacco; (2) the manufacture of wood, paper and pulp, printing and publishing; and (3) the manufacture of basic metal, metal products, electrical products and transport equipment. The effect of localization and urbanization economies on the level of labor productivity is of particular interest. Three-year mean figures for regional labor productivity are used as a dependent variable in the Cobb-Douglas production function model. The level of urbanization is proxied by the share of the population living in built-up areas. The existence of localization economies, in turn, is defined by the regional location quotient: the share of employment in a particular sector in the regions relative to that sector's share on a national level.

The results of Chapter 2 reveal sector-specific differences in the role of agglomeration economies in Finland. On the whole, regional specialization seems to contribute more to labor productivity than does diversification, particularly in the wood/paper manufacturing sector. These results indicate that small regions may be a good location for specific industries if they are able to attract a 'critical mass' of firms operating in the same industry. As the benefits of agglomeration seem to vary from industry to industry these differences should be taken into account by regional policy makers.

Chapter 3 focuses on regional policy interventions that target the development of networks and innovation activity among high-tech firms. The main aim is to map the development needs and wishes of high-tech firms and to gather information that will assist regional developers in their decision-making. This chapter first provides a discussion and theoretical framework for

the innovation environment and favorable development paths. Then, concrete needs are investigated through personal interviews carried out at thirty high-tech firms concentrated in the Jyväskylä Science Park area in Finland. The importance of external support to networking is analyzed for fields like R&D, sales and marketing, accounting, finance, and exports and internationalization. Correspondingly, the innovation process is divided into stages: the evaluation and screening of new inventions, the analysis of business concepts, the development of the inventions into innovations, testing, and the commercialization and distribution of the new product on the market. Moreover, the basic characteristics of firms are taken into account. These include age, size, annual turnover and whether each firm belongs to the ICT sector or to another sector.

The results from Chapter 3 indicate that a customized approach involving rapid reaction capabilities on the part of regional developers are appreciated at high-tech firms, young firms and small firms in particular. Furthermore, opportunities for face-to-face contacts are emphasized, and having a diverse set of service providers, including accountants, financiers and marketers, available is considered useful. On the whole, business knowledge and commercial views of regional development activities are of special importance.

Chapter 4 considers the mobility of highly educated high technology[15] (HEHT) workers. The main emphasis is on inter-regional moves and potential knowledge spillovers. It is assumed that sector-specific technical knowledge is best transmitted through moves within HT sectors. How does the mobility of HEHT workers and non-HEHT workers differ? Which regions are the winners and which are the losers from the perspective of knowledge transfer? Responses to these questions are sought using individual-level data based on a Finnish Longitudinal Census from Statistics Finland. The data represent 7% of individuals living in Finland in 2001 (approximately 470,000 individuals). The sample used in the estimation covers individuals ages 20 to 63 in 1999 who were working during period from 1999 to 2001. An interactive binary logit model is used in which the dependent variable indicates whether each individual switched work regions between the years 1999 and 2001. Numerous explanatory variables related to personal, family, working life and regional characteristics are included in the model. The interaction variables are formed by multiplying all explanatory variables by the dummy denoting HEHT workers.

The results of Chapter 4 show that regional worker flows are heavily concentrated in urban regions, whereas other regions have experienced significant losses in terms of their number of workers with a high amount of human capital resources (HEHT workers). Moreover, the HEHT workers are willing to change work regions even if they already have a job in a non-urban region, which implies that those regions struggle to retain their high-technology labor force and that knowledge flows are directed toward urban regions. Thus, to avoid considerable losses in human capital from non-urban regions, regional

---

15 In this chapter, the HT sectors also include the Research and development and Computer and related activities.

policy-makers should make an effort to create a favorable living environment for workers and a supportive environment for firm growth (in high-tech sectors in particular). The propensity of HEHT workers to switch work regions seems to be slightly higher than among the other workers, contributing to the effective transfer of knowledge.

Chapter 5 approaches job mobility from the perspective of inter-industry moves, considering worker flows toward the high-tech and KIBS sectors. The mobility of skilled workers and the potential transfer of knowledge are of special interest. First, the differences between the characteristics of workers moving from one industry to another and those who are staying in the same industry are analyzed. Secondly, the characteristics of workers moving to the HT or KIBS sectors are investigated. The estimation methods take into account potential sample selection bias. The specific models are a bivariate probit model with sample selection and a novel selection model by Sartori (2003). This Chapter utilizes the same individual-level micro data that was used in Chapter 4. The sample covers individuals who were working in 2003-2004. A change in industry is defined as mobility between any two of 15 industries (the HT and KIBS sectors are separated from the manufacturing and business service sectors, respectively). A basic assumption is that high education, technical education, earlier work experience and high income indicate a high level of skill.

According to the results of Chapter 5, young workers are the most mobile, whereas earlier work experience, high education and high income level decrease mobility. These findings may imply that the most skilled workers and potential diffusers of knowledge are not the most mobile, which may weaken the effectiveness of knowledge transfer. However, highly educated workers move to KIBS sectors more often than to other sectors on average, and the HT sectors, in turn, attract workers with high incomes (valuation of skills). Inter-industry mobility in the capital area and other urban regions is frequent, whereas in one-sided industrial centers, opportunities to move are rare. Migration behavior is positively related to inter-industry mobility. From the policy perspective, it is important to allow the smooth circulation of workers between industries. This initiative may also be connected to re-education and on-the-job training (life-long learning). In a knowledge-based economy, it is particularly important to make sure that skilled workers are available in the knowledge-intensive sectors and to support worker flows from lagging industries to growing ones.

TABLE 1 Summary of the studies and main results (Chapters 2-5)

Chapter	Focus	Data and method	Main results
2	Effect of agglomeration economies on labor productivity	• Manufacturing sectors (food, forest and metal) in 83 NUTS-4 level regions in 1995 and 1999 • Production function method	• There are sector-specific differences in the role of agglomeration economies • The role of localization economies is dominant • The effects of urbanization are ambiguous and vary between sectors
3	Role of regional policies in promoting networking and innovative activity	• 30 high-tech firms located in the Jyväskylä Science Park • Analysis of interviews	• A customized approach involving fast reaction capabilities by regional developers is supported • Opportunities to create face-to-face contacts, and having a diverse set of service providers (accountants, marketing, etc.) available are seen as useful • Business orientation of regional development activities is important • Young and small firms need support in particular
4	Regional mobility of highly educated high-tech workers (HEHT) and potential knowledge spillovers	• Individuals ages 20-63 who were working in 1999-2001 • Interactive binary logit model	• Regional worker flows are heavily concentrated in urban regions, whereas in other regions, the loss of skilled workers is significant • Non-urban regions have difficulty retaining their high-tech workers, and knowledge flows are directed to urban regions • Propensity of HEHT workers to switch work regions is higher than among the workers in the other sectors which contributes to effective knowledge transfer
5	Inter-industry mobility of skilled workers and potential knowledge spillovers	• Individuals who were working in 2003-2004 • Binary logit model with sample selection • Sartori model (relaxes the assumption of exclusion restriction variable)	• Inter-industry mobility in the capital area and other urban university regions is frequent, whereas in one-sided industrial centers and rural areas, mobility rates are low • Migration behavior is positively related to inter-industry mobility • Earlier work experience, high education and high income levels decrease mobility, which may imply that the diffusers of knowledge with the highest potential are not the most mobile • Highly educated workers move to KIBS sectors, and HT sectors attract workers with high income (valuation of skills)

REFERENCES

Aghion P. & Howitt P. 1998. Endogenous growth theory. Cambridge: MIT Press.

Almeida, P. & Kogut, B. 1999. Localization of knowledge and the mobility of engineers in regional networks. Management Science 45 (7), 905-917.

Antikainen, J., Luukkonen, J. & Pyöriä, T. 2006. Kaupunkiverkko ja kaupunkiseudut 2006. Publications 10. Ministry of the Interior. Helsinki.

Antikainen, J. & Vartiainen, P. 2006. A patchwork of urban regions – structures and policies in support of polycentricity. In H. Eskelinen & T. Hirvonen (Eds) Positioning Finland in a European space. Helsinki: Edita Prima Ltd, 30-40.

Arrow, K. 1962. Economic welfare and the allocation of resources for invention. In R. Nelson (Ed.) The rate and direction of inventive activity. Princeton: Princeton University Press, 609-626.

Audretsch, D. B. 1998. Agglomeration and the Location of Innovative Activity. Oxford Review of Economic Policy 14(2), 18-29.

Audretsch, D. B., & Feldman, M. P. 2004. Knowledge Spillovers and the Geography of Innovation. In V. Henderson, & J. F. Thisse (Eds) Handbook of Regional and Urban Economics: Cities and Geography. Amsterdam: North-Holland and Elsevier Science Publisher, 2713-2739.

Barro, R. J. 1991. Economic growth in cross section of countries. The Quarterly Journal of Economics 106 (2), 407-444.

Capello, R. 2002. Entrepreneurship and spatial externalities: Theory and measurement. The Annals of Regional Science 36 (3), 387-402.

Cooke, P. & Morgan, K. 2002. The Associational Economy. Firms, Regions, and Innovation. Oxford: Oxford University Press.

Cortright, J. & Mayer, H. 2001. High tech specialization: a comparison of high technology centers. Washington D.C.: The Brookings Institution, Center on Urban and Metropolitan Policy.

De Laurentis, C. 2006. Regional innovation systems and the labour market: A comparison of five regions. European Planning Studies 14 (8), 1059-1084.

Dolton, P. J. & Kidd, M. P. 1998. Job changes, occupational mobility and human capital acquisition: An empirical analysis. Bulletin of Economic Research 50 (4), 265-295.

Eberts, R. W. & McMillen, D. P. 1999. Agglomeration economies and urban public infrastructure. In E. S. Mills & P. Cheshire (Eds.) Handbook of regional and urban economics. Amsterdam: Elsevier Science, 1455-1495.

Ehrenberg, R. G. & Smith, R. S. 2009. Modern Labor Economics: Theory and Public Policy. New York: Pearson Education.

Eriksson, T. & Jäntti, M. 1995. Työntekijöiden liikkuvuus ja ansiotulot. Kansantaloudellinen aikakauskirja 1.

Eskelinen, H. 2001. Aluepolitiikka rautahäkissä. Kunnallisalan kehittämissäätiön Polemia-sarjan julkaisu nro 41. Vammala: Vammalan Kirjapaino Oy.

Eskelinen, H. & Hirvonen, T. 2006. Introduction. In H. Eskelinen & T. Hirvonen (Eds) Positioning Finland in a European space. Helsinki: Edita Prima Ltd, 7-14.

Feldman, M. P. & Audretsch, D. P. 1999. Innovation in cities: Science-based diversity, specialization and localized competition. European Economic Review 43 (2), 409-429.

Florida, R. 1995. Toward the learning region. Futures 27 (5), 527-536.

Florida, R. 2001 Technology and tolerance: the importance of diversity to high-technology growth. The Brookings Institution Survey Series June 2001.

Frenkel, A. 2001. Why high-technology firms choose to locate in or near metropolitan areas. Urban Studies 38 (7), 1093-1101.

Fujita, M. 1988. A monopolistic competition model of spatial agglomeration: A differentiated products approach. Regional Science and Urban Economics 18 (1), 87-124.

Glaeser, E. L., Kallal, H. D., Scheinkman, J. A. & Schleifer, A. 1992. Growth in cities. Journal of Political Economy 100 (6), 1126-52.

Glasson, J., Chadwick, A. & Lawton Smith H. 2006. Defining, explaining and managing high-tech growth: The case of Oxfordshire. European Planning Studies 14 (4), 503-524.

Griliches, Z. 1992. The Search for R&D Spillovers. Scandinavian Journal of Economics 94 (supplement), 29-47.

Grossman, G. M. & Helpman, E. 1991. Quality Ladders in the Theory of Growth. Review of Economic Studies 58 (1), 43-61.

Haapanen, M. 2003. Studies on the determinants of migration and spatial concentration of labour. Jyväskylä Studies in Business and Economics, University of Jyväskylä. Doctoral Dissertation.

Henderson, J. V. 1986. Efficiency of resource usage and city size. Journal of Urban Economics 19 (1), 47-70.

Henderson, J. V. 1988. Urban development – Theory, fact and illusion. New York: Oxford University Press.

Henderson, J. V., Kuncoro, A. & Turner, M. 1995. Industrial development in cities. The Journal of Political Economy 103 (5), 1067-1090.

Hommen, L. & Doloreux, D. 2003. Is the regional innovation system concept at the end of its life cycle? Paper presented for the conference Innovation in Europe: dynamics, institutions and values, 8th–9th May, Denmark.

Huovari, J., Kangasharju, A. & Alanen, A. 2001. Alueiden kilpailukyky. Reports 176. Pellervo Economic Research Institute. Helsinki.

Ilmakunnas, P. & Maliranta, M. 2005. Worker inflow, outflow, and churning. Applied Economics 37 (10), 1115-1133.

Jacobs, J. 1969. The economy of cities. New York: Vintage.

Kaufmann, A. & Tödtling, F. 2001. Science-industry interaction in the process of innovation: the importance of boundary-crossing between systems. Research Policy 30 (5), 791-804.

Kauhanen, M. & Tervo, H. 2002. Who moves to depressed regions? An analysis of migration streams in Finland in the 1990s. International Regional Science Review 25 (2), 200-218.

Kolehmainen, J. 2003. Territorial Agglomeration as a Local Innovation Environment: The Case of a Digital Media Agglomeration in Tampere, Finland. MIT IPC Local Innovation Systems Working Paper 03-002.

Krugman, P. 1991. Geography and trade. Cambridge: MIT Press.

Krugman, P. 1998. What's New about the New Economic Geography? Oxford Review of Economic Policy 14 (2), 7-17.

Lamorgese, A. 1998. Local knowledge spillovers and city growth. ECARE, Université Libre de Bruxelles 98-02.

Lith, P. 2003. Osaamisintensiiviset liike-elämän palvelut ja ammatit Uudellamaalla – tilastollinen tarkastelu. Tutkimuksia ja raportteja 10. Suunnittelu- ja tutkimuspalvelut Pekka Lith. Helsinki.

Lucas, R. E. 1988. On the mechanics of economic development. Journal of Monetary Economics 22 (1), 3-42.

Maliranta, M., Mohnen, P. & Rouvinen, P. 2009. Is inter-firm labor mobility a channel of knowledge spillovers? Evidence from a linked employer-employee panel. Industrial and Corporate Change 18 (6), 1161-1191.

Marshall, A. 1920. Principles of Economics. London: Macmillan.

Moomaw, R. L. 1981. Productivity and city size? A critique of the evidence. The Quarterly Journal of Economics 96 (4), 675-88.

Moomaw, R. L. 1986. Have changes in localization economies been responsible for declining productivity advantages in large cities? Journal of Regional Science 26 (1), 19-32.

Muffels, R. J. A. & Luijkx, R. 2004. Job mobility and employment patterns across European welfare states. Is there a 'trade-off' or a 'double bind' between flexibility and security? Paper presented in the TLM.Net Conference 'Quality in Labour Market Transitions: A European Challenge' in Amsterdam.

Mukkala, K., Ritsilä, J. & Suosara, E. 2006. OECD/IMHE - Supporting the contribution of higher education institutions to regional development. Self-evaluation report of the Jyväskylä region in Finland. Publications of the Ministry of Education, Finland 26. Helsinki.

Muller, E. & Zenker, A. 2001. Business services as actors of knowledge transformation: the role of KIBS in regional and national innovation systems. Research Policy 30 (9), 1501-1516.

Müller, K. & Peters, B. 2010. Churning of R&D Personnel and Innovation, ZEW Discussion Paper No. 10-03.

Nakamura, R. 1985. Agglomeration economies in urban manufacturing industries: A case of Japanese cities. Journal of Urban Economics 17 (1), 108-124.

Nivalainen, S. 2003. Where do migrants go? An analysis of rural and urban destined/originated migration in Finland in 1996-1999. Pellervo Economic Research Institute Working Papers No. 66.

Nivalainen, S. 2005. Interregional migration and post-move employment in two-earner families: Evidence from Finland". Regional Studies 39 (7), 891-907.

Nivalainen, S. & Mukkala, K. & Tohmo, T. 2009. Alueellinen kyvykkyys ja sitä muovaavat tekijät – erityistarkastelussa korkea teknologia ja osaamisintensiiviset palvelut. Tekesin katsaus 247, Helsinki.

Oerlemens, L. A. G., Meeus, M. T. H. & Boekema, F. W. M. 2001. Firm clustering and innovation: Determinants and effects. Papers in Regional Science 80 (3), 337-356.

Ottaviano, G. I. P. & Pinelli, D. 2004. The challenge of globalization for Finland and its regions: The new economic geography perspective. Prime Minister's office: Publications 24. Helsinki.

Ottaviano, G. I. P. & Kangasharju, A. & Maliranta, M. 2009. Local innovative activity and regional productivity: Implications for the Finnish national innovation policy. In: Evaluation of the Finnish national innovation system – Full report. Ministry of Education and the Ministry of Employment and the Economy, Helsinki: Helsinki University Print, 203-238.

Paci, R. & Usai, S. 2000. Externalities, knowledge spillovers and the spatial distribution of innovation. GeoJournal 49 (4), 381-390.

Patrucco, P. P. 2003. Institutional variety, networking and knowledge exchange: Communication and innovation in the case of Brianza technological district. Regional Studies 37 (2), 159-172.

Pekkala, S. 2003. Migration flows in Finland: Regional differences in migration determinants and migrant types. International Regional Science Review 26 (4), 466-482.

Piekkola, H. 2006. Knowledge and innovation subsidies as engines for growth. The competitiveness of Finnish regions. ETLA B 216. Helsinki.

Power, D. & Lundmark, M. 2004. Working through knowledge pools: Labour market dynamics, the transference of knowledge and ideas, and industrial clusters. Urban Studies 41 (5/6), 1025-1044.

Raspe, O. & Van Oort, F. 2008. Firm growth and localized knowledge externalities. The Journal of Regional Analysis & Policy 38 (2), 100-116.

Ritsilä, J. 2001. Studies on the spatial concentration of human capital. Jyväskylä Studies in Business and Economics, University of Jyväskylä. Doctoral Dissertation.

Ritsilä, J. & Ovaskainen, M. 2001. Migration and regional centralization of human capital. Applied Economics 33 (3), 317-325.

Romer, P. M. 1986. Increasing returns and long run growth. Journal of Political Economy 94 (5), 1002-1037.

Rosenthal, S. S. & Strange, W. C. 2004. Evidence on the nature and sources of agglomeration economies. In J. V. Henderson & J. F. Thisse (Eds) Handbook of Regional and Urban Economics. Amsterdam: Elsevier, 2119-2171.

Sartori, A. 2003. An estimator for some binary-outcome selection models without exclusion restrictions. Political analysis 11 (2), 111-138.

Saxenian, A. L. 1994. Regional advantage: Culture and competition in Silicon Valley and Route 128. Cambridge: Harvard University Press.

Schaeffer, P. 1985. Human capital accumulation and job mobility. Journal of Regional Science 25 (1), 103-114.

Segal, D. 1976. Are there returns to scale in city size? The Review of Economics and Statistics 58 (3), 339-350.

Selting, A., Allanach, C. & Loveridge, S. 1994. The role of agglomeration economies in firm location: A review of the literature. Staff paper series P94-14. Department of Agricultural and Applied Economics, College of Agriculture, University of Minnesota.

Simmie, J. 2001. Introduction. In J. Simmie (Ed.) Innovative cities. London: Spon Press, 1-8.

Simon, C. 1998. Human capital and metropolitan employment growth. Journal of Urban Economics 43 (2), 223-243.

Simonen, J. & McCann, P. 2010. Knowledge transfers and innovation: The role of labour markets and R&D co-operation between agents and institutions. Papers in Regional Science 89 (2), 295-309.

Sjaastad, L. 1962. Cost and returns of human migration. Journal of Political Economy 70 (5), 80-93.

Stambol, L. S. 2001. Local labour market performance through different activation rates, input and economic returns to human capital. Paper presented in the 41st ERSA Conference in Zagreb.

Sveikauskas, L. 1975. The productivity of cities. The Quarterly Journal of Economics 89 (3), 393-413.

Tervo, H. 2000. Migration and labour market adjustment: empirical evidence from Finland 1985-90. Internal Review of Applied Economics 14 (3), 343-360.

Tervo, H. 2005. Regional policy lessons from Finland. In D. Felsenstein & B. A. Portnov (Eds.) Regional disparities in small countries. Berlin: Springer-Verlag, 267-282.

Trippl, M. & Tödtling, F. 2008. From the ivory tower to the marketplace: Knowledge organisations in the development of biotechnology clusters. The Journal of Regional Analysis & Policy 38 (2), 159-175.

Tödtling, F. 1994. Regional networks of high-technology firms - the case of the greater Boston. Technovation 14 (5), 323-343.

Tödtling, F., Lehner, P. & Trippl, M. 2004. Knowledge intensive industries, networks, and collective learning. Paper presented in ERSA conference in Porto.

Tödtling, F., Lehner, P. & Trippl, M. 2006. Innovation in knowledge intensive industries: The nature and geography of knowledge links. European Planning Studies 14 (8), 1035-1058.

Van der Laan, L. J., de Boom, J. & van Oort, F. 2000. Sweet-talking regions. Paper presented in the 40th ERSA conference in Barcelona.

Van Oort, F. & Atzema, O. 2002. Agglomeration economies and the location of new information and communication technology (ICT) firms in the Netherlands. Paper presented in the ERSA conference in Dortmund.

Venables, A. J. 1996 Equilibrium locations of vertically linked industries. International Economic Review 37 (2), 341-359.

Viljamaa, K. & Lemola, T . & Lehenkari, J. & Lahtinen, H . 2009. Innovaatiopolitiikan alueellinen ulottuvuus. Työ- ja elinkeinoministeriön julkaisuja, Innovaatio No. 22. Helsinki.

Virjo I., Aho S. & Koponen H. 2007. Työvoiman toimialaliikkuvuus Suomessa 1995-2003. In: Rekrytointiongelmat, työvoiman tarjonta ja liikkuvuus. Valtioneuvoston kanslian julkaisusarja 5. Helsinki.

Weiss, Y. 1971. Learning by doing and occupational specialization. Journal of Economic Theory 3 (2), 189-198.

SUMMARY IN FINNISH (YHTEENVETO)

Tämä väitöskirja tarkastelee alueellista kehitystä ja työvoiman liikkuvuutta erityisesti maantieteellisen keskittymisen ja osaamisintensiivisten alojen näkökulmasta. Tutkimuskohteina ovat keskittymisestä saatavat hyödyt teollisuusaloilla, korkean teknologian yritysten innovatiivisuuden ja verkostoitumisen tukeminen sekä työntekijöiden alueellinen ja toimialojen välinen liikkuvuus. Väitöskirja koostuu neljästä erillistutkimuksesta, jotka on kytketty tietotalous (knowledge economy) -teoriakehyksen alle. Tutkimuksia edeltää johdantoluku, joka käsittelee tutkimusaiheita osaamisperusteisen talouden näkökulmasta, esittelee lyhyesti Suomen alueellisen kehityksen pääpiirteitä sekä kokoaa väitöskirjan keskeiset tulokset.

Väitöskirjan toisessa luvussa tarkastellaan väestön ja yritysten maantieteellisestä keskittymisestä saatavien hyötyjen eli agglomeraatiohyötyjen ilmenemistä Suomen teollisuussektorilla. Agglomeraatiohyödyt jaetaan perinteisesti lokalisaatio- ja urbanisaatiohyötyihin, joista ensimmäinen viittaa toimialan sisäiseen erikoistumiseen, verkostoitumiseen ja maantieteelliseen keskittymiseen, kun taas jälkimmäinen viittaa tietyn alueen yleiseen monipuolisuuteen sekä erilaisten toimijoiden ja toimialojen välisiin yhteyksiin. Tarkastelu kohdistuu kolmelle teollisuuden alalle (elintarviketeollisuus, metalliteollisuus sekä massa-/paperiteollisuus ja kustantaminen) vuosina 1995 ja 1999 seutukuntatason aineistoa hyödyntäen. Tuotantofunktiomalliin perustuvien tulosten mukaan lokalisaatiohyödyt ovat tarkastelluilla toimialoilla vahvempia kuin urbanisaatiohyödyt. Erityisesti massa- ja paperiteollisuuden yritykset näyttäisivät hyötyvän saman toimialan yritysten läheisyydestä. Toisin sanoen, myös pienempi alue voi tarjota suotuisan toimintaympäristön yrityksille, jos se kykenee kokoamaan riittävän määrän saman toimialan yrityksiä toistensa läheisyyteen. Toimialat ja yritykset hyötyvät kuitenkin keskittymisestä eri tavoin, mikä on tärkeä huomioida aluekehittämisessä ja poliittisessa päätöksenteossa.

Sekä aluekehitys Suomessa että kansainvälisesti osoittaa osaamisintensiivisten alojen keskittyvän ja hakeutuvan erityisesti suuriin kaupunkeihin ja yliopistojen läheisyyteen. Väitöskirjan kolmannessa luvussa kartoitetaan korkean teknologian yritysten tarpeita verkostoitumisen ja innovaatiotoiminnan kehittämisessä. Erityisesti pyritään kokoamaan tietoa aluekehittämistoimijoiden päätöksenteon tueksi. Tutkimusta varten on haastatteluin kerätty aineistoa 30 korkean teknologian alan yrityksestä, jotka sijaitsevat Jyväskylän teknologiakeskuksen (nykyisin Jyväskylä Innovation Oy) tiloissa. Tulokset osoittavat, että asiakaskohtaisesti räätälöity tuki ja kehittämistoimijoiden kyky reagoida nopeasti muuttuviin tilanteisiin ovat avainasemassa verkostoitumisen ja innovaatiotoiminnan kehittämisessä. Lisäksi korostuvat alueen tarjoamien liiketoimintapalvelujen kattavuus sekä aluekehittäjien liiketoiminnallinen osaaminen ja näkemys. Erityisesti tukea tarvitsevat pienet ja toimintansa alkuvaiheessa olevat yritykset.

Väitöskirjan neljäs ja viides luku analysoivat alueellisen keskittymisen kannalta merkittävää tutkimuskohdetta: työvoiman liikkuvuutta. Tarkastelussa

hyödynnetään yksilötason tilastoaineistoa, joka kattaa 7 %:n satunnaisotoksen suomalaisista eli tietoja noin 470 000 henkilön henkilökohtaisista ominaisuuksista, perheestä, koulutuksesta, työkokemuksesta, asumisesta sekä työ- ja asuinalueesta.

Neljännessä luvussa erityisenä kiinnostuksen kohteena on korkeasti koulutettujen korkean teknologian alojen työntekijöiden alueellinen liikkuvuus. Liikkuvuutta mitataan työpaikan kunnan muutoksella tarkasteluvuosina 1999-2001 interaktiivista logit -mallia hyödyntäen. Työntekijävirrat ovat vahvasti keskittyneet suurille kaupunkialueille, kun taas muut alueet menettävät osaavaa työvoimaa. Erityisesti korkeasti koulutetut korkean teknologian työntekijät kaupunkialueiden ulkopuolisilla alueilla ovat halukkaita vaihtamaan työskentelyaluetta. Osaamisvirtojen suuntautuminen yhä vahvemmin keskusalueille asettaa suuria haasteita muille alueille. Työntekijä- ja tietovuotojen vähentämiseksi alueilta edellytetään kykyä tarjota työntekijöille viihtyisä ja virikkeellinen asuinympäristö sekä yrityksille kasvua ja yrittäjyyttä tukeva toimintaympäristö.

Väitöskirjan viimeinen luku jatkaa työvoimaliikkuvuuden teemaa keskittyen toimialojen väliseen liikkuvuuteen vuosina 2003-2004. Ensimmäisessä vaiheessa tarkastellaan eroja toimialaa vaihtaneiden ja samalla toimialalla pysyneiden välillä. Koska toimialaliikkuvuuden kautta heijastellaan vaikutuksia tiedon siirtymiseen, erityishuomion kohteena ovat osaamisintensiiviset työntekijät. Osaamista kuvaavina muuttujina on käytetty yksilön koulutustasoa, tekniikan koulutusta, aiempaa työkokemusta, tulotasoa sekä ikää. Toisessa vaiheessa tarkastellaan työntekijävirtoja korkean teknologian ja osaamisintensiivisten liike-elämän palvelujen (KIBS) aloille. Ilmiöiden mallintamisessa on hyödynnetty mahdollisen valikoitumisharhan huomioivia mikroekonometrisiä menetelmiä. Tulokset osoittavat nuorten olevan aktiivisimpia toimialan vaihtajia, kun taas korkea koulutus ja korkea tulotaso hillitsevät liikkumista. Tämä viittaisi siihen, että osaavimmat ihmiset eivät ole liikkuvaisimpia toimialojen välillä, mikä voi osaltaan hillitä tiedon siirtymistä. Toisaalta, korkeasti koulutetut siirtyvät KIBS aloille useammin kuin muille aloille ja korkean teknologian alat houkuttelevat korkean tulotason osaajia, mikä kertoo oikeansuuntaisesta osaamisvirrasta. Tulosten mukaan toimialaliikkuvuus on vilkkainta suurilla monipuolisilla kaupunkialueilla. Lisäksi, alueellisesti liikkuvaiset ihmiset vaihtavat myös toimialaa useammin. Toimialaliikkuvuus on tärkeä osa työmarkkinoiden toimintaa, jota voidaan tukea mm. uudelleen- ja täydennyskoulutuksen kautta. Osaamisintensiivisten alojen näkökulmasta toimialaliikkuvuuden kautta tuleva osaajien virta on tärkeä taata myös tulevaisuudessa.

JYVÄSKYLÄ STUDIES IN BUSINESS AND ECONOMICS

1 LAINE, JUHANI, Toimialareseptin ja yritysparadigman muutos sekä sen vaikutus strategiseen muutokseen. Laadullinen ja historiallinen case-tutkimus perheyrityksen siirtymisestä monialayhtymän osaksi. - Change in industry recipe and company paradigm and its impact on strategic change. A qualitative and longitudinal case study on a one-family owned company which moved into the context of a multi-business company. 252 p. Summary 12 p. 2000.

2 WAHLGRÉN, ASTA, Mastery and slavery. Triangulatory views on owner-managers' managerial work. - Isäntä ja renki. Trianguloituja näkökulmia omistajajohtajien johtamistyöhön. 138 p. Yhteenveto 4 p. 2000.

3 SEPPÄ, MARKO, Strategy logic of the venture capitalist. Understanding veture capitalism - the businesses within - by exploring linkages between ownership and strategy of venture capital companies, over time, in America and Europe. 321 p. Yhteenveto 9 p. 2000.

4 PEKKALA, SARI, Regional convergence and migration in Finland, 1960-95. 121 p. Yhteenveto 1 p. 2000.

5 KORHONEN, JOUNI, Industrial ecosystem. Using the material and energy flow model of an ecosystem in an industrian system. - Teollinen ekosysteemi - Ekosysteemin materiaali- ja energiavirtamallin soveltaminen teollisessa systeemissä.131 p. Tiivistelmä 1 p. 2000.

6 KARVONEN, MINNA-MAARI, An industry in transition. Environmental significance of strategic reaction and proaction mechanisms of the Finnish pulp and paper industry. 146 p. Yhteenveto 2 p. 2000.

7 RITSILÄ, JARI, Studies on the spatial concentration of human capital. 140 p. Yhteenveto1 p. 2001.

8 LITTUNEN, HANNU, The birth and success of new firms in a changing environment. 261 p. Yhteenveto 2 p. 2001.

9 MATTILA, MINNA, Essays on customers in the dawn of interactive banking. - Asiakkaat interaktiivisen pankkiliiketoiminnan aamunkoitossa. 154 p. Yhteenveto 3 p. 2001.

10 HYRSKY, KIMMO, Reflections on the advent of a more enterprising culture in Finland: an exploratory study. 244 p. Tiivistelmä 4 p. 2001.

11 KUJALA, JOHANNA, Liiketoiminnan moraalia etsimässä. Suomalaisten teollisuusjohtajien sidosryhmänäkemykset ja moraalinen päätöksenteko. - Searching for business morality. Finnish industrial managers' stakeholder perseptions and moral decision-making. 217 p. Summary 4 p. 2001.

12 LÄMSÄ, ANNA-MAIJA, Organizational downsizing and the Finnish manager from an ethical perspective. - Organisaation kutistaminen ja suomalainen liikkeenjohto eettisestä näkökulmasta tarkasteltuna 61 p. (115 p.) Summary 5 p. 2001.

13 GRONOW, TITO, Material flow models in environmental policy planning. Case: pulp and paper industry. - Materiaalivirtamallit ympäristöpolitiikan ja -toimintatapojen suunnittelussa. Case: Massa- ja paperiteollisuus. 103 p. (144 p.) Yhteenveto 1 p. 2001.

14 MOILANEN, RAILI, A learning organization: machine or human? - Oppiva organisaatio: kone vai oppivien ihmisten yhteisö? 55 p. (162 p.) Yhteenveto 7 p. 2001.

15 HOKKANEN, SIMO, Innovatiivisen oppimisyhteisön profiili. Ammattikorkeakoulujen tekniikan ja liikenteen koulutusalan näkökulmasta tarkasteltuna. - The factors contributing to the profile of an innovative learning community. 242 p. Summary 10 p. 2001.

16 PAAJANEN, PEKKA, Yrittäjyyskasvattaja. Ammattikorkeakoulun hallinnon ja kaupan alan opettajien näkemykset itsestään ja työstään yrittäjyyskasvattajana. - An entrepreneurship educator. Teachers´ views of themselves and their work as an entrepreneurship educator at the polytechnic level, in the field of business and administration. 276 p. Summary 9 p. 2001.

17 MANGELOJA, ESA, Nordic stock market integration. - Pohjoismaisten osakemarkkinoiden integraatio. 164 p. Yhteenveto 2 p. 2001.

18 KARJALUOTO, HEIKKI, Electronic banking in Finland. Consumer beliefs, attitudes, intentions, and behaviors. - Elektroninen pankkitoiminta Suomessa. Kuluttajien uskomukset, asenteet, aikomukset ja käyttäytyminen. 195 p. Yhteenveto 3 p. 2002.

19 VIRTANEN, AILA, Laskentatoimi ja moraali. Laskenta-ammattilaisten käsityksiä hyvästä kirjanpitotavasta, hyväksyttävästä verosuunnittelusta ja hyvästä tilintarkastustavasta. 184 p. Summary 4 p. 2002.

20 TENHUNEN, MARJA-LIISA, The professional growth of an accounting agency entrepreneur. - Tilitoimistoyrittäjän ammatillinen kasvu. 121 p. (359) Yhteenveto 7 p. 2002.

21 ALANKO, JUHA, Siipien alla ilmaa. Liikenneilmailun lentotoiminnan johtaminen liikennelentäjien miehistönkäytön tehokkuudella ja kustannuksilla mitattu. Empiirisenä kohteena Finnair Oy 1980- ja 1990-luvuilla. - Air under wings. 240 p. Summary 2 p. 2002.

22 NIEMELÄ, TARJA, Inter-Firm Co-operation Capability. - A Processual Empirical Study on Networking Family Firms. 204 p. Yhteenveto 1 p. 2003.

23 SAJASALO, PASI, Strategies in transition - the internationalization of Finnish forest industry companies. 223 p. Yhteenveto 8 p. 2003.

24 NEVANPERÄ, ERKKI, Yrittäjyys Suupohjan opiskelijanuorten ajattelussa. Tutkimus Suupohjan seudun nuorisoasteen opiskelijoiden yrittäjyysnäkemyksistä sekä yrittäjyysopetuksen opetussuunnitelman kehittämispyrkimyksistä. - How the young residents in Suupohja region see entrepreneurship: study of students´ opinions

about entrepreneurship in juvenile degree schools and the efforts in developing the curriculum of entrepreneurship education. 210 p. Summary 2 p. 2003.

25 Joutsen-Onnela, Merja, Turvallisuutta ja sopusointua vai jännitystä ja valtaa. Tutkimus sairaanhoitaja- ja terveydenhoitajaopiskelijoiden yrittäjyys- ja muista arvoista. - Security and harmony or thrills power. 229 p. Summary 3 p. 2003.

26 Rajotte, Alain, Knowledge and decisions in environmental contexts. A case study of the pulp and paper industry. 190 p. 2003.

27 Haapanen, Mika, Studies on the Determinants of Migration and the Spatial Concentration of Labour. 127 p. Yhteenveto 1 p. 2003.

28 Suoranta, Mari, Adoption of mobile banking in Finland. - Mobiilipankkipalveluiden adoptio Suomessa. 79 p. (167 p.) Yhteenveto 3 p. 2003.

29 Mattila, Anssi, Understanding seamless mobile service interface between customer and technology: An empirical study 62 p. (170 p.) Yhteenveto 3 p. 2003.

30 Halttunen, Jussi, Teollisten perheyritysten kasvudynamiikan systeemiteoreettinen tarkastelu. - The growth dynamics of industrial family-owned firms – a systems theory approach. 302 p. Summary 8 p. 2004.

31 Madureira, Ricardo, The role of personal contacts of foreign subsidiary managers in the coordination of industrial multinationals: the case of Finnish subsidiaries in Portugal. 186 p. - Ulkomaisten tytäryhtiöiden johtajien henkilökohtaisten kontaktien rooli koordinoinnissa monikansallisissa teollisuusyrityksissä. Case: Suomalaiset tytäryhtiöt Portugalissa. Yhteenveto 1 p. 2004.

32 Koivunen, Mauri, Osaamisperustaisen kilpailukyvyn ja yrittäjyyden edistäminen. Tutkimustapauksena Raahen tietotekniikan muuntokoulutusohjelma insinööreille. - Enhancing competence-based competitiveness and entrepreneurship. Research case: Professional degree upgrading in information technology for engineers in Raahe. 216 p. Summary 3 p. 2004.

33 Kansikas, Juha, Myyjiä, tuotekehittäjiä ja tuotejohtajia. Tuotepäälliköiden tehtävärakenteen heijastuminen tuotekehitysprojektissa sisäiseen yrittäjyyteen ja intuitiiviseen päätöksentekotyyliin kuuluviin tekijöihin. - Sales people, product developers and product champions – product managers´ responsibilities and job roles in a product development project and their reflection to intrapreneurship and intuitive decision making style. 258 p. Summary 6 p. 2004.

34 Munnukka, Juha, Perception-based pricing strategies for mobile services in customer marketing context. 65 p. (151 p.) Yhteenveto 1 p. 2004.

35 Paloviita, Ari, Matrix Sustainability: Applying input-output analysis to environmental and economic sustainability indicators. Case: Finnish forest sector. - Matriisikestävyys: Panos-tuotosanalyysin soveltaminen ekologisen ja taloudellisen kestävyyden indikaattoreihin. Case: Suomen metsäsektori. 216 p. Yhteenveto 2 p. 2004.

36 Hanzelkova, Alena, Re-establishing traditional Czech family businesses. A multiple case study on the present challeges. 306 p. Tiivistelmä 1 p. 2004.

37 Tuunanen, Mika, Essays on franchising in Finland – Empirical findings on franchisors and franchisees, and their relationships. 143 p. (252 p.) 2005.

38 Ahlfors, Ulla, Successful interactive business: Integration of strategy and IT. - Menestyksellinen vuorovaikutteinen e-liiketoiminta: Strategian ja informaatioteknologian integrointia. 353 p. Yhteenveto 2 p. 2005.

39 Niemi, Liisa, The father, the son and the refreshed spirit. Strategic renewal after family business succession in the context of the textile, clothing, leather and footwear industry. - Isä, poika ja yritys yhä hengissä. Perheyrityksen strateginen uudistuminen sukupolvenvaihdoksen jälkeen – tapaustutkimus tekstiili-, vaatetus, nahka- ja kenkäteollisuudessa. 219 p. Summary 2 p. 2005.

40 Lassila, Hilkka, Matkailutilan sukupolvenvaihdos talonpoikaisten arvojen ohjaamana prosessina. – Traditional values affecting succession in farm tourism businesses. 206 p. Summary 12 p. 2005.

41 Turjanmaa, Pirkko, Laadun oppiminen pienissä yrityksissä. Mallin konstruointi ja kehittäminen. – Learning of quality in small companies. Construction and Development of a model. 204 p. Summary 6 p. 2005.

42 Yläoutinen, Sami, Development and functioning of fiscal frameworks in the Central and Eastern European countries. - Finassipolitiikan kehikkojen kehittyminen ja toiminta Keski- ja Itä-Euroopan maissa. 220 p. Yhteenveto 4 p. 2005.

43 Törmäkangas, Raili, Perheyrittäjyyden arjen kulttuuri. Kolmen sukupolven sahatoimintaa. – The everyday culture of entrepreneurship over three generations in a saw mill. 203 p. Summary 3 p. 2005.

44 Tunkkari-Eskelinen, Minna, Mentored to feel free. Exploring family business next generation members' experiences of non-family mentoring. - Mentoroinnilla vapaudentunteeseen: Kartoittava tutkimus perheyritysten seuraajasukupolven mentoroinnista saamistaan kokemuksista. 233 p. Yhteenveto 3 p. 2005.

45 Lintula, Paavo, Maakuntalehden toimittajan toimintatila teknis-rationaalisessa ajassa. - The action scope of a journalist in a regional newspaper under pressure of a technical-rational discourse. 321 p. Summary 3 p. 2005.

46 Heikkilä, Mauri, Minäkäsitys, itsetunto ja elämänhallinnan tunne sisäisen yrittäjyyden determinantteina. - The self-concept, the self-esteem and the sense of life control as the determinants of the intrapreneurship. 209 p. Summary 5p. 2006.

47 Syrjälä, Jari, Valoon piirrettyjä kuvia. Tarinoita ja tulkintoja sähköalan murroksesta hyvinvoinnin ja henkilöstöstrategian näkökulmasta. - Pictures in Light. Narratives and interpretations of changes in the energy sector from the point of view of welfare and personnel strategy. 333 p. 2006.

48 Niemelä, Margit, Pitkäikäisten perheyritysten arvoprofiili. Pitkäikäisten perheyritysten arvojen ja jatkuvuuden kuvaus Bronfenbrennerin ekologisen teorian avulla. - The value profile of long-lived family firms. The description of the values and the continuity of long-lived family firms as seen through Bronfenbrenner's ecological theory . 187 p. Summary 2 p. 2006.

49 Kakkonen, Marja-Liisa, Intuition and entrepreneurs. A Phenomenological Study of managerial intuition of finnish family entrepreneurs. 176 p. Tiivistelmä 2 p. 2006.

50 Lahtonen, Jukka, Matching heterogeneous job seekers and vacancies. Empirical studies using finnish data. 110. p. Yhteenveto 2 p. 2006.

51 Ollikainen, Virve, Gender Differences in Unemployment in Finland. 157. p. Yhteenveto 1 p. 2006.

52 Puronaho, Kari, Liikuntaseurojen lasten ja nuorten liikunnan markkinointi – Tutkimus lasten ja nuorten liikunnan tuotanto-prosessista, resursseista ja kustannuksista. - Sport marketing by sport clubs for children and youngsters – Exploring the production process, resources and costs of children's and youngsters' sport activities. 236 p. Summary 3 p. 2006.

53 Poikkimäki, Sanna, Look closer to see further. Exploring definitions, goals and activities of environmental life cycle management 153. p. Yhteenveto 1 p. 2006.

54 Siljanen, Tuula, Narratives of expatriates in the Middle East. Adaptation, identity and learning in non-profit organizations. 250 p. Tiivistelmä 2p. 2007.

55 Westerholm, Hely, Tutkimusmatka pienyrittäjän työvalmiuksien ytimeen. Kirjallisuuteen ja DACUM-analyysiin perustuva kartoitus. – A journey into the core of the occupational competence and attitudes of small business entrepreneurs. 221 p. Summary 5 p. 2007.

56 Hynninen, Sanna-Mari, Matching in local labour markets: Empirical studies from Finland. 100 p. Summary 2 p. 2007.

57 Tohmo, Timo, Regional economic structures in Finland: Analyses of location and regional economic impact. 53 p. (273 p.) Tiivistelmä 2 p. 2007.

58 Hiironen, Marja-Liisa, Hoivayritykset kotona asuvien ikääntyvien toimintakyvyn tukena. Ikääntyvien, kuntapäättäjien ja hoivayrittäjien näkökulma. - Care enterprises and the functionality of elderly people living at home. The perspectives of aging people, municipal decision-makers and care entrepreneurs. 153 p. Summary 2 p. 2007.

59 Arhio, Kaija, Luova laatu ja arvoinnovaatiot oppivan verkoston tuottamina. Tapaustutkimus rakennuspuutuoteteollisuuden verkostosta. - Creative quality and value innovations created by a learning network. Case-study within a building components manufacturing network. 191 p. Summary 10 p. 2007.

60 Heikkinen, Eila, Yrittäjän persoonallisuus ja sen yhteys yrityksen kasvuun BigFive-teorian mukaan tarkasteltuna. - An entrepreneur's personality and its impact on the firm's growth: An analysis through the Big Five Theory. 139 p. Summary 5 p. 2007.

61 Elo-Pärssinen, Krista, Arvot ja yhteiskuntavastuullinen toiminta suurissa suomalaisissa perheyrityksissä. Omistajan näkökulma. - Values and corporate social performance in large Finnish family firms. Owners view. 188 p. Summary 2 p. 2007.

62 Nyyssölä, Hannu, Omistajaohjaus, sisäinen yrittäjyys ja tuloksellisuus ammattikorkeakouluissa. - Corporate governance, intrapreneurship and effectiveness in the Universities of Applied Sciences. 361 p. Summary 9 p. 2008.

63 Kauko-Valli, Sofia, Subjective well-being as an individually constructed phenomenon. 179 p. Summary 1 p. 2008.

64 Sintonen, Teppo, Diversiteetti ja narratiivisuus. Tutkielmia diskursiivisesta organisaatiotodellisuudesta. - Diversity and Narrative. Discursive approaches to organizational reality. 59 p (123 p.) Summary 2 p. 2008.

65 Kooskora, Mari, Understanding corporate moral development in the context of rapid and radical changes . The case of Estonia. 105 p. (198 p.) Tiivistelmä 9 p. 2008.

66 Takanen-Körperich, Pirjo, Sama koulutus – eri urat. Tutkimus Mainzin yliopistossa soveltavaa kielitiedettä vuosina 1965–2001 opiskelleiden suomalaisten urakehityksestä palkkatyöhön, freelancereiksi ja yrittäjiksi. – Same Education – Different Careers. The study of the Finnish nationals who have studied applied linguistics in the University of Mainz, Germany, during the years 1965–

2001, and their working development as employees, freelancers and entrepreneurs. 203 p. Summary 2 p.Zusammenfassung 3 p. 2008.

67 Rankinen, Arja, Kulttuurinen osaaminen Etelä-ja Itä-Kiinassa toimittaessa. Illustraationa eräs tulkinta suomalaisjohtajien Kiina-kokemuksista. - Cultural competence when operating in Southern and Eastern China. An interpretation of some Finnish business managers' experiences in China as an illustration. 294 p. Summary 4 p. 2008.

68 Kotaja, Sari Maarit Susanna, Keskipohjalaisyritykset toimintaympäristönsä ja sen hyvinvoinnin rakentajina. Diskurssianalyyttinen näkökulma. - Central Ostrobothnian SMEs as constructors of their operating environment and regional welfare. Discourse analytic research. 209 p. Summary 3 p. 2008.

69 Teittinen, Henri, Näkymätön ERP. Taloudellisen toiminnanohjauksen rakentuminen. - Invisible ERP. Construction of enterprise resource planning. 206 p. Summary 2 p. 2008.

70 Luoto, Jani, Bayesian applications in dynamic econometric models. - Bayesilaisia sovelluksia dynaamisissa ekonometrisissa malleissa. 148 p. Tiivistelmä 3 p. 2009.

71 Tourunen, Kalevi, Perheyritykset kansantalouden resurssina. Keskisuurten ja suurten yritysten omistajuus, toiminnan laajuus ja kannattavuus Suomessa 2000–2005. - Family businesses as an economic resource. Ownership, scale and profitability of middle-sized and large-sized businesses in Finland in 2000–2005. 174 p. Summary 3 p. 2009.

72 Niemelä-Nyrhinen, Jenni, Factors affecting acceptance of mobile content services among mature consumers. - Mobiilien sisältöpalveluiden omaksumiseen vaikuttavat tekijät ikääntyvien kuluttajien keskuudessa. 148 p. Yhteenveto 3 p. 2009.

73 Lauronen, Mirja, Yrittäjämäinen elinkeinopolitiikka. Kolmevaiheinen, diskurssianalyyttinen tarkastelu kunnan elinkeinopolitiikan roolista ja tehtävistä. - Entrepreneurial economic policy. A three-phase discourse-analytical study of the roles and functions of municipal economic policy. 193 p. Summary 4 p. 2009.

74 Koskinen, Marketta, Omistajuus erilaisten yrittäjien käsityksinä ja tulkintoina. Fenomenografinen tutkimus. - Ownership as understood and interpreted by various entrepreneur types. A phenomenographic study. 227 p. Summary 2 p. 2009.

75 Frantsi, Tapani, Ikääntyvä johtaja tienhaarassa. Ikääntyvien johtajien kertomukset johtajuuden ja identiteetin rakentajana. - Stories as identity construction of ageing leaders at the career crossroads. 247 p. 2009.

76 Onkila, Tiina, Environmental rhetoric in Finnish business. Environmental values and stakeholder relations in the corporate argumentation of acceptable environmental management. 200 p. Yhteenveto 1 p. 2009.

77 Hartikainen, Pertti, "Tätä peliä ei hävitä" Abduktiivinen tutkimus Halton-konsernin oppimishistoriasta 1968–2006. - "We won´t lose this game." Abductive research on learning history of Halton Group 1968–2006. 190 p. Summary 4 p. 2009.

78 Kerttula, Kari, Valta ja muutos. Ylimmän johdon tulkinta vallan ilmenemisestä organisaation strategisessa muutosprosessissa. - Power and change. Interpretation of the top management about the power arising from a strategic change process: qualitative case study within a forest industry organization. 206 p. Summary 3 p. 2009.

79 Anttonen, Ritva, »Manne takaraivossa». Ennakkoluulot ja syrjintä suomalaisten romaniyrittäjien kokemana. Fenomenografinen tutkimus. - Experiences of prejudice and discrimination of Roma entrepreneurs in Finland. A phenomenographic study. 199 p. Summary 3 p. 2009.

80 Salvador, Pablo F., Labour market dynamics in the Nordic countries according to the chain reaction theory. 148 p. 2009.

81 Pellinen, Antti, Sijoitusrahastoasiakkaiden taloudellinen kyvykkyys ja tulevat lisäsijoituspäätökset. - Financial capability of mutual fund clients and additional investment decisions. 196 p. 2009.

82 Kalliomaa, Sami, Sisäinen markkinointi johtamisena. Tapaustutkimus konepajateollisuuden projektiorganisaatiosta. - Internal marketing as management –case study: project organisation within the engineering industry. 232 p. Summary 8 p. 2009.

83 von Bonsdorff, Monika E., Intentions of early retirement and continuing to work among middle-aged and older employees. - Keski-ikäisten ja ikääntyneiden työntekijöiden eläke- ja työssä jatkamisaikeet. 86 p. (194 p.) Yhteenveto 3 p. 2009.

84 Laakkonen, Helinä, Essays on the asymmetric news effects on exchange rate volatility. - Esseitä makrotalouden uutisten vaikutuksista valuuttakurssien volatiliteettiin. 124 p. Yhteenveto 4 p. 2009.

85 Lappalainen, Minna, Entrepreneurial orientation at the level of dyad relationships in supply chains and networks. 138 p. Yhteenveto 3 p. 2009.

86 Siltaoja, Marjo, Discarding the mirror - The importance of intangible social resources to responsibility in business in a Finnish context. - Peiliä hylkäämässä. Aineettomien sosiaalisten resurssien merkitys liiketoiminnan vastuille. 204 p. Yhteenveto 3 p. 2010.

87 Ovaskainen, Marko, Qualification requirements of SMEs in Internet-based electronic commerce. - Findings from Finland. - Pk-yritysten kvalifikaatiovaatimukset Internet-pohjaisessa elektronisessa kaupankäynnissä – löydöksiä Suomesta. 273 p. Yhteenveto 6 p. 2010.

88 Kuivaniemi, Leni, Evaluation and reasoning in the entrepreneurial opportunity process: Narratives from sex industry entrepreneurs. - Arviointi ja päättely liiketoiminta-mahdollisuuksien tunnistamisprosessissa. Yrittäjien tarinoita seksiteollisuudesta. 216 p. 2010.

89 Storhammar, Esa, Toimintaympäristö ja PK-yritykset. Havaintoja yritysten toimintaan vaikuttavista tekijöistä. - Local environment and the small and medium sized enterprises. Observations of the factors which affect the operations of firms. 188 p. Summary 3 p. 2010.

90 Koskinen, Hannu, Studies on money and labour market dynamics and goods market imperfections. - Tutkimuksia raha- ja työmarkkinadynamiikasta ja hyödyke-markkinoiden epätäydellisyyksistä. 106 p. Yhteenveto 2 p. 2010.

91 Hämäläinen, Ilkka, Suunnittelijat innovaatio-toiminnan ja kasvun ytimessä. - Architects and consulting engineers in the core of innovation and growth. 270 p. Summary 2 p. 2010.

92 Ketola, Hannu U., Tulokkaasta tuottavaksi asiantuntijaksi. Perehdyttäminen kehittämisen välineenä eräissä suomalaisissa tietoalan yrityksissä. - Transformation from a recruit (newcomer) into a productive expert. The job orientation process as a tool for personnel development in Finnish ICT companies. 212 p. 2010.

93 Rautiainen, Antti, Conflicting legitimations and pressures in performance measurement adoption, use and change in Finnish municipalities. - Ristiriitaiset legitimaatiot ja paineet suoritusmittauksen käyttöönotossa, käytössä ja muutoksessa Suomen kunnissa. 52 p. (109 p.) Summary 4p. 2010.

94 Jauhiainen, Signe, Studies on human capital flows and spatial labour markets. - Tutkimuksia inhimillisen pääoman virroista ja alueellisista työmarkkinoista Suomessa. 98 p. Summary 1p. 2010.

95 Korsunova, Angelina, Encouraging energy conservation with 'no hard feelings': a two-part analysis of communication between energy companies and Finnish households. 213 p. 2010.

96 Nokso-Koivisto, Pekka, Verkostoaktivaattorien roolit yritysten verkostoituessa. - Roles of Network Activators in Business Networking Process. 262 p. Summary 6 p. 2010.

97 Aaltonen, Heli, Co-creation of value in advertising. An interpretive study from the consumers' perspective. - Yhteinen arvonluonti mainonnassa. Kuluttaja-keskeinen tulkitseva tutkimus. 186 p. Yhteenveto 2 p. 2010.

98 Ylinen, Aulis, Opettajien yrittäjyyskasvatusvalmiudet Etelä-Pohjanmaan lukioissa. - Teachers' readiness for entrepreneurship education at Southern Ostrobothnia upper secondary schools. 221 p. Summary 8 p. 2011.

99 Mukkala, Kirsi, Essays on regional development and labor mobility in a knowledge-based economy. - Esseitä alueellisesta kehityksestä ja työvoiman liikkuvuudesta osaamisperusteisessa taloudessa. 127 p. Yhteenveto 2 p. 2011.