“SCIENTIA EST POTENTIA”

**HUMAN CAPITAL AND THE ROLE OF NETWORKS – MIGRATION, INCLUSION
AND NEW QUALIFICATION FOR A SUSTAINABLE REGIONAL ECONOMY**

DISSERTATION

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To my beloved uncle Michael

„Zgaś moje oczy: ja cię widzieć mogę, zamknij mi uszy, a ja cię usłyszę,
nawet bez nóg znajdę do ciebie drogę, i bez ust nawet zaklnę cię najciszej.
Ramiona odrańb mi, ja cię obejmę sercem mym, które będzie mym ramieniem,
serce zatrzymaj, będzie tętnił mózg, a jeśli w mózg mój rzucisz swe płomienie,
ja ciebie na krwi mojej będę niósł.”

“Put out my eyes, and I can see you still, Slam my ears too, and I can hear you yet;
And without any feet can go to you; And tongueless, I can conjure you at will.
Break off my arms, I shall take hold of you and grasp you with my heart as with a hand;
Arrest my heart, my brain will beat as true; And if you set this brain of mine afire,
Then on my blood-stream I yet will carry you.”

„Lösch mir die Augen aus: ich kann dich sehen, wirf mir die Ohren zu: ich kann dich hören,
und ohne Füße kann ich zu dir gehn, und ohne Mund noch kann ich dich beschwören.
Brich mir die Arme ab, ich fasse dich mit meinem Herzen wie mit einer Hand,
halt mir das Herz zu, und mein Hirn wird schlagen, und wirfst du in mein Hirn den Brand,
so werd ich dich auf meinem Blute tragen.”

Rainer Maria Rilke (1875-1926)

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LIST OF ABBREVIATIONS

BRAND – Border Regions Alumni Network Development

CH – Switzerland

CoP – Community of Practice

CPS – Cyber-Physical Systems

CURE – Corporate Culture and Regional Embeddedness

CVET – Continuing Education and Training

DIMENDAAI – Diversity and Mentoring Approaches Supporting Active Aging and Integration

ELMO^s – Electromobility Solutions for Cities and Regions

EU – European Union

EWL – East Westphalia-Lippe

GER – Germany

IBB2 – Inclusive Disable Care

ICT – Information and Communication Technologies

IVET – Initial and Education Training

LLL – Lifelong Learning

NetKnowing 2.0 - Web 2.0 Technologies and Net Collaborating Practices to support Informal Learning in Small and Medium European Enterprises

NL – the Netherlands

NRW – North Rhine-Westphalia

NO – Norway

NUTS2 – Nomenclature des unités territoriales statistiques

VAM Groups – Vulnerable and Marginalised Groups

VET – Vocational and Educational Training/System

R&D – Research and Development

RIS – Regional Innovation System

RTDI – Research and Technical Development Infrastructure

SE – Sweden

SME – Small and Medium Sized Company

UK – United Kingdom

USA – United States of America

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“You can never be overdressed or overeducated” - Oscar Wilde

I wrote the last words of this thesis in Italy, where I tried to get some distance from the work done and the topic itself. But under these conditions it seems impossible to forget human capital, especially the migration issues that are related to it and which make up an essential part of this thesis. Everywhere I go I meet people with a migration history, mostly working under hard conditions in jobs which are below their level of qualification. This is what they tell me when I ask them. I think about brain drain and brain waste and their tacit knowledge that stays undetected. And here I am again: in the eye of the storm.

When I began my research on human capital with a strong focus on highly skilled workers and knowledge migrants, I could not have been aware that this topic, four years later, would be even more significant on the European agenda than it was before. The current refugee situation opened me to conviction.

First and foremost I want to thank all the people that were involved and took part in my studies and shared their knowledge with me. I thank all the participants who completed my surveys. I appreciate their openness and their trust to give me insights. They are the pillars of this thesis.

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CHAPTER 1: INTRODUCTION

PREFACE TO THE THESIS: MOTIVATION

The European regions suffer a common problem: they lack (adequate) human capital, and this is recognised by several societal and political actors as a challenge (OECD, 2008; OECD, 2007), which has placed it on the political agenda. Studies by Coenen and Fikkers (2010), Trippel and Maier (2007), Asheim and Coenen (2006) or Brint (2001) describe this challenge in depth by revealing highly skilled workers as carriers of knowledge. Knowledge is identified as the key factor of the knowledge economy (Asheim & Coenen, 2006).

The present dissertation is in line with these studies, regarding highly skilled workers as the key factor for sustainable, regional economic and social development: highly skilled workers are the driving force of regional innovative capacity. It is thanks to the relevance of the highly skilled workers and their knowledge that regions develop and implement human capital strategies to mobilise their human capital potential and retain and (re)-attract highly skilled workers as a long-term endeavour. In that context the so-called non-core regions, which are defined here as border and peripheral regions, characterised by a lower level of attraction, are finding it even more necessary to develop a sustainable human capital model, including a mix of strategies to address highly skilled workers.

Coenen and Fikkers (2010) and Fikkers (2005) state that the government alone cannot solve the human capital problem, which needs further social actors, such as co-creators and co-producers. Co-creation and co-production, in this context, is understood as co-operation between regional actors and the government aimed at the solution of a previously defined issue (Voorberg et al., 2014). Thus, to solve the problem of the lack of an adequate stock of human capital, regional resources are taken into more careful consideration, as one of the preconditions for developing and implementing regional human capital strategies. Throughout this thesis, actor networks are discussed as such a resource, as co-creators and co-producers of possible human capital strategies. This thesis handles actor networks as regional resources and part of the regional social capital (Putnam, 2000), which can turn out to be advantageous when addressing specific regional issues.

Driven by an interest in providing insights into and understand the mechanisms and conditions underlying regional human capital strategies, this thesis sets out the following key question:

What kinds of strategies take regions (including non-core regions) into consideration to assure an appropriate regional human capital stock for a sustainable regional economy and how do actor networks support this purpose?

This key question is tackled with a multi-disciplinary approach. The decision to adopt such an approach was driven by the assumption that human capital, as already outlined, is a factor that can positively impact economies and their innovative capacities. Knowledge, which is mainly carried by highly skilled workers, is important for the sectoral and firms' competitiveness. Moreover, human capital can have a positive impact on regional societies and the building of further regional social capital. Taking "regions" as the research entities in this approach to the question, this thesis takes among others a spatial scientific perspective. However, to fully catch the scale of human capital's socio-economic importance and its far-reaching anthropological consequences, further scientific perspectives will be taken into account, including research from social science, communication science, economics, and cultural science. Of these areas, special emphasis is laid on innovation and knowledge studies, actor networks theories, firms and cluster theories, migration theories, and regional attraction models.

Using these approaches, the thesis elaborates on its topic of interest as follows: In chapter 1 the reader will discover the shift in the perception of human capital mainly caused by the occurrence of the knowledge-based society and economy. This will be proceeding by an explanation of the changing role of the individual in its economic and social environment. In line with the overall description of the problem, the lack of an adequate regional human capital, sections 1.1.1 – 1.1.5 discuss the societal challenges forcing the problem. The conceptual underpinnings in chapter 2 present in-depth insights into the importance of knowledge, its varieties and flows for regions and their economies (section 2.2). Moreover, section 2.3 discusses the socio-economic relevance of highly skilled workers for regions. The factor of regional attraction is a further focus, debated in section 2.3.3. Section 2.4 introduces a human capital model that includes possible human capital strategies and regional frameworks, which are regarded as preconditions for strategic development and implementation. The role of actor networks in the co-creation and co-production of such strategies is discussed in section 2.5. The core of the thesis is presented in chapters 3-8. Here, insights are given into human capital mechanisms and various ways of developing and implementing possible human capital strategies. Finally, chapter 9 draws the conclusions.

1.1 PROBLEM DESCRIPTION - THE CHANGING PERCEPTION OF HUMAN CAPITAL IN A KNOWLEDGE-BASED SOCIETY

1.1.1 ON THE TRAIL OF THE KNOWLEDGE-BASED SOCIETY

Regional innovation systems, also known in the literature as RIS, are often described as actor networks supported by regional institutional settings (Asheim & Gertler, 2005; Cooke, 2001; Cooke, 2001; Cooke et al. 1998; Freeman, 1987). “Characteristic for a system approach to innovation is the acknowledgement that innovations are carried out through a network of various actors underpinned by an institutional framework” (Asheim & Coenen, 2006: 166). In this context, recognized studies explain the regional ability and capacity to innovate by “successful” regional co-operations in terms of the “Triple Helix” based on university-industry-governance relations (Hassing & Klaerding, 2012; Etzkowitz & Leydesdorff, 1995). In-depth studies stress the importance of clusters or, more generally, of (knowledge) networks for regional innovation activities (Boschma, 2015; Terstriep & Lüthje, 2014; Cotic-Svetina et al., 2008; Cooke, 2001; Rehfeld, 1999; Porter, 1990). Likewise, other authors pay attention to factors that support innovation, such as the proximity of companies and organisations (Asheim & Gertler, 2005; Boschma, 2005), and specific innovation-encouraging cultures or milieus (Clifton et al., 2014; Crevoisier, 2011). In the innovation literature, mainly studies on learning regions (Lagendijk & Cornford, 2000) or learning spaces (Hassink & Klaerding, 2012) consider the role of individual actors as part of the innovation processes of firms and organisations. Several such studies focus closely on knowledge as one of the key factors of innovation (Malecki, 2010; Malmberg & Power, 2005). In the main listed studies, however, humans - or rather employees - as carriers of knowledge, are often not fully considered.

For decades, employees were regarded somewhat in terms of “exporting producers”. For the “traditional” industries, run in a broader sense by low-skilled labour, employees’ skills were seen as decoupled from their knowledge and their qualification. Therefore, such industries invested less in human capital. Even in times of mass production, employees were treated as a supplementary factor, with no need to understand the entire production process (see Fordism as an example). As a result of this view, numerous companies in the production industries transferred their production from domestic to low-wages countries. In doing so, they believed they were saving money to achieve higher turnover on global markets. Such companies often argued that, in the low-skilled sectors, a workforce with equal skills could be found anywhere. Nowadays, several everyday examples of companies (as examples of companies reshoring from China, see Gruner & Jahr, Google, Steiff, and others) admit they

had miscalculated and reshore their production to their domestic countries or regions (the term region is defined here in the sense of NUTS2 - statistical regions). The main reason for the movement is that equivalent skills cannot be found everywhere. They often form part of the employees' tacit knowledge (Cooke, 1996; Polanyi, 1966), which is attached to regional settings, understandings, working traditions, and cultures. Therefore, tacit knowledge is rather difficult to transfer from region to region if the two areas do not form part of the same regional frame and culture (Cooke & Rehfeld, 2011; see also chapter 8). Following Polanyi (1966), tacit knowledge is linked to single individuals in regard to their background and experience. Therefore, it cannot simply be decoupled, codified and totally absorbed by others. (For a broader definition of tacit knowledge see section 2.2.) Tacit knowledge is one reason why knowledge is such an important regional factor. Another factor is the rise of the knowledge-based society and economy.

In retrospect, the agricultural society was characterised by a high percentage of workers in the primary sector. The former primary sector had little in common with the later industrialised agriculture. Back in those times, in general, humans' activity was characterised by a low level of work division. An outstanding characteristic of the agricultural society was the rare mobility of workers – an important factor in the assumptions of this thesis, which sees a close co-dependence between the rise of a knowledge-based society and new mobility and migration patterns. In this thesis the terms mobility and migration are regarded as heterogeneous phenomena. Mobility is explained by, for example, the change of an “individual” between defined entities of a system (Bähr, 1983). In this context, labour mobility is understood as every movement of work, as a production factor, from one region to another (or the possibility that such a movement can be triggered) (Tassinopoulos et al., 1998). In contrast, geographical mobility, which is connected to a change of residence, is defined as “migration”. In this way, migration is understood as expression of mobility. Depending on the criteria selected, different forms of migration can be distinguished, and these are specified later in chapters 3 and 6 (David & Barwińska-Małajowicz, 2015; David et al., 2012).

Prior to industrialisation, the main European societies were regarded as agricultural. During these times urbanisation was not advanced. Rural areas were mainly located around small cities, providing them with all their provisions. A higher technical and economic standard was set first of all with the switch to an industrial society. This was marked by, for instance, a greater division of labour, more vertical and horizontal mobility, increasing urbanisation, and a higher educational level. Then, with the shift from industrial society to a service society, a shift from the secondary to the tertiary sector became visible. Literally speaking, this marked the liberation of the workforce, in the sense of participation and co-determination rights. In

addition, part of the transformation was characterised by a growth of employees' incomes, which required from the external world a greater service orientation through new societal inquiries. Moreover, the shift from the secondary to the tertiary sector was observed in people's life expectancy, an advanced health system, additional leisure activities, and an astonishing readiness for mobility. As we know today, a large percentage of e.g. inter-European migration occurred in times of industrialisation (Nowicka, 2007; see also chapter 6). Apart from these endogenous labour market processes, which were responsible of this transformation, other, exogenous processes can be enumerated, such as a higher complexity of social and economic organisations and structures. These led to a more refined division of labour, with more profound insights into and greater knowledge of new working environments. These new conditions required more specific knowledge on the part of employees. As a consequence, the demand for a skilled workforce grew.

With the shift to the knowledge-based society and its relation to the innovation discussion, human capital gained in importance (Trippel & Maier, 2007; Asheim & Coenen, 2006; Brint, 2001). What might seem a new approach is not; rather, it is the shift of a paradigm, as this thesis sets out below. In the previous eras of agricultural society, industrial society, and service society, human capital was regarded as a production and service factor, but the knowledge-based society started to change the perception of human capital (Cooke & Leydesdorff, 2006; David & Foray, 2003).

1.1.2 KNOWLEDGE-BASED SOCIETY AND THE ROLE OF HUMAN CAPITAL

As the term itself reveals, the knowledge-based society is founded on the knowledge factor. As early as the 1960s the publications of the sociologist Lane and the economist Drucker shaped this term (Krüger-Charlé, 2007; Bell, 1976). These substantial works were followed by Bell (1976), who used the term simultaneously in describing the post-industrial society (Steinbicker, 2010). Along the same line, Stehr (1994) is also worth mentioning, who conceptualised the term (Adolf, 2010) and laid the foundation for its further development.

Drucker, for instance, explains the development of the knowledge-based society in terms of the increase of employees' knowledge and the shift to higher educational levels. The employees' higher educational level can be laid at the door of increasing technical development and the emergence of highly complex machines (Steinbicker, 2010). As an effect, the low-skilled workforce decreased and highly skilled workers were in greater demand. In this way, the division between employees and the management boards of companies became more fluid.

“Many technological innovations require workers with complementary skills and knowledge of that technology, which leads to an increase in demand for educated workers. At the same time, low-skilled positions are made redundant by technology, which decreases the need for less-educated workers.” (Powell & Snellman, 2004: 213)

As additional forces of change, Drucker stresses the increasing complexity of the world (internationalisation and globalisation). Through the opening of the world's markets and the expansion of faster modes of communication and transportation (Lehner, 2005), the regional markets lost their unique selling position in their domestic sales regions and had to compete globally. To match the global requirements, new product and process innovations appeared. For this, new knowledge was required. The consequence was a demand for an adequate stock of human capital. In that vein, Drucker (1969) refers to the better-educated and (highly) skilled workers as “knowledge workers”. He regards knowledge as the foundation of the modern society (Steinbicker, 2010). Similarly, he argues that the main characteristic of the knowledge-based society is the utilisation of knowledge to again constitute knowledge, to generate it and use it productively. Highly skilled workers are the managers of such processes. The larger their knowledge base already is, the better they can absorb external knowledge and combine it with their experiences. In doing so, they create a mix of new knowledge, which is often characterised as problem-solving or situation-specific (Cohen & Levinthal, 1990).

Similarly to Drucker, Bell (1976) refers to knowledge workers as a phenomenon of the knowledge-based society. He characterises knowledge workers as one of the (positive and beneficiary) symptoms of the knowledge-based society. Bell bases the concept of a knowledge-based society on codified theoretical knowledge, which is not omnipresent, but rather linked to specific societal groups, such as researchers. He states that this codified knowledge later needs to be translated into broader social and economic contexts to make it specific and manageable (Steinbicker, 2010). In addition to the technical development, Bell stresses that innovative ways of production and distribution, and new regulations are the driving forces of the transformation (Krüger-Charlé, 2007). Today's discourse expands this view by taking new information and communication technologies into account (Lehner, 2005).

In the late 1980s Stehr concluded that the increasing importance of knowledge also leads to inequalities and local differences (Adolf, 2010). Stehr states that ignorance and unknowingness increase simultaneously with the gain of knowledge. Thus, the fact of an

increase of knowledge is not only beneficial to individuals, firms and regions, but can also cast light on their instabilities. Stehr argues that knowledge itself is not solely the foundation of a knowledge-based society, but that it is rather the quality of the knowledge that counts. Alongside the “know-that”, the “know-how” gains in importance (Adolf, 2010; both terms are defined in section 2.1.1). In his opinion, knowledge is the source of new additional, differentiated knowledge, which allows even more options for action. In this understanding, research and development are not regarded as a displacer of production and traditional structures, but somewhat as an additional supplemented tool (Adolf, 2010). Based on this, the main factor on which to concentrate is human capital, as a carrier of knowledge and its (re)-producer.

1.1.3 THE ROLE OF INDIVIDUALS AND ACTOR NETWORKS IN THE KNOWLEDGE-BASED SOCIETY

The knowledge-based society also changes our view of individuals in regard to political and economic involvement. Companies engage in flexible forms of working that facilitate the involvement of individual workers, allowing them to act in a more problem-oriented fashion (Powell & Snellman, 2004). Conversely, this means that the individual as an employee in the knowledge-based society gains more responsibility at work. With this changing position, employees are no longer regarded as simply the “workforce”, but as the human and social capital of a firm and - globally speaking - of a region (Bourdieu, 1983; the correlation between human capital and social capital is explained further in section 2.3.2). Especially highly skilled workers seem to contribute to the regional and companies’ knowledge base. In this context, the importance of degrees and education was enhanced boosted and is still growing. This indicates the rising economic importance of knowledge-based professions (Krüger-Charlé, 2007). The notion that knowledge is a productive force means that knowledge is an important individual resource, which can be responsible for the success and failure of a human individual. Based on this argument, an individual is not only assessed according to his or her knowledge base, but is also responsible for a steady acquisition of new knowledge to constantly extend the knowledge base, a concept known as lifelong learning (LLL).

The LLL concept goes far beyond continuing education (see chapter 4). It includes a comprehensive understanding of learning by an individual. An individual is considered as being responsible for gaining and (re)-producing knowledge by flexibly broadening his/her own competences. What once was simply “the way things are” occurs very rarely in the knowledge-based society: the individual pursuing a career within one company, in the same position, with the same competences, for an entire working lifetime. Today, changes to an

employee's job position are a natural phenomenon. Additionally, the requirements of companies also change. Driven by global and international transformations, firms expect employees to be flexible. They are asked to broaden and updating their knowledge base constantly, in order to stay on track. Innovation today can no longer be decoupled from the individual and collective knowledge base. Innovation does not appear "out of the blue", but rather as an iterative process with the involvement of highly skilled individuals.

In times when Europe is facing such challenges as the "greying" of society, high (youth) unemployment in certain European regions, coupled with a "skills shortage", which refers to specific knowledge-based sectors and professions, the role of human capital as a carrier of knowledge is more important than ever. In this thesis the term human capital is defined as the performance potential of humans represented by qualified and (highly) skilled individuals as prospective employees (Mohr, 1997; for an extended definition see section 2.3.1). In addition, highly skilled workers are here not only classed in terms of their formal education, but rather the job position and the job-related skills they possess. Literally speaking, human capital is the collective regional potential articulated in the human knowledge base and reflected in human labour and skills (see chapter 3). Thus, the role of human capital as a knowledge-holder (Grove, 2009) is important for knowledge-based societies and affects regional innovation systems. To assure sustainability, actor networks can be exploited to support this goal.

It appears evident that as individuals' knowledge increases, their authority and power grows, which in turn changes regional systems and regulations. For instance, (regional) governments and their structures tend to be more fragmented and specialised (Smith, 1997). Individuals require more political involvement, also known as "government with society". This implies in turn that the right to greater participation of individuals in political, economic and social discussions and activities can no longer be denied. Moreover, the effect of tensions in global flows in the national institutional contexts brings "home-based" activities more strongly to the fore (Grabher, 2004). A further increase of regional steering entities can be observed. The growth of regional actor networks can be regarded as an example of such a regional decentralisation of responsibilities. Policy networks, for example, are relationships that exist between (individual) groups and governments.

"Policy networks occur when there is an exchange of information between groups and government (or between different groups or parts of the government) and this exchange of information leads to the recognition that a group has an interest in a certain policy area " (Smith, 1997: 136)

Along similar lines, issue networks, as kinds of policy networks, are also introduced.

“Originally, the term “issue network” was described by the American political scientist, Hugh Heclo, as a network of professional actors forming around a policy issue that interacts directly with each other to debate, redefine and find new policy options.” (Oermen, 2012: 2ff)

Issue networks often use new technologies such as web 2.0 to reach a previously clearly defined objective. Generally speaking, actor networks are attention grabbing. They are constituted to reach a goal in a certain policy area or point of interest through their flexible and transformative nature, coupled with a close focus on mutual co-operation. Co-operations are one of the key characteristics of networks (Granovetter, 1973). In comparison to numerous organisations and institutions that tend to have “frozen” structures, which do not allow them to follow specific interests to their full extent, actor networks have the capability to react “elastically” and to change the scope of their actions more rapidly, as needed. By contrast, political organisations and governmental institutions in particular still are characterized by strong hierarchical concentrations marked by less capacity and flexibility to respond quickly to regional and local challenges.

On these grounds, actor networks are here treated as important regional resources set up by regional individuals in order to develop, move forward and implement a certain regional concern using problem-solving approaches. The importance of human capital to regions requires the formation of strategies. Aligned with that, the point of interest of regional actor networks is here defined as “the assurance of an adequate sustainable regional stock of human capital”. The goal here is to uncover and understand mechanisms underlying regional human capital strategies, co-created and co-produced by actor networks, concentrating on their development and implementation. Coenen and Fikkers (2010) state that government alone cannot solve the human capital problem. It needs the further participation of social actors as co-creators and co-producers. By terming the involvement of actor networks in human capital strategies as co-creators/co-producers allows us to understand their involvement in the design and implementation of public processes. Such a process implies public participation, co-management and interactive governance (Voorberg et al., 2014).

The possible strategies, which will be considered more closely in chapters 3-8, rely on four pillars, which are introduced and defined in section 2.4. Consequently, actor networks as co-creators/co-producers of human capital strategies are integrated in the overall research question of this thesis:

What kinds of strategies take regions (including non-core regions) into consideration to assure an appropriate regional human capital stock for a sustainable regional economy and how do actor networks support this purpose?

The core (chapter 3-8) of this thesis is based on articles that have been previously published or submitted to particular scientific journals. Each of the chapters 3-8 describes the involvement of specific actor networks as co-creators/co-producers in the identification of human capital mechanisms and the development and implementation process of regional human capital strategies. The actor networks, which are considered closely throughout this thesis, include migration networks, social networks, alumni networks, clusters and others (for actor networks, see the definition in section 2.5).

1.1.4 THE KNOWLEDGE-BASED ECONOMY

Initially it was argued that an adequate stock of regional human capital is important in economic and societal terms. Therefore, in this section the focus is laid explicitly on the rise of the knowledge-based economy. Referring to Powell and Snellman (2004: 199), “[...] the economy in developed countries has become driven by technologies based on knowledge and information production and dissemination”. The instruments used, such as the Internet and email, changed the nature of work and economy. Global transformations (as described in section 1.1.2) are forcing companies to innovate constantly, in order to stay competitive. The knowledge-based economy is marked by economic structural changes, the operations of financial markets, a transformation of labour markets, and new forms and structures of company organisations (Dörhöfer, 2010). Both Stockhorst (2011) and Powell and Snellman (2004) date the discussion of knowledge-based economy back to the 1960s, where science-based industries impacted social and economic change. Already, decades before, Schumpeter (1911) acknowledged the importance of knowledge in an economy and noted the role of individuals for innovation. In line with that, Bell (1976) stated that the core of the knowledge-based economy lies in theoretical knowledge as a source of innovation. In other words, knowledge-based economies are defined as economies that are based on the production, distribution, and usage of knowledge and information.

The knowledge-based economy, following Stockhorst (2011) and Stehr (1991), is often misunderstood and portrayed as the sudden appearance of the knowledge factor in an economy. However, the importance of knowledge in economies should rather be considered as a slow and stable process. As Stehr (1991) and later Gibbons et al. (1994) argue, it is not the sole fact of knowledge generation that marks out the knowledge-based economy. It is

rather the specification of knowledge (Adolf, 2010) and the decoupling of knowledge generation from a single discipline. Gibbons et al. (1994), followed by Leydesdorff (2006), describes “modern” knowledge generation as transdisciplinary and applied. Knowledge creation in the knowledge-based society does not follow a linear path (see also mode 1 and mode 2 of Gibbons et al., 1994 and Etzkowitz & Leydesdorff, 2000), but can rather be described as a manifold process. Based on Gibbons et al. (1994), Leydesdorff (2006: 192) argues “[t]he Mode 2 thesis [...] implies that the economic system has gained a degree of freedom under the pressure of globalization and the new communication technologies.” The “Triple Helix” concept, for instance, presents an innovation system that can be driven by various sub-dynamics, to varying extents. “In the Triple Helix model, the main institutions carrying the knowledge-based system are first analyzed as university, industry, and government” (Leydesdorff, 2006: 194; also compare Etzkowitz, 2008). In this way, knowledge generation is no longer related to disciplinary nature and scientific groups, but can also occur during the conception and creation of a product or process by several actors. Machlup (1962), for instance, classified the following sectors of knowledge: education, R&D, artistic creation, communication media, and information services, as well as information technologies.

Consequently, universities, which for a long time were held to be the only knowledge provider, lost their unique role. Knowledge in times of the knowledge-based economy is also created in practice-oriented ways. Examples can be found in companies, clusters, networks, and other organisations. Today, concepts such as open innovation (Chesbrough, 2003) are regarded as extensions of the basic idea. They trigger the opening of internal firm innovation processes to external parties. The underlying concept addresses the attraction of external impulses and ideas, which can be implemented in companies’ innovative activities. Moreover, new information and communication technologies ensure the rapid dissemination of codified knowledge and in doing so they contribute to regional knowledge bases. Practically, in the knowledge-based economy each individual has free access to any kind of knowledge and can again generate and disseminate new knowledge. Aside from this, new information and communication technologies permit the creation of co-operation networks (Stockhorst, 2011) where knowledge is shared, discussed and exchanged without the physical movement of individuals. Dörhöfer (2010) claims that the embeddedness of companies in the knowledge-based global economy affects their working processes, (inter)-regional networking possibilities, their strategies, and their knowledge management.

Finally, it can be stated that one main characteristic of the knowledge-based economy is the “new” understanding of knowledge generation and the occurrence of different knowledge

types, which will be explained in greater detail in section 2.1. Based on these arguments, Dörhöfer (2010) explains that in the knowledge-based economy the heterogeneity of knowledge types and the acceptance of tacit knowledge lead to local processes of knowledge generation. As a result of the processes described above, Drucker (1993) emphasises that knowledge, which successively replaces the physical labour force and natural materials, becomes a valuable resource.

1.1.5 THE SOCIETAL AND ECONOMIC CHALLENGES RELATED TO HIGHLY SKILLED WORKERS

The sections above focused on the importance of knowledge in the process of transformation to knowledge-based societies and knowledge-based economies. Moreover, the focus lay on the elaboration of the changing role of human capital and more specifically the role of highly skilled workers for the regional ability to innovate and stay competitive in a global world. Additionally, the role of knowledge-individuals was argued. Thus, human capital as the regional potential of knowledge-holders was described as an essential resource for regions, their (knowledge)-based sectors and a variety of regional companies (Stockhorst, 2011). It was stated that knowledge-based economies brought to the fore a strong division of labour, for which more specific and profound kinds of knowledge are needed, which is why today's firms make high demands on an adequate stock of human capital to provide the knowledge. Highly skilled workers especially are the core target group that companies seek to attract and the group on which they focus (Faggian & McCann, 2009; Tripl & Maier, 2007) when seeking new employees. Predominantly, companies demand highly skilled workers possessing a certain type of knowledge. Simultaneously, they want the employees to have a broader view of how the individual production processes mesh. This phenomenon can be observed along the entire value chain in various sectors (this example will be revisited in chapter 7). In addition, highly skilled workers are not only required to possess sector- and company-related expertise, they are also asked to know global markets and changes in order to be aware of how to place new products and processes in a broader context outside of the firms' logic. It is estimated that this demand will increase steadily in the future. The biography of highly skilled workers leads companies also to rely on the networking abilities of their employees, which can lead to knowledge exchange and external knowledge absorption and can be beneficial for the firm's innovations. The need for a certain willingness to co-operate and to network among employees accounts for new ways of approaching innovation, such as open innovation, user-driven innovation and more, where co-operation among diverse actors is needed.

What seems to be an easy endeavour for companies, to find an adequate highly skilled workforce, is indeed a challenge. In certain knowledge-intensive sectors, a new phenomenon can be observed: in times of industrialisation and mass production, employees were looking for a proper job opportunity. Today's companies often search for adequate highly skilled workers, even when there is relatively high unemployment in the general labour force. This phenomenon can be described as a paradigm shift, which brings the importance of highly skilled workers and the discussion of human capital to the fore. As a result, across Europe, several sectors now rely on a highly skilled workforce, but claim they have difficulties finding it. Among others, the MINT-based sectors (MINT stands for mathematics, informatics, natural sciences and technology), the health sector, and any knowledge-intensive sectors, report a lack of highly skilled workers, which cannot be remedied immediately. This can be related to several socio-economic challenges in the principal parts of Europe. Some socio-economic challenges are presented below, which are related to highly skilled workers. Overcoming these could improve the regional and firms' quest for highly skilled workers. These challenges lead to the research question of this thesis (see section 1.2.1), which will be further processed and elaborated in chapters 3-8:

1: The demographic transformation of European societies is one of the biggest regional challenges. Currently, birth rates are steadily decreasing and an aging population endangers European societies. This affects inter alia the size of the potential labour force (Stockhorst, 2011), whose absence might negatively impact regional economies and their sectors.

2: The existence of imbalances in the educational systems across Europe still is visible, and this also strongly affects regional economies. The standards of qualifications and degrees still are nationally oriented, and there is still no mutual recognition of qualifications. These factors challenge the European right to the free movement of highly skilled workers.

3: Referring to the European right to the free movement of workers, and explicitly to the migration of highly skilled workers, it is becoming a significant factor for European regions and their economies. Thus, highly skilled migration can be regarded in terms of rebalancing disequilibria in several regional and national labour markets. As noted, there are numerous European regions with a high skills shortage in knowledge-based sectors (regions in Germany, Austria, the Netherlands). By contrast, several European regions (examples being regions in Spain, Italy and south-east Europe) claim high (youth) unemployment, even among highly skilled workers. Thus, in the future, the affected

regions will rely on the migration of highly skilled workers (also known as brain drains) to bring labour markets and economies back into balance and to increase innovative regional potential. But here a further challenge occurs. Not many European regions possess proper strategies for the (re)-inclusion and (re)-integration of highly skilled migrants (Lichtenthaler, 2009; see also chapter 3) to make them part of the regional society and economy. There still is a lack of a “welcoming culture” that enfolds highly skilled migrants with potential as innovators (OECD, 2014). In addition, a German study of the IAB-SOEP Migration Sample (2014) could show, that there still are a small proportion of countries who take the advantage of the freedom of movement for workers.

4: The challenge of regions to remain innovative and competitive by the attraction of highly skilled workers relates first and foremost to less attractive regions. These are mainly impacted by a brain drain, which needs to be compensated. Surveys by Stockhorst (2011) or Coenen and Fikkers (2010) have shown that brain drain particularly affects less attractive, non-core regions such as border and/or peripheral regions. Highly skilled workers, besides the economic aspect, are regarded as the backbone of regional societies. The loss of highly skilled workers can lead to a downward spiral, which in turn leads the region into stagnation. The challenge is to find a balance between the emigration and immigration of highly skilled workers. Thanks to their specific regional socio-economic and geographical characteristics, non-core regions as referred to here, are explicitly affected by this challenge.

5: As migration is a hardly practical option for each region to gain a highly skilled workforce, due to socio-economic and spatial disadvantages, a further challenge is the mobilisation of a region’s own untapped labour potential. In this thesis, untapped potential addresses specific target groups, such as (post) migrants, early school dropouts, the long-term unemployed, and further vulnerable and marginalised groups, such as people with disabilities.

6: One effect of the knowledge-based economy is that firms need their employees to provide more specific skills and knowledge. As several sectors complain about a shortage of skills and knowledge, the challenge here inheres in a better understanding of the skills needed and in finding ways to gain more rapid access to potential highly skilled workers in order to ensure a solid regional knowledge base. Regional framework conditions (policies, research infrastructure, co-operations etc.), as presented later in section 2.4, evidently can impact the recruitment of highly skilled workers. Moreover, regional social capital needs to be established in terms of actor networks.

7: Finally, the structural changes, (e.g. transformation to knowledge-based economies) that have occurred within the last few decades have shown that regional governance structures and strategies often depend on socio-cultural factors and the flexibility to react quickly to rapid global shifts. The challenge of the main regions is to integrate global flows (highly skilled migration/skills shortage) with local needs without losing regional points of interests (the development of a regional human capital agenda). Regional frames based on regional culture, social capital and traditions are said to be a supportive manner to meet this challenge.

The described situation results in a joint problem for (European) regions, which is regarded as carrying on into the future: the lack of an (adequate) stock of regional human capital. Not all European regions are equally affected by the challenges described. It seems as if mainly non-core regions, which were defined above as border and peripheral regions, are more challenged to attract highly skilled workers than e.g. metropolitan areas. Highly skilled workers often assume that the job situation and proper job offers are located in bigger cities and metropolitan areas (Florida, 2008). Moreover, there they hope to find better leisure facilities, a better childcare system, and more cultural events, referring foremost to the creative class, as Florida (2008) calls a specific, innovative group of highly skilled workers. Nonetheless, almost every European region needs to face the described problem of attracting knowledge workers for a sustainable regional economy. It is on this basis that the main research interests of this thesis are elaborated further below.

1.2 MAIN RESEARCH INTERESTS OF THE THESIS

1.2.1 OBJECTIVES AND RESEARCH QUESTIONS

With respect to the overall problem description and the enumerated challenges, the main objectives of this thesis are:

- To understand and to offer insights into the mechanisms underlying human capital strategies and their conditions for their development and implementation;
- To contribute to the body of knowledge and to disseminate knowledge on regional strategies to assure an appropriate stock of human capital;
- To understand the scientific and practical relevance of highly skilled workers to regional economies and societies;
- To uncover the involvement of various actor networks and to understand their relevance as co-creators and co-producers in the development and implementation of

regional human capital strategies to assure an adequate stock of regional human capital;

- To gain deeper insights into the international and inter-regional migration of highly skilled workers;
- To elaborate long-term human capital strategies connected to the following pillars (which will explicitly be outlined and discussed in chapter 2): (1) mobilising regional untapped potential; (2) retention of highly skilled workers; (3) re-attraction of highly skilled workers who once lived in the region; and finally (4) the fresh acquisition of external highly skilled workers.

With regard to the challenges and the main objectives set out above, the key thesis question is formulated as follows:

What kinds of strategies take regions (including non-core regions) into consideration to assure an appropriate regional human capital stock for a sustainable regional economy and how do actor networks support this purpose?

Based on the key question, the following sub-questions are elaborated in chapters 3-8. This thesis is based on articles that have been published or submitted to scientific topic-related journals. Therefore, the sub-questions enumerated below are not precisely identical with the questions asked in each chapter. They are more assimilated to the overall structure of the thesis, in order to bridge part 1 and part 2 with the core chapters 3-8.

- Chapter 3: What kind of regional supportive concepts and actor networks facilitate brain exchange to promote knowledge spillover effects based on various migration patterns?
- Chapter 4: What is the contribution of social capital in the form of learning networks to the (re)-inclusion of the untapped labour potential of vulnerable and marginalized groups?
- Chapter 5: How do (university) alumni networks function as retention and (re)-attraction instruments for highly skilled workers?
- Chapter 6: To what extent do migration networks influence the migration decision of highly skilled graduates, and have migration motives changed over time?
- Chapter 7: How do R&D policies, research infrastructure and regional economic networks impact the development and recruitment of highly skilled workers?
- Chapter 8: How do cultural aspects and regional path dependence as a part of social capital accomplish structural change in labour markets?

1.3 STRUCTURE OF THE THESIS

The problem description shows that the increasing demand for knowledge brings with it change in human capital's perception in societies. The foremost knowledge-based economies rely on highly skilled workers who are regarded as the requested knowledge carriers. It is their potential, which is needed for regional economies to stay competitive by innovation in a global world, which daily is triggered by new international flows and movements. Section 1.1.5 listed challenges that complicate the gain of "best" brains for regional firms. They intensify the global competition for knowledge. Against this background, regions rely on a varied portfolio of strategies to assure an adequate long-term human capital stock. For a relatively long time, several regions ignored this undertaking. Especially European regions and their highly developed economic markets assumed they had the best conditions to attract highly skilled workers without their own, active contribution. Certainly, European regions are still to some extent attractive to highly skilled workers. However, many highly skilled workers are complaining about Europe's inability to create future attractive and flexible working conditions, which can be reduced to the absence of a "welcoming culture" as well as shadowy incentives for highly skilled migrants (e.g. work permits for highly skilled migrants), which work out better in countries such as the U.S. or Canada.

The key interest of this thesis is to uncover and understand the mechanisms underlying the manifold regional human capital strategies that address topics of migration, inclusion, and new qualification. Actor networks as co-creators and co-producers of such strategies are also considered. The chapters of this thesis are based on articles that have already been published in specific specialised journals, or were submitted to such (the information of the state of play of each article is marked by footnotes in each of the chapters 3-8). In line with this structure, each of the chapters addresses a specific topic in the overall human capital agenda outlined in chapter 2.4. After each chapter (3-8) a brief resume is given, which at the same time is the connecting passage to the following section. In this way, the highlights of each chapter are summarized and recoupled to the overall framework of the thesis to keep the reader on track. In doing so, the reader will recognize a thread running through the thesis while reading the text. Moreover, the thesis is so structured as to give the reader the opportunity to read the whole text as a continuous item or just to choose the chapters that are of interest.

Figure 1.1: Structure of the thesis. Source: David, 2015.

After the *introduction*, chapter 1, the thesis is divided into three core parts. The *conceptual underpinnings* mark chapter 2. Here, several aspects are drawn, resulting from the problem description (chapter 1). Among other subjects, chapter 2 fleshes out the question of why knowledge is important for regions (2.2). Following the argument in section 2.3, attention is paid to the importance of highly skilled workers as knowledge carriers for regional economies, and the role of highly skilled workers as the backbone of regional societies is discussed. Here is where a definition of highly skilled workers is given. Overall, this chapter argues for the role of highly skilled workers as innovators. Section 2.3.3 regards regional attraction as a factor for acquiring a highly skilled workforce. Thereby, the impact of regional attraction on highly skilled workers living and working place choices is discussed.

In section 2.4 the model of long-term regional human capital strategies is drawn based on a four-pillar model as action fields for strategies, which is transferred to the research reported in chapters 3-8. In section 2.5 the network terminology used here is outlined and it will be shown why actor networks as a part of regional social capital indicate the adoption of a bottom-up approach in the later development and implementation of human capital

strategies. Finally, section 2.6 presents an overview of the mix of methods used in the chapters.

Chapters 3 to 8 can be considered the core of the thesis. These chapters provide insights into human capital mechanisms underlying the potential strategies to develop and implement an adequate regional human capital stock with the help of actor networks. The logic of the chapters follows the human capital model developed in chapter 2, section 2.3, with the following pillars: (1) *mobilising of own potential*, (2) *retention of highly skilled workers*, (3) *re-attraction of highly skilled workers*, and (4) *attraction of external highly skilled workers*.

In concrete terms, the chapters take the following aspects as the subject of discussion. Chapter 3 argues that skills shortage and an aging population is a future regional challenge in Europe. Especially the absence of highly skilled workers who are regarded as knowledge carriers can have adverse socio-economic effects on regions. In this context, labour migration can be regarded as a possibility on which a regional strategy can be developed to counteract the phenomenon described above. In times of new European mobility, migration-related knowledge spillover effects are moved into the spotlight. The chapter claims that in reality the freedom of movement of mobile citizens often encounters practical obstacles, such as high entrance barriers to particular occupations, regional labour markets, and regional societies. In addition to such strategies such as the recognition of qualifications, complementary regional strategies are drawn to make full use of migrants' skill potential in order to completely absorb migration-related knowledge. Hence, chapter 3 gives a conceptual presentation of a migration-related knowledge effect on domestic and receiving regions, and discusses two possible regional approaches: the inclusion of (re)-migrants and the regional absorptive capacity. Both function as concepts to convert brain drain and brain waste into brain gain or even regional brain exchange effects. A further part of the chapter introduces actor networks, in particular migration networks, as co-creators and co-producers for better social inclusion and knowledge absorption related to highly skilled migration.

The initial point of chapter 4 is the high (youth) unemployment in several EU regions. Other European regions are suffering from brain drain and the consequent depletion of knowledge due to the emigration of highly skilled, knowledgeable people. To ensure a broad, productive regional knowledge base, which would enable innovation, regions need to develop an integrated human capital agenda. A main pillar of such an agenda is the use of untapped regional labour potential. To date, scholars have only examined the meaning of highly skilled workers as knowledge holders, thereby neglecting the role of vulnerable and marginalised (VAM) groups. This chapter focuses on the (re)-integration of VAM groups to the vocational

education and training (VET) system and labour markets using innovative VET solutions such as mentoring and social media (Web 2.0 and 3.0), as well as strategies based on social networks. Social networks and learning networks in particular have good potential, such as the formation of regional social capital through the ability of learners to interact in common learning situations, which may raise the regional human capital of VAM groups. Vice versa, if human capital accumulates into a strong regional knowledge base, which can be used for regional (economic) issues, the result will be an increase in regional social capital.

Chapter 5 of this thesis focuses on the regional need (particularly of non-core regions) to keep the stock of human capital stable. These regions follow the strategy of (re)-attracting highly skilled workers rather than attracting highly skilled workers who had never been in contact with the region. The (re)-attraction of such workers, who once left the region, is therefore important because they have gained knowledge and contacts elsewhere, which they can mix with the knowledge of their domestic living place. Since the so-called return migrants once lived in the region of study, they have already established ties to the university region and are easier to address than attempting to attract outsiders without such ties. In general, social actor networks contribute to nurturing a “warm place” perception among potential workers. This chapter looks at special kinds of social actor networks. It focuses on higher education alumni networks and discusses their involvement in retention and (re)-attraction to increase the highly skilled workforce in their university regions. Being part of a university community means that alumni networks are able to maintain continuous contact with their alumni and have a positive effect on students remaining in the region.

Chapter 6 deals with the migration motives of German and Polish final semester students and university graduates in the partner cities of Bielefeld (GER) and Rzeszów (PL) who are on the threshold of their professional careers. The survey accomplished for this chapter was motivated by the following question: are the current migration motives of highly skilled graduates still economically driven, or have the motives for migration changed due to the increasing educational level of migrants and new migration patterns? Chapter 6 thus provides insights into emigration destinations favoured by graduates from the two cities. In addition, the importance of informal networks for a migration-related job search was analysed. The survey’s results contribute, at a micro-level, to the broader literature. The survey also adds new findings to several migration theories at the macro and meso-levels. In times of high (youth) unemployment in several European regions, as well as skill shortages and demand for highly skilled workers in other European regions, new findings and approaches to migration motives are required. The findings presented in this chapter can help receiving countries and regions reflect on their strategies for attracting highly skilled

workers and set new incentives based on an individual view. In addition, chapter 5 poses the question whether migration networks still play a role in migration decision-making.

Chapter 7 is directed towards new qualification of highly skilled workers in future transport and mobility-related sectors. In a search for appropriate solutions to cope with ever-increasing road traffic, cities and urban agglomerations across Europe are placing great emphasis on new transport and mobility solutions, electric mobility in particular. Located at the intersection of the three constituent sectors, automotive, information and communication technologies (ICT), and green energy, electric mobility is perceived as a future-oriented sector. Innovation in the sector not only requires collaboration and the exchange of knowledge, but also an increase in skilled workforces and distinct job qualifications. These demands emerge, on the one hand, through the electrification of cars, which results in structural changes throughout the entire value chain. On the other hand, growing customer and service orientation further accelerate such developments. So far, our knowledge about the concrete demands for engineers as knowledge carriers and innovation drivers is relatively scarce. To shed some light on this issue, the chapter discusses companies' changed demand for engineers in electric mobility and the role of networks (e.g. clusters). The research question is empirically addressed by analysing data on electric mobility-related companies (n = 79) collected in two traditional automotive regions, Stuttgart in Germany and Alsace/Franche-Comté in France. The results strongly suggest the relevance of regional actor networks.

Chapter 8 handles the importance of cultural influences on regional economies, their societies and regional attraction, in order to cope with challenges such as the example of "structural change" and in this context the development of human capital recruitment strategies. It argues that the change to knowledge-based societies and economies moved culture to the fore, as transformations and structural changes could no longer be regarded as economic factors only. Previously, especially in the field of economic geography, culture was not considered an important factor influencing a region's ability to innovate or shape structural or/and economic changes. Several cultural "frames" have been studied using the examples of the regions Basel (CH), East Westphalia-Lippe (GER), Southeast Netherlands/Brabant (NL), Wales (UK), Győr (HU), Brandenburg (GER) and Styria (AUT), which build the conditions for successful regional co-operations, actor network building, policy development in terms of economy, labour market, regional image, and the attraction of highly skilled workers etc. Chapter 8 thus shows that the quality of such a frame, which means the extension of actors' activities under a certain setting based on shared values, traditions, belief structures, etc., depends strongly on the regional culture (including

subcultures) and regional path dependence as part of a strong regional social capital. It is argued that regional frames vary as a result of different paths and their historical embeddedness, but there are specific cultures and trust values that seem to be more flexible than others in terms of change management. The EWL region is a good example of how structural change can be managed by regions with the help of cultural factors and a strong regional social capital with a focus on human capital and labour markets.

The conclusion of the thesis is outlined in chapter 9. Section 9.1 functions as the introduction to the conclusions and a summary of the thesis. The chapters' conclusions are summarised in section 9.2. In addition, the overall thesis conclusions are summarised in section 9.3. As one aim of this thesis is the dissemination of its findings, section 9.3.2 also addresses the political and regional relevance of the topics discussed. Finally, in chapter 9.4 the work's contribution to the current body of knowledge is elaborated and the need for future research is discussed.

1.4 MIXED-METHODS APPROACH

The fact that this thesis has been written based on articles that were later transformed into chapters 3-8 also affects the methodology used. Each of the chapters 3-8 has gained a methodological approach. Thus, the entire methodology is defined as a mixed-methods approach (Creswell & Clark, 2011; Teddie & Tashakkori, 2009) integrating qualitative and quantitative data. Moreover, conceptual approaches constitute the introductory chapters (chapters 3 and 4). In addition to the overall conceptual underpinnings, each chapter retains its own conceptual foundations, in line with the chapter's main issue and defining the terms used in the chapter. In the main, the chapter's surveys are based on accomplished European projects or bilateral research co-operation.

Chapters 3 and 4 are regarded as conceptual chapters. Chapter 3 considers new migration flows and their possible knowledge spillover effects on regions and their economies. To deepen our understanding of how migration-related knowledge spillover effects can be fully used for regional concerns, two concepts are presented: regional inclusion and regional knowledge absorption. Chapter 4 fleshes out the knowledge of vulnerable and marginalised groups as regional untapped potential, using examples of several accomplished projects on the topic. Mentoring concepts and innovative learning concepts are introduced. Both chapters are regarded as the introductory chapters to the core of the thesis (chapters 3-8) to demonstrate possible regional strategies for the retention and (re)-attraction of highly skilled workers.

The empirical material of chapter 5 is taken from the sub-project “BRAND – Border Regions Alumni Network Development”, as part of the INTERREG IVC Mini Programme “Brain Flow”. The unit of analysis in chapter 5 is university alumni networks in five European border regions: the Netherlands (NL), Germany (North Rhine-Westphalia) (NRW&GER), Norway (NO), Sweden (SE), and Switzerland (CH). Here, their function as supportive instruments for the retention and (re)-attraction of highly skilled workers is analysed. A standardized questionnaire addressed to alumni network managers was used in face-to-face interviews in the course of the in-depth case studies. Later, desk research was done on these networks. To gain further insight into what alumni networks do and how they are organised, a complementary web survey was added to the eleven alumni network case studies of the five European border regions. The web survey focused on the same countries: the Netherlands (NL), Germany (North Rhine-Westphalia) (NRW&GER), Norway (NO), Sweden (SE), and Switzerland (CH). but the web survey sample was taken from universities in all regions in these countries, not just the border regions. The web survey was deliberately confined to “traditional” universities rather than applied science universities because the status, size, scope and position of applied science universities varies considerably among the countries surveyed, leading to comparison difficulties. The sample for the web survey consisted of 47 university alumni networks, 14 from the Netherlands, 8 from NRW (Germany), 8 from Norway, 8 from Sweden, and 9 from Switzerland. It also looked into 38 faculty networks, 14 from the Netherlands, 14 from NRW (Germany), 3 from Sweden, and 7 from Switzerland. Because of the diversity and unbalanced country sample, the main focus of the web survey was applied in the overall university network; faculty network analysis was then used for comparison. The web survey provided less in-depth information on the scope and structure of the networks than with the case studies, which were based on face-to-face interviews and extended document analysis, even though the focus had been on the same questions and issues. The variables and analytic elements used for the web survey were taken from the explorative in-depth case studies.

The survey presented in chapter 6 deals with possible motives for migration which favour labour-driven migration. The views presented are those of a group of highly skilled university graduates. The survey’s empirical material is based on a standardised qualitative questionnaire distributed to Polish and German students shortly before graduation, as well as to graduates from public universities in two partner cities (Rzeszów, Poland and Bielefeld, Germany). The aim of the questionnaire was to discover how, based on the graduates’ prospects, personal motives led to labour driven migration. The survey was conducted among university graduates, as well as students in their final semester in various disciplines,

at the University of Bielefeld, the Bielefeld University of Applied Sciences, the University of Rzeszów, and the Rzeszów Technical University of Applied Sciences. A total of 439 participants from Bielefeld (Germany) and 402 from Rzeszów (Poland) took part. The groups of respondents were addressed with identical questionnaires, which dealt primarily with possible migration motives based on previous literature analysis. Thus, the majority of possible answers were given. Another part of the survey asked about the preferred destination countries of potential emigrants (in the case of possible migration). A further important requirement was to obtain insights into the question of which form of recruitment graduates wishing to migrate would choose. Would they prefer to use informal national networks or EU-wide networks? This question was posed to examine the idea of whether social networks are still important to those planning migration and whether they are linked to job searches.

In chapter 7, a mixed-methods approach integrating quantitative and qualitative methodologies was applied to answer the research questions. While the qualitative methodology is based on desk research including the analysis of secondary data plus semi-structured interviews with cluster managers, the quantitative data are drawn from a company survey in the two case study regions Alsace/France-Comté (FR) and Stuttgart (DE), undertaken as part of the FP7 European funded project “ELMO^s - Electromobility Solutions for Cities and Regions”. The choice of case regions was made because of their strong automotive industry, their engagement in electric mobility, and localised clusters. The quantitative survey was based on a questionnaire that sought to develop insights into engineer recruitment practices by companies working on new transport and mobility solutions, as well as collaborative recruitment activities in the regions. It incorporated questions regarding companies’ view on new driving technologies and future mobility concepts, demands for engineers in new mobility and transport solutions, and their perception of engineering education and its importance in relation to companies’ demands plus future R&D needs. Responses were measured using a 4-point Likert scale ranging from 1 = ‘I fully agree’ to 4 = ‘I do not agree at all’. Administered by the cluster managers in the two regions, the seven-page questionnaire was sent out to a sample of 1,000 companies active in electric mobility. Data were collected from the middle of March until the end of May 2014, including two reminders sent two and six weeks after the initial mail. In total, 79 valid questionnaires were received, representing a response rate of 7.9%. In addition, a sample of 79 seemed adequate to determine significance at the $p = 0.05$ level, in order to emphasize possible existing differences or similarities between the regions regarding their regional

orientation, personal regional contacts in their search for engineers, and the engineers' skills demanded.

Finally, chapter 8 is based on the findings of the FP6 European funded project "CURE – Corporate Culture and Regional Embeddedness". Here importance is given to regional culture and regional path dependence, which play out in certain regional "frames", a term coined by Goffman (1974). The frame analysis was adapted to seven European regions: Basel (CH), East Westphalia-Lippe (GER), Southeast Netherlands region of Brabant (NL), Wales (UK), Győr (HU), Brandenburg (GER), and Styria (AUT) and amplified in case studies. After the frame analysis, a comparative analysis was performed. Based on the example of the East Westphalia-Lippe (GER) region, the business and labour frame were expanded to present the cultural impact on regional networking and co-operation ability influencing the structural change on the example of the labour market.

CHAPTER 2: CONCEPTUAL UNDERPINNINGS

2.1 INTRODUCTION TO THE CHAPTER

The introductory chapter of this thesis (chapter 1) portrayed the changing perception of human capital with a focus on highly skilled workers over recent decades. It was argued that the shift to a knowledge-based society brought knowledge to the fore. Chapter 1 explains why knowledge gained in importance, coming to the conclusion that specific knowledge is needed for regions and their economies if they are to be and remain competitive by innovation in a globalised world. This is accounted for by the fact that the brighter the knowledge base of a region is, which drives the regional innovation systems (RIS), the better it is for regions to face world-wide competition. Moreover, the diversity of knowledge, which is introduced in chapter 2.1, assures a better and faster recognition and absorption of further (external) incoming knowledge. This again is useful for the generation of new knowledge and can be seen as a further competitive factor. In this context, chapter 1 argues that highly skilled workers are the carriers of knowledge and therefore are the main target group demanded by regions and regional companies. How essential knowledge really is for regions and their economies is discussed further in chapter 2, which introduces concepts related to knowledge and highly skilled workers, which are useful for the further course of the thesis. Thereafter, the role of highly skilled workers as the backbone of regional societies is debated, explaining why it is fundamental for regions to gain the best brains. Moreover, possible strategies are presented to assure an adequate stock of human capital, which is fundamental to the further studies in chapters 3-8. Finally, a central part of chapter 2 is the definition of actor networks considered here. Actor networks are regarded as part of regional social capital and therefore as an important regional resource. Following this, the involvement of actor networks as co-creators and co-producers of several regional human capital strategies is revealed.

2.2 KNOWLEDGE FLOWS IN REGIONS

As described in chapter 1, regions and companies are forced to innovate constantly mainly due to the effects of globalisation and internationalisation. Changing technologies, customer needs and market competitiveness mean that innovations have become more complex over recent decades. As several authors have argued, such as Drucker (1969), or Etzkowitz and Leydesdorff (2000), the process of innovation no longer follows a linear path. Innovation processes, as Malecki (2010) stresses, are characterised by a series of interactive feedback loops. Asheim and Coenen (2006: 164) argue that, "[...] there is a large variety of knowledge

sources and inputs to be used by organisations and firms and there is more interdependence and division of labour among actors (individuals, companies, and other organisations).” Regions that aspire to growth and wish to increase their global market competitiveness are forced to gain, accumulate and use a sector-specific mix of knowledge that is embodied in human capital, which includes synthetic, analytical and symbolic knowledge - described later in section 2.1.1 (Asheim & Gertler, 2005). Such a mix of knowledge can confer an advantage over competitors. A wide diversity of regional knowledge types promises the better absorption of a combination of knowledge (Lichtenthaler, 2009) and is the starting position of a region when it considers national and international competition (Malecki, 2010).

Referring to David and Foray (2003), a distinction should be drawn between knowledge and information when considering the term knowledge. Knowledge, as defined by the authors, “[...] empowers its possessors with the capacity for intellectual or physical action” (David & Foray, 2003: 4). Following this, knowledge can be understood as a matter of cognitive capability. In contrast to knowledge, David and Foray (2003) define information as “[...] the shape of structured and formatted data that remain passive and inert until used by those with the knowledge needed to interpret and process them” (David & Foray, 2003: 4). Continuing along these lines, information is characterised by cheap and rapid distribution. Knowledge, on the other hand is harder to transform and to distribute, as it is often tacit.

The term tacit knowledge according to Polanyi means that “we know more than we can say” (Polanyi, 1966). He notes that human beings are aware of various subjects and experience which cannot be communicated explicitly. Thus, tacit knowledge is characterised as a kind of prior knowledge that therefore can only be learnt with difficulty. Malecki (2010) claims that tacit knowledge is central to innovation as a learning process. In that line, tacit knowledge (Butzin, 2000; Cooke, 1996) is granted to be highly relevant to regional innovations. Tacit knowledge is the kind of knowledge which is a regional advantage, as outlined previously. This is because tacit knowledge is anchored in regional frames and is based on regional cultures, values and processes, going back to the historical times of a region. It clearly depends on face-to-face interactions. By contrast with codified knowledge, tacit knowledge is hard to capture and transfer. The codification of tacit knowledge does not make tacit knowledge more accessible or understandable to others (Lundvall, 2006). Following these ideas, Bathel et al., (2004) describe tacit knowledge as a distinguishing feature of regions, contributing to a regional competitive capacity (Stockhorst, 2011). The collective learning effects of regional actors (Cotic-Svetina et al., 2008) cause tacit knowledge to accumulate over the course of a human lifetime to become the source of a regional characteristic. As a result, the importance of human capital as a carrier moves to the foreground. By contrast,

codified knowledge (Butzin, 2000; Cooke, 1996) can be transformed into language, codes, images, etc., and exchanged inter- and intra-regionally more rapidly and with greater cost efficiency. In any case, referring to Asheim and Gertler (2005), a mix of both types of knowledge, tacit and codified, is of immense importance to regional innovation.

2.2.1 TYPES AND VARIETIES OF KNOWLEDGE

The literature (Boshuizen, 2009; Saxenian, 2007) gives insights into the importance of knowledge spillover effects and knowledge exchange for regions. Knowledge exchange and the spillover effects of knowledge make up one of the key preconditions for regional innovation and knowledge production. Interactive learning processes allow knowledge to be absorbed and regenerated by regional individuals. Lichtenthaler (2009) uses the example of companies' knowledge absorption to explain that, the broader a knowledge base of a company is, the greater the absorptive capacity for new or external knowledge. The same applies to regional individuals. In that line, as Stehr has already stated, knowledge-based economies are not based on knowledge in general, but rather on varieties of knowledge and its quality (Adolf, 2010). This can be reduced to the required differentiated knowledge, which is strongly sector-related. Sector-related knowledge mainly varies due to specific modes of production, application and transfer of knowledge. Thus, each sector possesses its own knowledge base.

Knowledge can be classed into different types. In "The Learning Economy" Lundvall and Johnson (1994) set up the most popular differentiation of knowledge, namely the (1) "know-what", (2) "know-why", (3) "know-who", and (4) "know-how"; this was later characterized as the central knowledge differentiation (Stockhorst, 2011). As Lundvall (2003) states, the "know-what" type of knowledge refers to knowledge of facts. In that case, knowledge can be regarded as nearly identical to the term information "[...] it can be broken down into bits and communicated data" (Lundvall, 2003: 4). Knowledge of principles and laws of motion in nature, in the human mind and in society, Lundvall (2003) calls "know-why". The "know-why" type of knowledge seems very important for technological development in certain science-based areas. The "know-how" type refers to skills and the ability to do something. Obviously, this plays a key role in economic activities. Lundvall (2003: 4) explains "[i]t would be misleading to characterise know-how as practical rather than theoretical". Lastly, the "know-who" type contains information about who knows what and who knows what to do. This is an important type of knowledge, as it includes information on different disciplines and the capacity for social co-operation.

Based on the argument that the success of regional innovation activity depends not solely on knowledge in general, but on its generation and exploitation (Lundvall & Borrás, 1998; Nonaka & Takeuchi, 1997), Asheim and Gertler (2005) state that it also depends on varieties of knowledge and a dynamic interplay and transformation of tacit and codified knowledge. Here, a strong interaction of individuals with different knowledge is indispensable. The authors continue that, despite the varieties of knowledge, company innovation processes are strongly shaped by their specific knowledge base (Asheim & Gertler, 2005: 295) “[...] which tends to vary systematically by industrial sectors” as “analytical” and “synthetic” knowledge. These types of knowledge, which can also be complemented by “symbolic” knowledge (Scott, 1997), include different mixes of tacit and codified knowledge, and imply different qualifications and skills. Thus, in the understanding of Asheim and Gertler (2005), a synthetic knowledge base predominates in industrial settings, which are active in innovation. This is mainly set up by the re-combination of pre-existing knowledge. By contrast, the “analytical” knowledge base is needed for economic activities, which rely on scientific knowledge. Here, knowledge creation is important, based on formal, codified science and rational processes (Asheim & Gertler, 2005). In addition, “symbolic” knowledge is described in the literature as a kind of knowledge base of sectors, which can be attributed to aesthetics or symbolic power. Mainly, the consumer motivation of such goods produced through “symbolic” knowledge lies less in practical usage and but rather more in customer satisfaction. The “creative industries” can be mentioned as an example of symbolic-related sectoral knowledge (Stockhorst, 2011).

According to the view that regional innovation relies on varieties and types of knowledge, it seems obvious that there is a regional need, not only to focus on existing knowledge, but also to steadily expand the available knowledge base. This can mainly be done by the interactions between organisations and firms. Aside from this, Malmberg & Power (2005) claim that external knowledge flows are even more significant for firms’ activities than internal flows. To absorb and exchange more knowledge, regional companies depend on networks such as communities of practice where diverse individuals co-operate in the form of suppliers, customers, or working partners. It may then even be possible that knowledge flows across the boundaries of organisations, regions and even nations. How highly skilled workers can contribute to the increase of intra- and inter-regional knowledge flows is discussed in the following section.

2.2.2 FACTORS THAT INFLUENCE KNOWLEDGE FLOWS

In his work “Who's your city? How the creative economy is making where to live the most important decision of your life”, Florida states, “When people – especially talented and

creative ones – come together, ideas flow more freely, and as a result individual and aggregate talents increase exponentially” (2008: 66).

It is known that regional proximity (Boschma, 2005) and networks of regional actors and firms, such as clusters (Porter, 2000; Rehfeld, 1999) or inter-firm relations, enhance the creation of new ideas and inspire people to engage in innovative ways of thinking (Cotic-Svetina et al. 2008). By these means, short path interactions can be useful for both co-operation and competition between companies (Dankwart & David, 2011). Co-operation among regional partners also holds further advantages. For instance, knowledge exchange is easier to practice when regional partners rely on similar values and norms and share the same understandings. As outlined in chapter 1, it is foremost tacit knowledge that is regionally based and therefore difficult to codify. Thus, the exchange of tacit knowledge is linked to personal interactions and geographical proximity. “The partners’ personal knowledge of each other and the experience with succeeded co-operation in the past makes the spatial proximity the key of effective production” (Dankwart & David, 2011). Moreover, such partners share common cultural and social frames, acting as “nutritious soil” allowing them to develop ideas and implement them faster. Since firms are not black boxes, but mainly consist of face-to-face interactions at different levels, a firm’s highly skilled employees represent the best mode of interregional inter-firm relations, which can result in successful learning effects and even in innovation (Dankwart & David, 2011).

However, knowledge, which is solely circulated regionally, can lead to negative effects and, in adverse cases, to regional lock-ins. Based on this, Malmberg & Power (2005) stress the importance of external knowledge to regions and their innovative performance. They consider a continuous entry of external knowledge an essential precondition for a region’s competitiveness and economic growth (Malmberg & Power, 2005; Butzin, 2000). Correspondingly, Martin and Sunley (2006) argue that the absence of external knowledge can bring regions into difficulty and make them inflexible in their actions and developments. Likewise, several regional sectors rely on varieties of knowledge, as shown in the previous section, which are not provided by the regional knowledge base. According to Smed Olsen et al. (2010) there are four main channels which seem to be appropriate to transfer knowledge inter-regionally and within a firm. Apart from such events as conferences, firm-level interactions and the acquisition of codified knowledge from the literature, the authors suggest job-related mobility as a knowledge exchange channel. Similarly, Faggian and McCann (2009) regard human capital migration as a recognized option to enhance the external knowledge inflow and knowledge exchange, in general.

Connected to this suggestion, in recent times the discussion of highly skilled migration was led by concepts popular under the terms brain drain/brain gain and brain exchange. In this context Saxenian (2007) works with the term “brain circulation”. Brain exchange and brain circulation describe a knowledge exchange through the returning migrants e.g. via migration and/or transnational networks (Pries, 2001a). These concepts became even more fashionable in times of the knowledge-based societies and economies, when it was recognised that the loss or gain of highly skilled workers by migration can determine regional sustainable socio-economic development. “Brain exchange implies a two-way flow of expertise between origin and destination. Where the net flow is heavily in one direction, the terms “brain gain” or “brain drain” tend to be used” (Salt, 1997: 5). The term brain drain was mentioned as early as the 1960s, referring first of all to migration flows between developing countries and industrialised ones (Dankwart & David, 2011). Today, brain drain is also a common phenomenon across European regional borders. It is related to the European challenges such as the current (youth) unemployment rate in several southeast European regions and the persistent income differences. Brain gain is an opposite phenomenon to describe the gain of highly skilled workers, who often fill the regional skills shortage gap.

The (return) migration of highly skilled workers can be profitable for regions in terms of knowledge spillover effects (see chapters 1 and 3), especially when ex-emigré highly skilled workers return to the domestic region or in case of a brain flow (referring to a circular migration). Concepts such as Saxenian’s (2007) “New Argonauts” describe the process of highly skilled worker migration between developing and industrialised countries. It stresses the high impact of highly skilled worker migration on national economies. In this thesis, this concept is transformed to the regional level. Highly skilled migrants move abroad. Mainly, as the concept of “Expatriates” by Israel (2006) shows, Expatriates migrate in a professional context. In doing so, they take part in inter-regional firm exchanges or move internationally and inter-regionally to study. Highly skilled workers who leave their native country and become part of the foreign society of the destination country or region acquire numerous skills during their stay abroad. First, they get in touch with foreign, often different cultures, which expands their intercultural skills. Moreover, they are often confronted with new ways of working in organisations and labour processes, and approach a new way of solution-oriented thinking. Apart from socio-economic abilities, highly skilled workers acquire personal knowledge, which relates to their new living situation. Often they are confronted with the challenges of a foreign environment, which they have to overcome. The acquisition of a new language and the expansion of a secondary “business language” such as English are common occurrences. In case of a successful incorporation in the new environment, highly

skilled workers grow according to their capacities; in the best case they become global citizens.

The decision to undertake a return migration presents several success stories. Klagge and Klein-Hitpaß (2010) show how effective the inflow of external knowledge can work out in domestic economies. When returning to their domestic regions, highly skilled workers often go into business for themselves. They mix the newly acquired skills with the knowledge of their domestic region and, in doing so, engender innovative ideas. Return migrants' businesses are often more successful than previously established ones. This can be reduced to the phenomenon described above (Saxenian, 2007). They use the knowledge and skills of both regions, mix them, and move forward faster. Sometimes, they open up a business they have witnessed in the foreign regions and adapt it to the circumstances of their domestic region. Moreover, highly skilled migrants are habitually interlinked in several communities and actor networks. These so-called migration networks today are transnational in nature. Transnational networks not only concentrate on two-way co-operation between parties, such as the domestic and the receiving regions or countries, but on the domestic region/country and several receiving regions/countries. Actors in further regions, in which the highly skilled worker was not directly involved, can also share such a community and enrich it. Such further relations in a network that relies on second-hand contacts are called the "weak ties" of a network: the person I know personally knows another, whom I don't yet know personally, but I can trust him to co-operate, because of the involvement of an intermediary person, who is one both I and he knows (Granovetter, 1973). This can be accounted for by the fact that highly skilled workers are mostly employed for globally active companies and work in an international environment. In addition, the new migration patterns, such as "New Nomads" (David et al. 2012), describe the migration of highly skilled workers between their domestic region and not just one, but several destination regions. In thus migrating, the "New Nomads" spin a transnational network of brains that exchange knowledge. After their return to the domestic region, the network exists further due to new communication technologies. These so-called (knowledge) networks are not focused on location, but operate in a third dimension, which Bhabha (2000) calls the "third space".

The operation of highly skilled workers in the third space means the usage of an exchange platform, where transmigrants accumulate knowledge and generate new knowledge by transnational interactions. Transforming this external knowledge flow into regional grounds and physical places such as regions can contribute to regional knowledge bases. As chapter 3 shows, besides knowledge spillover effects, further regional concepts are important to absorb external knowledge and transform it for one's own purposes.

2.3 THE RISING DEMAND FOR (HIGHLY) SKILLED WORKERS

2.3.1 WHO ARE HIGHLY SKILLED WORKERS?

The definition of highly skilled workers is far more complex than the definition of human capital in general. In chapter 1, following Mohr (1997), human capital is defined as the performance potential of humans represented by qualified and (highly) skilled individuals as prospective employees (Mohr, 1997). Thus, human capital is the collective regional potential articulated in the human knowledge base and reflected in human labour and skills (section 1.1.3). Referring to this definition, the characterization of highly skilled workers is no easy endeavour. This can be accounted for by the different approaches to highly skilled workers in manifold contexts and disciplines in which the term is used. None of the approaches can be marked as the right one, as they are all constituted by their own logic and functionality. In current times, the term highly skilled workers is often used in the debate on brain drain/brain gain. The national or regional loss or gain of highly skilled workers is discussed according to this concept (for definition see section 2.2.2).

As has already been pointed out in the first part of this thesis, the term highly skilled workers is related to knowledge and the knowledge-based economy. Thus, in the broader literature, highly skilled workers are also termed “knowledge workers” (Drucker, 1969), “talents” (Florida, 2002), “carriers of knowledge/knowledge spillover agents” (Trippel & Maier, 2007) or “knowledge holders” (Groeve, 2009).

“Most commentary on the highly skilled assumes them to have a tertiary educational qualification or its equivalent. However, many graduates are not in highly-skilled jobs; conversely, many whose work is highly-skilled are not graduates.” (Salt, 1997: 5)

In line with Salt (1997), it seems narrow minded to define highly skilled workers only in terms of their education or qualifications. If one does so, the term would need to be redefined from highly skilled to highly educated or highly qualified workers, the difference being that a higher degree or a tertiary qualification is not a guarantee that the holder is highly skilled. An individual who is highly educated or highly qualified is often found in positions which are beneath her/his qualification level. By contrast contrary, in several European countries (see Germany as an example) there is a demand for a “skilled/qualified workforce” (in German “qualifizierte Arbeitnehmer”), graduated after “dual vocational training” (duale Ausbildung), which is more adequate for their job positions than a tertiary education. Sticking to the education level to which highly skilled workers are related, one needs to take into

consideration that the education systems within Europe are still uneven. This finds prominent reflection in the difficulty of recognising qualifications around Europe in the case of free movement or migration of highly skilled workers. The problem occurs on an even bigger scale when leaving Europe and regarding the challenge globally. As a consequence, highly skilled workers cannot be defined solely by their education or qualification level.

Often, the literature defines highly skilled workers in terms of academics or scientists or individuals provided with special talents and creativity (Florida, 2008; Trippi & Maier, 2007). Stockhorst (2011) provides a differentiated view of highly skilled workers, based on their abilities. Thus, he uncouples the notion from certificates and degrees, but assesses staff with regard to the scope of activities actually performed in a job. In doing so, Stockhorst (2011) pleads for a new classification of highly skilled workers. He also counts employees without a tertiary education under this term. Thereby he adds an important aspect to the discussion on the use of the recognition of qualifications in immigration countries. In addition, such a view of highly skilled workers allows individuals without a higher education to be characterised as highly skilled. With reference to the LLL concept (section 1.1.3), individuals are able to learn for a lifetime. Thus, knowledge acquisition is a continuous process, which can be approached by everybody. In this context vulnerable and marginalised groups, which are focused on more closely in chapter 4, can also be characterised as potential highly skilled workers. Often, these are the regional untapped labour potential.

This thesis shares its definition of highly skilled workers with Stockhorst's (2011) understanding. It considers individuals who are provided with special skills and knowledge as highly skilled workers. Of course, reality shows that most such individuals possess a higher education degree or qualification. At the same time, it presents counterexamples. A huge number of individuals who can be termed as "lateral entrants" or "newcomers" to a sector, show that, under certain circumstances, being an "out-of-sector" individual can have positive effects on a firm's development. Often it is the very mixture of these groups' previous knowledge and skills with their newly acquired knowledge and skills which appoint them to become "drivers of innovation".

2.3.2 HIGHLY SKILLED WORKERS AND FUTURE REGIONAL ECONOMIES

As societies and economies are progressing, apart from current developments future socio-economic developments should also be taken into consideration. The impact of highly skilled workers on the future regional economy can be visualized using the example of the new type of future industrialisation, which is summarised under the concept of “Industry 4.0”. The Industry 4.0 concept focuses on the establishment of intelligent products and production processes (Brettel et al., 2014). Industry 4.0 is marked by last-minute production changes, optimised decision making and new business models, which progress along similar lines to the previously named developments. Thus, against the background of knowledge-based economies, future manufactories, which are defined as “smart factories” under the umbrella of Industry 4.0, also rely on knowledge to stay competitive in the global world (Deuse et al., 2015). Smart factories are distinguished from others by worldwide, interlinked production through the use of “Cyber-Physical Systems” (CPS). As Brettel et al. (2014) explain, CPS allow close interaction and communication between humans, machines and products and a rapid response to the outside world and market requirements. In a rapidly moving world driven by a quest for high-tech products that satisfy customers’ individual needs, the challenges to be faced by smart factories are ways to handle rapid product development, flexible production and a complex environment including a wide range of activities (Brettel et al., 2014). As the newly developed view does not apply solely to the production of products, but has an impact on the entire value chain, Industry 4.0 relies greatly on the specific skills and knowledge of highly skilled workers. Here, highly skilled workers play key roles in developing and implementing all kinds of innovations, including intra- and inter-firm actions. The division of work progresses, which at the same time does not imply any decrease in needed skills. On the contrary, smart factories demand even more skills and specific knowledge of their employees. Thus, referring to section 2.2.1, the need for knowledge in general is a characteristic of Industry 4.0, but more precisely, more explicit and deeper knowledge is required in the sense of its variety. The varieties of knowledge demanded relate not solely to the individual working place, but to the entire production system, connecting inter-firm and intra-firm processes and relations. In this context, employees are asked to manage complexity through problem-solving approaches.

“Employees will also be expected to be able to act much more on their own initiative and to possess excellent communication skills and the ability to organise their own work. In short, greater demands will be placed on employees’ subjective skills and potential.” (Kagermann et al., 2013: 53)

Thus, a mix of skills and competences and the ability to be flexible to new challenges are what make up the future working environment of highly skilled workers. Another aspect, regarding the future development of employee requirements, is the ability to strengthen co-operation and collaboration networks, to gain knowledge and exchange it. Even today, it is popular for firms to use several kinds of networks to foster and broaden the scope of actors in their innovation activities. Concepts such as open innovation (Chesbrough, 2003), or user-driven innovation, show how important it is for firms to open up to external parties and involve them in their innovation circles. Based on this, the future highly skilled workers will be characterised by a mix of soft and hard skills, which are on the one hand specific to a given sector while on the other hand they are asked to share in broader knowledge about global flows and developments.

2.3.3 REGIONAL HUMAN AND SOCIAL CAPITAL

This thesis regards knowledge from several angles. The individual power of knowledge is considered, but also knowledge varieties related to specific knowledge bases. In general, knowledge is not an independent entity. In the sense of its generation, distribution and practical usage it is always coupled to human beings, who practice learning (as a means of gaining knowledge) at several levels (Hassing & Klaerding, 2012; Tripl & Maier, 2007) and exchange their knowledge with others, often within (knowledge-related) networks. This implies that there are varieties of knowledge which are regarded as “common property”, distributed to audiences in the form of research papers, books, conferences, workshops and, in times of new media, also via internet and social networks, etc. This kind of knowledge is often known as codified or explicit knowledge, which can be transferred in time and space using language, codes and images (Cooke, 1996). In a broader sense, this knowledge can be regarded as part of regional social capital, which Coleman (1990) calls group-level social capital. By group-level social capital, Coleman (1990) and, in line with him, Boshuizen (2009), define social capital not as being driven solely by individual interests and goals and independent actions, but rather as bound by a social system, which combines individual actions and interests to a whole social occurrence. Transforming this line of argumentation to the action of knowledge generation and exchange by highly skilled workers as part of the regional human capital, it can be considered as regional social capital. Thus, knowledge is an individual and at the same time a common regional resource. The transition of codified knowledge is rooted in the whole educational system, starting with the primary school and continuing through all levels up to tertiary education, based on experience and knowledge as “common property”. Finally, the LLL concept is no different, including as it does formal and

informal learning opportunities; learning is often regarded in terms of transfer between individuals, but also between individuals and organisations (examples are learning opportunities in clusters, companies, networks etc.) (Hassing & Klaerding, 2012).

The importance of knowledge as a foundation for regional innovation and competitiveness, as discussed above, was early on topic of much interdisciplinary research (Al-Laham et al., 2011; Cotic-Svetina et al., 2008; Lawson & Lorenz, 1998) mainly located in spatial science, social science, and economics. It is assumed that knowledge as coupled to humans, and foremost highly skilled workers, makes up the regional human capital, which constitutes a regional knowledge base. A broad knowledge base, which includes varieties of knowledge, can also positively impact the regional social capital of a region (Bourdieu, 1983). Social capital, as defined here, is the collective of existing current and potential resources given to a region and an individual (in Bourdieu's concept the spatial entity is not exactly defined as a region, but in this thesis his concept is translated to the regional entity). Along that line of thought, this thesis considers collective knowledge in the sense of codified knowledge, as a current and potential regional resource. Serageldin and Grootaert (2000) or Putnam (1993) define (social capital) resources as collective norms, networks and organisations. In this thesis (see section 2.5) actor networks, as part of social capital, are considered from this point of view as co-creators/co-producers of regional human capital strategies.

Different from "human capital", which obviously considers humans and their resources as capital, social capital can rather be described as any kind of relation between humans that is beneficial to the individual and the collective (Bourdieu, 1983, see also chapter 4). Thus, there is a certain co-dependence between human capital and social capital. The assumption is that the greater the percentage of a (highly) skilled workforce is in a region, which is interconnected by network relations and co-operation, the more it can positively affect the regional social capital. The correlation between human and social capital, which is elaborated in chapter 4, can be explained as follows:

Human capital, which is the collective regional potential articulated in a human knowledge base and reflected in human labour and skills, is mostly linked to highly skilled workers, regarded as knowledge carriers. Regional social capital arises from the knowledge accumulated and exchanged by highly skilled workers in mutual co-operation. These co-operations often build networks. The scope of these networks can even reach transnational dimensions due to manifold interlinkages, which Granovetter (1973) calls weak and strong ties. These ties are helpful for new knowledge acquisition, knowledge generation, and knowledge exchange. Consequently, constituting and being part of such networks then

mainly impacts on social capital, when the workers possess the ability to absorb the network-related knowledge. They can then spill it over to the regional knowledge base and transform it to regional needs. In that way, knowledge and actor networks become regional resources, which can be manifested regionally in new norms and organisations (Lawson & Lorenz, 1998). Human capital may even become one of the regional sources, in terms of social capital, when (highly skilled) workers' knowledge is able to unfold regional effects to realise collective regional advantages and benefits.

Hereby, there is a huge potential in knowledge networks, which relate to re-migrants (Saxenian, 2007 calls them "New Argonauts") or "Expatriates" (Israel, 2006). Both groups are people who once lived in a region of their birth or who studied/worked there. They left the region for economic or social reasons and returned after a while. Return migration, as chapter 5 looks at more closely, is one of the key ways to provide regions with external knowledge. This can be explained by the fact that return migrants after an accomplished return migration still hold on to networks in both regions. In this way, they provide both regions with a brain exchange or brain circulation.

"In addition to acquired skills, employees who migrated for a while and re-turned also learn new social abilities. Often, they were active abroad in a different cultural environment and were part of a different society. They were handling different values and rules as they know from their home country or region and learn how to integrate themselves." (Dankwart & David, 2011: 13).

According to the citation, highly skilled workers, as regional human capital, constitute regional social capital by their interactions and knowledge. This happens not solely from their impact on regional economies, but also by their social abilities, which play out in social capital and regional attraction. In section 2.5.3, a further beneficial side-effect of bridging social capital is explicitly drawn by actor networks as regional resources and their involvement in human capital strategies.

2.3.4 ATTRACTIVE FACTORS FOR HIGHLY SKILLED WORKERS

In a globalised world characterised by internationalisation, new and rapid communication and information technologies, as well as the increase of peoples' mobility thanks to cheaper and faster transportation modalities caused the meaning of "the one place" to fade, in a sense. Places in terms of spatial entities such as countries, regions, municipalities are now easy to reach for almost anybody, and they merge in the perception of a global whole. The effect is that one person can be in several places (virtually) at the same time. Multi-dimensional

effects mark this new age. The effects outlined above allow communication to flow faster and with it the exchange of data, information and knowledge. At the same time, the flows of finances and human migration increase to affect regions with new economic and social challenges. In this sense, globalisation triggers localisation. This means that the local environment gains once again in importance and regional co-operation is as important as global co-operation, in order to build counteractions and bring balance to regional, national and international tensions. In a sense these are the regional bases of absorbing global flows, which enter by international and global networks and actor interactions.

The same processes as those sketched out above contribute to the phenomenon of megacities (examples for global megacities are Tokyo, Delhi and/or Sao Paulo with a population approx. 20 – 30 millions inhabitants/ examples for European megacities are Paris or London with a population approx. 12 – 13 millions inhabitants), and, on the other hand, entire areas that are unoccupied. Globally, today's world is more than ever impacted by the phenomenon of migration (Castles et al. 2014). It is both the international and inter-regional migration movements, first and foremost marked by rural-urban migration processes (Saunders, 2011) that lead to urbanisation. Urbanisation is not a new phenomenon, but in the current world the replacement of rural culture by urban culture is growing rapidly. Reasons for the fast rise of urbanisation throughout the world are better job opportunities, economic opportunities, better quality of life, higher income, and an open and tolerant culture (Florida, 2008). These factors can be described as push-pull factors (Lee, 1966). The change to a knowledge-based society also impacts socio-economic development. The growth of the public's educational level and new family structures, as well as technological and socio-economic innovations, affect people's flexibility and freedom to move to "the places", where they can find advantages and opportunities for a better life in terms of working and living conditions.

It is said that highly skilled workers mainly live in cities and agglomerations. Their way of life drives them to places where they see the best chances to develop in their private lives and in terms of their career. Generally speaking, metropolitan regions seem more attractive to professional highly skilled workers than non-core regions, which are characterised here as border or peripheral regions (Stockhorst, 2011). This assumption is reinforced by the global trend of rural-urban migration. Nevertheless, no general statements can be made about regional attraction that matters to highly skilled workers. Usually, despite "hard" regional factors such as a good infrastructure and a positive city image (e.g. prominent architecture) and big-brand firms, "soft" regional attraction factors such as a good quality of life, job security, personal development opportunities, good salaries, social security, cheap cost of

living, employment opportunities for the partners, well-organised childcare, co-determination of living and working conditions, seem to be important criteria for highly skilled workers (Dankwart & David, 2011). In addition, it should be noted that the demands of highly skilled workers for living locations change over the course of time. They often underlie the life cycles of target groups and the offers that a region brings for their personal advancement. Champion (2011) refers in this context to the so-called “escalator regions”. These regions are mainly known for their good opportunities with starting positions in the labour market and better housing. Mainly, young highly skilled people make use of such opportunities and are attracted by regions that are considered “escalator regions”.

That graduates who focus on advancing their careers in the first place often incline towards large cities or metropolitan areas is hardly surprising. The fact that professionals move away with an advanced career and a family from big cities or urban centres to see their children grow up in a "greener" environment is also understandable. Moreover, people in general often choose the place to live according to their social contacts. Thus, social networks play an immense role in this context. Family, friends and job-based relationships are soft factors, which provide people with a feeling of a “welcoming culture”. Likewise, in the context of return migration, a further phenomenon is visible, which Hospers (2010) calls “warm city marketing”. Warm city marketing is used for the (re)-attraction of highly skilled workers to the cities and areas to which they were actively linked during their lifetimes. Literally speaking, cities and regions that want to attract highly skilled workers have an advantage when addressing group of people who were born in the region or lived there for study or occupation and are still tied to it. Hospers (2010: 188) argues, “[...] keeping existing customers is more profitable than acquiring new ones.” These ties to a region are not only built on the personal experience of living there but also on established networks with people in the region.

Figure 2.1: Requirements of the highly skilled workers referring to their living and working places, example of the city of Linz. Source: Dankwart & David, 2011 based on Pöchhacker Innovation Consulting GmbH, 2009.

Taking the regional perspective, the previous sections explained the importance of highly skilled workers mainly from the perspective of economic growth. Coenen and Fikkers (2010) refer to the highly skilled as the backbone of regional society in general. According to Dankwart and David (2011) this can be usefully illustrated by the interconnection between regions, highly skilled workers and firms, showing how highly skilled workers affect regional attraction and social concerns (Florida, 2008). Often, the brain drain causes a region to spiral downwards, bringing it into decline, which can be shown in the following six steps: (1) Brain drain of highly skilled workers rooted in uncertain labour market conditions and bad career prospects, poor living and educational conditions, leading to (2) a greater decrease of the regional educational level, which leads in turn to (3) a further decrease of highly skilled workforce and human capital in general, resulting in (4) inflexibility of the region and unattractiveness of the region to gain new highly skilled workers and meet their demands, which impacts (5) the attraction of the location as a quarter for new firms that offer new job opportunities for highly skilled workers, which leads to (6) financial and social shortcomings, which looks like (6.1) a decreasing number of firms with a regional location and this affects the regional tax situation and the region's financial wealth, which again also affects (6.2) the number of highly skilled workers, who are high-income workers contributing to regional wealth; as a consequence (6.3) the region does not possess enough money to spend on

public services such as education institutes, kindergartens, health institutes, culture and the public space (David & Dankwart, 2011). These factors trigger not only the economic, but also the social situation of a region. In doing so, the region becomes continuously more unattractive to the population and visitors. Moreover, an existing adequate stock of highly skilled workers is an attraction in itself for addressing further human capital.

Figure 2.2: Downward spiral of regional development. Source: Dankwart & David, 2011 (based on Dankwart, 2011).

Again, it is important for regions to ensure a long-term human capital stock of highly skilled workers. First and foremost, peripheral and border regions (non-core regions), which in general are less attractive to highly skilled workers because of their infrastructure and culture as well as fewer options for career development, are most at risk to be hit by the downward spiral. This can affect their image even more. Consequently, the development and implementation of a long-term regional human capital model is crucial, and this is presented in the next section.

2.4 THE MODEL OF LONG-TERM REGIONAL HUMAN CAPITAL STRATEGIES

As many European regions are impacted by the challenges of an aging population or a high unemployment rate and even a skills shortage, the regions develop strategies to mobilise, retain, (re)-attract and address highly skilled workers from outside. To cultivate an appropriate long-term human capital stock this thesis suggests a model of long-term regional human capital strategies that regions can develop and implement to make their society and economy sustainable in the future.

As revealed in section 2.3.3, there is far more to the regional attraction of highly skilled workers than the regional image or the “hard” factors, such as a good infrastructure and the region’s size, or a popular architecture. “Soft” factors were uncovered, which have an even bigger influence on the attraction of highly skilled workers. What matters is rather a mix of economic, social and cultural factors. A balanced mix of these factors can be responsible for the regional brain gain and, in the best case, foster the brain exchange in a region. Each region differs in its hard and soft factors, which consequently are connected to regional characteristics. Figure 2.3 is a model of a long-term regional human capital agenda including various strategies. The core of the model is built on four pillars, which are the fields of action addressing specific target groups of human capital. The four fields of action are enclosed by regional framework conditions. The presence and absence of these framework conditions is essential to reach a sustainable regional human capital stock.

Figure 2.3: Model of long-term regional human capital strategies. Source: David, 2015.

Figure 2.3 shows the process of long-term regional human capital strategies. The framework conditions, which are defined as (1) *economic structure*, (2) *regional knowledge base*, (3) *regional governance structure* and (4) *culture* build the overall regional foundation for the sustainable stock of regional human capital.

- *The economic structure* of a region is an important factor for highly skilled workers. It is characterised by e.g. the regional labour market as well as the company structure (global players, family-based companies, SMEs etc.), and their relation to regional sectors. A regional concentration of firms in clusters can be regarded as a regional specialisation, which attracts particular knowledge and workers. All these characteristics determine an employee's career development prospects. They open up the likelihood that highly skilled workers will contribute to the region with their own knowledge and plan their professional development. A concentration of sector-related firms in regional clusters influences the regional knowledge base and the kinds of workplaces for highly skilled workers as well as firms' requirements for certain varieties of skills and knowledge. In that line, chapter 7 addresses the role of clusters in the recruitment of highly skilled workers, using the example of engineers.

- The *regional knowledge base* includes the regional education structure and education institutions such as universities, the number of highly skilled workers present in the region, or students. Moreover, as linked to the economic structure, the regional knowledge base is important in terms of identifying external knowledge inflows to implementing it regionally through the fostering of spillover effects. The brighter a knowledge base is, the more external knowledge can be absorbed (Cohen & Levinthal, 1990). The absorptive capacity of a region and the concept of inclusion in order to benefit from knowledge spillover effects is the topic of chapter 3.
- *The regional governance* structure is the regional ability to govern and act on a certain topic. It is the ability of regional actors and actor networks to co-operate and collaborate in a goal-oriented, problem solving way. In doing so, the work on common regional issues can be implemented, rapidly and flexibly, which in this case is the establishment of an appropriate human capital stock. Hereby regional concepts and structures such as the “Triple or the Quadruple Helix” or strategic policy actor networks are considered beneficial. This aspect is addressed in chapters 3-8. A comparison of framework conditions is explicitly outlined in chapters 5, 7 and 8.
- Finally, *cultural matters*. Several studies have shown that cultural conditions are part of regional innovative capacity (Cooke & Rehfeld, 2011). Here culture is understood as common values, traditions and economic and social paths. Thus culture was also taken into consideration in the model of the regional human capital strategies. The role of culture on social and economic regional issues is difficult to measure precisely. However, current studies show that culture can make a distinct difference to highly skilled workers when choosing their living and working location. Here the condition culture is understood as a multiplicity of cultural factors. This condition it sets the focus on a welcoming culture for e.g. highly skilled (re)-migrants, which is part of the inclusion and integration of highly skilled workers into regional societies and economies. Further, companies and the working culture of a region seem to be as important for highly skilled employees in terms of flexibility, overtaking responsibility and life-work balance. In addition, highly skilled workers are interested in the participation rights in firms. For instance, family companies try to include workers opinions into the overall firm culture and often show good examples of diversity, which can play out positively in terms of attracting and retaining highly skilled workers. Company culture is also seen as being crucial in terms of LLL strategies for employees. Training and coaching for workers are significant for several highly skilled workers, who focus strongly on their career development. Chapter 8 gives deeper insights into regional cultural differences.

In addition to the overall framework conditions of the model, the model's core is built on four pillars. These represent the fields of action in which human capital strategies can be developed and implemented. They can be summarised as follows: (1) *mobilising of own potential*, (2) *retention of highly skilled workers*, (3) *re-attraction of highly skilled workers*, and (4) *attraction of external highly skilled workers*.

The *mobilisation of own potential* strategies is summarised below, aiming to promote the identification and (re)-inclusion of certain groups of untapped regional potential into VET systems and later into the labour market. In doing so, these groups can be further educated as a highly skilled workforce. The strategies for the mobilisation of regional untapped labour potential address groups such as 1) older employees, (2) employees with a migration background, or the so-called (post) migrants in the second or third generation after the migration process, (3) women out of work due to pregnancy and childcare, (4) long-term unemployed workers, as well as (5) people with disabilities. The inclusion and further development of these marginalised and vulnerable groups can be addressed by several LLL concepts and new ways of learning. This topic and the impact of learning and social networks as supportive instruments build on social capital for the (re)-inclusion of vulnerable and marginalised groups is elaborated further in chapter 4. Moreover, the mobilisation strategies concern the encouragement of young people to decide for higher education (university study), in order to increase the internal stock of human capital, which can be retained by the region after graduation.

The second pillar of regional activity fields is the regional *retention of highly skilled workers* before they leave the region. The retention of highly skilled workers is one of the main future challenges of regions, in order that they are not affected by brain drain and do not lose knowledge. Even if brain flow is natural, and people move from one place to another, losing "brains" does not solely affect domestic regions on their regional labour market, but also means the loss of the repayment regions invested in the education and training of the highly skilled workers. Nevertheless, several studies (chapter 6) show that the majority of highly skilled graduates are willing to remain in the region of their alma mater (David & Barwińska-Małajowicz, 2015). However, the study also exposed that their migration decision still depends strongly on socio-economic factors such as career opportunities that are available to them. In addition, highly skilled graduates claim the improvement of regional information policy on the regional companies' landscape. Strategies to bind the highly skilled workers to the region should grab them during their study time and not just afterwards. This is the main concern of chapter 5, which appoints alumni networks as be the kind of regional networks needed for retention. Moreover, chapter 7 shows that a relatively early co-operation between

regional firms and regional universities ensures that highly skilled workers will remain in the region after graduation. This can be accounted for by internships and thesis projects, which highly skilled workers undertake in collaboration with a specific company. During this process highly skilled graduates are bound to regional firms and are more willing to stay.

The activity field of the third pillar focuses on the *(re)-attraction of highly skilled workers* and is connected to the previous field of retention activity. Here, it is all about (re)-attracting highly skilled workers who were born in a region, or have studied or enjoyed another temporary stay in the region. As outlined above (section 2.3.3), the idea of “warm city/place marketing” plays out here, meaning that people who still have ties with a region are easier to attract than people who never have been in touch with a specific region. In the (re)-attraction strategy, particular personal and professional networks (such as alumni networks) are important, as they can keep in touch with out-migrated highly skilled workers and provide them with information on the region itself and interesting job offers. Moreover, as chapter 5 presents, alumni networks are after the first point of contact for return migrants, because they are part of the regional higher education.

The *attraction of external highly skilled workers* in pillar four accounts for the completely new acquisition of an outside workforce. Chapter 6 analyses the motives of highly skilled graduates to figure out what factors are important for this target group when making the decision to migrate. Especially non-core regions are addressed by this topic, as their characteristics mean they have more difficulties attracting a highly skilled workforce than well-known metropolitan areas. The reduction of barriers to enter the local society and the reduction of restrictions on foreign workers is discussed in chapter 3. Highly skilled workers from outside also need proper social conditions to become part of a regional society. Here chapter 3 and chapter 6 investigate migration networks as supportive for regional inclusion in terms of job finding or help in a foreign environment. An open and international culture (including company culture, working culture, welcoming culture, etc.) as described in chapter 8 is a helpful factor to move towards inclusion.

2.5 ACTOR NETWORKS AS CO-CREATORS AND CO-PRODUCERS OF REGIONAL HUMAN CAPITAL STRATEGIES

2.5.1 THE NECESSITY OF REGIONAL ACTOR NETWORK INVOLVEMENT

The overall argumentation of this thesis begins with the shift to knowledge-based societies and economies. As a result of this transformation, the perception of human capital changed and the demand for highly skilled workers as key knowledge carriers arose. For a long time, regions and their actors did not consider the attraction of highly skilled workers as a future challenge. For decades especially the Western European regions possessed a stable and adequate stock of human capital. It was rather the Southeastern European regions that were hit by brain drain due to socio-economic factors and continuing migration outflows. In accordance with the challenges outlined in section 1.1.5, European regions today have to face several obstacles in a search for highly skilled workers. These obstacles are the aging population, high unemployment rates related to the financial and economic crises, skills shortage, and several migration movements among (and to) European regions.

For a long time, Europe was assumed to be an attractive place in the world for highly skilled workers. This is accounted for by well-developed European industries, a large number of stable work places, sectoral diversity, a pool of globally popular firms and their headquarters, and good education systems in many European countries such as the UK, Germany, the Netherlands and others. All these factors impacted the European knowledge base, which today is lacking specific knowledge in some sectors. With the growing pressure on European regions and their economies to stay competitive in the globalised world and due to the further economic development of countries such as China and India, or better migration policies provided by the U.S. or Canada (to name some examples), the attraction of European countries and their regions decreased in the perception of highly skilled employees. Likewise, the attraction of Europe and its regions was adversely affected by the absence of concepts and strategies to permit highly skilled migrants to gain fast, uncomplicated entrance to the European labour markets and societies. For example, even if in the meantime the EU has established a “Blue Card” (in analogy to the US Green Card) for highly skilled workers from non-member states, there still are obstacles to face when migrating to Europe. First of all, the “Blue Card” is time-limited (it is valid for four years) and it does not affect participation in the social systems of the receiving countries and regions. Moreover, there are still national and even regional problems concerning the recognition of qualifications (especially when talking about migrants from non-member states) and the qualification systems within Europe are still in a state of disequilibrium.

Furthermore, the economic crises of the last decade had an even greater impact on the regions' absence of awareness to develop and implement a sustainable regional human capital agenda, including strategies to mobilise, retain and (re)-attract a highly skilled workforce. With the occurrence of the economic and financial crises of the past years, the European governments have focused more on the high unemployment rates and the supply of work opportunities for people with lower skills who were the first to be hit by the crises. Thus, for a long time highly skilled workers were not on the national and regional policy agenda. By now, however, several European regions are claiming a great scarcity of highly skilled workers and are experiencing brain drain. As described above, it takes some time for a policy process to recognise a problem (in this case the shortage of highly skilled workers), to analyse it, to put it on the agenda, and to develop and implement top-down policies including measurements and strategies to tackle such a problem. In several regions, the demand for knowledge and highly skilled workers reached a peak. As a reaction to these developments, many regions containing knowledge-based sectors and firms became active and developed bottom-up approaches. As presented in chapters 3-8, actor networks in several regions, as regional resource and part of the regional social capital, became proactive in human capital concerns. Primarily, the actor networks discussed in this study were set up for other reasons than as co-creators and co-producers of human capital strategies. Nevertheless, this thesis shows how existing actor networks respond as a side-effect, targeting a human capital problem and how they fill the gap left by the absence of top-down policies.

2.5.2 ACTOR NETWORKS AS REGIONAL RESOURCES

It was Bourdieu (1983) who first coined the term social capital. Only several years later did Coleman (1988) follow him in explicating the theory behind the term. To Bourdieu (1983: 248) social capital is "[...] the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition." Analogous to this definition, Coleman (1988: 98) refers to social capital as "[...] a variety of entities with two elements in common: They all consist of some aspect of social structures, and they facilitate certain actions of actors – whether personal or corporate actors – within the structure." Later on, Putnam (1993) as well as Serageldin and Grootaert (1997) considered social capital as potential and resources which play out in beneficial, collective and economic ways. As these benefits refer to collaborations between individuals and groups, such social actor networks have value (Putnam, 2000). The most recent definitions of Durlauf and Fafchamps (2004: 5) state, "[...] social capital is [...]"

network-based processes that generate beneficial outcomes through norms and trust.” Considering the previous definitions in retrospect, Durlauf and Fafchamps (2004) summarise the following aspects of social capital: (1) social capital generates positive external effects for members of a group, (2) these external effects are realized through shared trust, norms, and values and their consequent effects on expectations and behaviour, (3) shared trust, norms, and values result from informal forms of organizations based on social networks and associations.

Social capital can be considered according to its group/collective nature and its individual nature (Coleman 1990). By group-level social capital, Coleman (1990) and in line with him, Boshuizen (2009) define social capital as not being driven solely by individual interests and goals and independent actions, but rather as being bound by a social system that combines individual actions and interests to a whole social occurrence. By contrast, the individual nature of social capital is defined as “[...] the individual resource accessible via a social network of direct and indirect contacts” (Boshuizen, 2009: 29). In that line of thought, social capital is regarded as a ground for collective and individual beneficiaries of a region, which Putnam (2000: 319) claims “[...] where trust and social networks flourish, individuals, firms, neighborhoods, and even nations prosper.” Based on Putnam’s citation and the earlier definition of social capital as mirrored in networks built on trust and reciprocity (Boshuizen, 2009), here the actor networks are considered as social capital, which is described later in section 2.5.3, and assumes that:

Social capital forms the building blocks for the supporting actor networks that address the regional human capital problem with bottom-up strategies.

As already outlined in section 1.2.2, actor networks are first of all social organisations (Cooke, 1996) that follow a specific dynamic and life cycle and are the link between independent actors of at least three equal member parties (Butzin, 2000). In addition, actor networks play an important role in this thesis, as they act towards clearly defined foci (Fürst & Schubert, 1998), which here refers to the assurance of a “sustainable regional human capital stock”. Moreover, these foci are addressed by horizontal communication structures without strong hierarchies. Likewise, actor networks are more flexible and faster in responding to socio-economic regional challenges than government organisations, which depend on strong hierarchies and long communication channels. Granovetter (1973: 1360) argues that networks show “[...] how interaction in small groups aggregates to form large-scale patterns [...]”. For this reason, regionally based actor networks, which are founded on trust and reciprocity (Boshuizen, 2009), are based on shared norms and values and form

part of the regional social capital, which can bring benefits to groups and individuals. In accordance with this, in the following section 2.5.3, examples of regional actor networks are described which were converted as supporting for the development and implementation of regional human capital strategies.

2.5.3 ACTOR NETWORKS – BRIDGING AND BONDING BY WEAK AND STRONG TIES

The consideration of regional actor networks as co-creators and co-producers of regional human capital strategies is based on the assumption that each network has a primary function and several secondary functions, which are regarded as the network's side-effect functions. For both the primary and the secondary functions, networks rely on weak and strong ties (Granovetter, 1973). Moreover, to emphasise the different interconnections between networks as part of regional social capital and to elaborate their benefits, in accordance with Granovetter's weak and strong ties, the bridging and bonding dimension of social capital (Putnam, 2000) is considered along the same lines.

As Burt (2005) explains, in any kind of network, it is not only direct connections, but also indirect connections that are of great importance. Both modes of interconnection form a network. Granovetter (1973) calls the different types of network connections "weak" and "strong" ties. In that sense, strong ties are the closest co-operations of a network. These are linear connections with high mutual confidence, reciprocal services, and a high emotional as well as temporal intensity. "Following this definition, a weak tie involves limited contact in time and intensity." (Boshuizen, 2009: 34). The assumption that strong ties provide a network with more information is misleading. It is these weak ties that deliver new information and knowledge to the network (members). This seems to be clear when one thinks about the fact that close friends and relationships as well as close network interrelations always move in the same actors' circle, where only a small number of new influences can be identified among the shared information. By contrast, weak ties, which consist of two separate components, can provide networks with new information flows and opportunities for development. Similar to Granovetter's (1973) concept of the "strength of weak ties", the social capital theory works with varieties of social capital called "bonds" and "bridges" (Putnam, 2000). Bonds are defined as links to actors in the sense of common identity. In line with Granovetter's strong ties, these are family members and close friends. In general, these are people who share the same culture, values and even ethnicity. Bridges, on the other hand, are links that sweep beyond the shared identity. These can be defined as distant friends, or second-hand relationships, colleagues and similar.

When translating the concepts of weak and strong ties as well as bonds and bridges to the actor networks as part of the social capital, one can state the following: each network has a primary function and a priority focus. Aside from this, networks may also have several side-effect functions or activities which can be explored when required. For both the primary and secondary functions, strong ties are needed, such as regional bonds, but bridges and weak ties seem to be of even greater importance when redefining networks in accordance with their secondary functions or, as it has been termed, their side-effect activities. In addition, when decoupling networks from their function, but regarding them as ties (by themselves) in a brighter network structure, they can take on a double role. They can be bonds in the sense of strong ties in the region and bridges thanks to weak ties to the outside world. In that sense, the bridging function of a network's weak ties can be regarded as the opening of a region to external flows. These flows can be of knowledge and information and can deliver regions with innovative approaches and ideas. On the other hand, the bridging function of actor networks can offer equilibrium between the local and the global levels and quickly respond to any kind of challenges in a bottom-up problem solving approach.

The core of the thesis (chapters 3-8) shows how several networks are used as bridges and how their side-effect functions were used to develop and implement regional human capital strategies. In accordance with chapters 3 to 8, the actor networks are the objects of investigation in this thesis. The actor networks used in this thesis are described below. The further consideration of actor networks as co-creators and co-producers of human capital strategies can be found in the empirical chapter.

MIGRATION NETWORKS

Migration networks (chapters 3 and 6) are social networks consisting of social ties between the domestic and the receiving country/region. Often, migration networks between two regions are established over the long term and date back to earlier times and historical interconnections between two regions (see as an example the Polish region Silesia and the German region North Rhine-Westphalia). Thus, many migration networks are path dependent. Because of the long term needed for their establishment, in their primary function they create social, financial (remittance) and human capital for both the domestic and the receiving region. In the case of preparation for migration, migration networks are often used to make the "proper" individual migration choice. They regularly function as a "door opener" in the receiving region by finding job opportunities for the "new" migrants or in helping them to integrate socially. A specific phenomenon of migration networks is transnational migration networks, which appeared with the phenomenon of "New Nomads" or "New Argonauts".

Through the multilayer identity of the so-called transmigrants, transnational migration networks connect various actors from several regions and countries. They are used even more for economic concerns than traditional migration networks. Often such networks provide regions with knowledge exchange and innovative ideas, which can be adapted regionally. Diaspora networks, as a further category of migration networks, were in former times first and foremost related to migrants who had involuntarily left their domestic regions (e.g. refugees). Today, they help in forming the migrants' identity. In the case of highly skilled worker migration, migration networks, as side-effects, can function as a recruiter of highly skilled workforces and platforms of knowledge generation and exchange.

(HIGHER EDUCATION) ALUMNI NETWORKS

Alumni networks are an old idea that originated in the USA (chapter 5) at private higher education institutes. Mainly, alumni networks were significant in financial matters. Later on, the idea was translated to private higher education institutes and also found solid ground in further universities worldwide. Today, almost every university possesses its own alumni network. The concept of alumni networks refers to the motto: building a relationship with students not only for the years of study but rather for a lifetime brings lifelong benefits to both the university and the alumni. The primary goal of alumni networks focuses on the friendship and fundraising function in order to support the alma mater in maintaining its image, quality of studies, and its popularity and attractiveness to possible future students. In the context of human capital, alumni networks have been identified as possible co-creators and co-producers for the retention and (re)-attraction of highly skilled workers. This accounts for their ability to provide highly skilled alumni workers with "warm city/place marketing" feelings in terms of knowledge and information exchange on the region. With regard to their retention strategies, many alumni networks offer career days and alumni days as information events. Moreover, field trips and labour market performances are used to try to bind graduates to the region and provide them with regional job opportunities. Concerning the (re)-attraction strategies, alumni networks organise homecoming events, send out job offers to their members, and arrange student and researcher exchanges (chapter 5).

SOCIAL NETWORKS/LEARNING NETWORKS

Chapter 4 focuses on social and learning networks. Social networks in this context are defined as web 2.0 or web 3.0 based networks that are driven by the usage of smart phones, social media or cloud computing. The underlying idea is the fast access to data and information, so that ICT-based learning networks play a crucial role in new learning

approaches such as E-Learning. They interlink trainers, companies, students and experts in one “virtual place” and make learning possible at any time, in any place. These mobile learning and social learning networks are extremely flexible and can adjust to the members’ life circumstances. They decrease differences between teachers and learners, between formal and informal learning processes, knowledge acquisition and knowledge exchange. Moreover, social learning networks provide people with the capacity to acquire information and behaviour by observing others. Social learning networks have the primary function of broadening learning options. In the context of human capital, they provide strategies for the faster inclusion of vulnerable and marginalised groups into VET systems and labour markets. This can be accounted for by the fact that social learning networks/mobile learning tools provide learners with a permanent connection and do not involve physical attendance in one fixed location.

REGIONAL ECONOMIC NETWORKS

Regional economic networks are described in chapters 7 and 8, “Triple Helix” constellations as well as policy and issue networks can be summarised under this umbrella cluster. Clusters are defined here as company networks in a certain sector, including companies along the entire value chain. One prior characteristic of clusters is their spatial proximity. Networks in the sense of a “Triple Helix” include university - industry - public co-operations. Issue and policy networks are defined as regional actor networks that use a common regional frame to foster the more rapid development and implementation of regional policies related to a certain issue or topic. Regional economic networks are here regarded as part of the regional framework conditions, as described in the model of a regional human capital agenda (section 2.4). Regional economic networks, as their name reveals, are mainly built to strengthen regional economic concerns, such as innovation activities. As a side-effect, they can be used for human capital concerns by developing a regional framework where bottom-up strategies, which address human capital, can be developed and implemented.

2.6. SUMMARY

After the discussion in chapter 1 on the transformation to knowledge-based societies and economies, chapter 2 sets out the conceptual underpinnings of the thesis. It underlines the assumptions made in chapter 1, that knowledge coupled to highly skilled workers is the driving force of innovative regional activities. In this line, the importance of highly skilled workers as knowledge carrier was regarded in socio-economic terms. It is argued that the lack of a highly skilled workforce can have an adverse impact on the economic and societal

development of a region and decrease its attraction. Non-core regions are often faced with this dilemma and develop strategies to break out of the vicious circle. To do so, actor networks as part of regional social capital seem to be an appropriate means by which to address regional human capital problems by bottom-up strategies.

PREFACE CHAPTER 3

Chapters 1 and 2 set out the introduction and the theoretical underpinnings of this thesis. In chapter 1 it is argued that the perception of human capital and especially of highly skilled workers as knowledge carriers changed through the transformation to knowledge-based societies and economies. Chapter 2, considered especially knowledge as the key driver for innovation. Later, the importance of highly skilled workers for regional economies and societies was described and the aspect of regional attraction was introduced. It was explained that knowledge generated by highly skilled workers can create regional value, in the sense of the regional social capital in terms of group level and individual level (section 2.5.2). Based on this, chapter 2 established a model of a long-term regional human capital agenda, which can be used as an example for the planning of a sustainable regional economy. In that line, human capital retention and (re)-attraction strategies were introduced, which can be developed and implemented by a bottom-up approach with the help of regional actor networks. Regional actor networks seem to be appropriate for such an undertaking, as they are part of the regional social capital and are thus based on common values, paths, trust and reciprocity.

Following this, the subsequent chapters 3-8 build the core of the thesis by providing the reader with examples of human capital mobilisation, retention and (re)-attraction strategies. Each chapter stresses the role of actor networks as supporting instruments for the development and implementation of such strategies. Chapter 3 can be considered as a conceptual introduction to the core of the thesis. Chapter 3 handles the overall topic of new migration patterns that have occurred in the knowledge-based society. Parts of the new migration patterns are migration processes related to highly skilled workers such as “New Nomads” (David et al., 2012) or, referring to Saxenian (2007), “New Argonauts”. Chapter 3 also argues that new migration networks appeared in line with the occurrence of new migration patterns. Moreover, it provides examples of regional strategies and concepts, which empower the absorption of external knowledge for domestic and receiving regions. It claims that the concept of regional inclusion is beneficial for a “successful” migration process, which can again affect the migrants’ role in regional economies by migration-related knowledge spillover effects.

CHAPTER 3: FROM BRAIN DRAIN TO BRAIN EXCHANGE: HOW TO USE BETTER HIGHLY SKILLED WORKERS – A CONCEPTUAL APPROACH^{*}

3.1 INTRODUCTION

Skills shortage seems to be an approaching challenge for several European regions. Foremost, in times of anew migration growth within Europe (OECD, 2012), international labour migration can be regarded as a jigsaw piece in the strategy to counteract this phenomenon. In this chapter it is argued that despite the European right of free movement within Europe, which aims at promoting inter-regional knowledge flows, labour migration-related knowledge still is not entirely exploited. To fully use the potentials and knowledge of labour migrants, regions need new concepts, which function complementary to national or even EU policies such as e.g. qualification recognition of foreign diploma and degrees, but simplify the entrance into the regional or even local society and labour market. Such required concepts cannot be designed at the national level, but as the chapter will present, rely on the contribution of actors and communities in the particular socio-economic regional context. Thus, this chapter's main objective is the conceptual presentation of labour migration-related knowledge effects on home and recipient regions. In that line, regional concepts will be suggested to reverse the negative brain drain and brain waste into positive brain gain and brain exchange knowledge effects in order to entirely utilize the migrants' skills potential. In that manner, this chapter aims at revealing the decreasing but still existing entrance obstacles for re-migrants to labour markets and societies in the domestic and foreign region.

3.2 KNOWLEDGE – A RESOURCE ESSENTIAL TO REGIONS

In the context of skills shortage, the future of EU discourse on labour migration should enhance its focus on:

- (1) a better and faster mobile citizens' knowledge and qualification recognition,
- (2) the prevention of mobile citizens' knowledge waste, and
- (3) the fully usage of mobile citizens' entire knowledge.

^{*} The current chapter is based on the article: David, A., Barwińska-Małajowicz, A. & Coenen, F. (2012): From Brain Drain to Brain Exchange: How to Use Better Highly Skilled Workers; A Conceptual Approach. In: *Unia Europejska.pl*, 210(5), 25-35.

Knowledge is literally one of the key resources for regions to stay competitive and to prosper. In the case of a positive knowledge impact on regional innovation activities and a sustainable regional development in economic terms, knowledge can be regarded as locational advantage. In addition, knowledge owes its growing importance for regions to the structural change from industrial to knowledge-based economies (Growe, 2009). A long time, knowledge was regarded as embodied in machinery, capital equipment and complex systems (Malecki, 2010). Nowadays, knowledge is primarily considered embodied in human capital. The term human capital is defined as the performance potential of citizens represented by qualified and skilled individuals (Mohr, 1997). In other words: human capital is the common regional potential expressed in human labour, skills and knowledge. So far, an exact correlation between knowledge and innovation processes has not been clarified yet. Anyhow, the role of human capital as knowledge-holder (Growe, 2009) seems to be important for knowledge-based innovation systems and knowledge-intensive business services, which are described by Strambach (2008) as “knowledge carriers, producers and mediators”.

In this context, tacit knowledge (Butzin, 2000; Cooke, 1996) is awarded highly relevant to regions. Tacit knowledge is generated and anchored in a regional context of certain processes and cultures. It is primarily passed through personal interactions (face-to-face). On the contrary, codified knowledge (Butzin, 2000; Cooke, 1996) can be spread and transported inter- and intra-regionally faster and more cost-efficient by using language, codes or images etc. By the need of spatial proximity (Bathel et al., 2004), acting as an exchange platform, tacit knowledge is a distinguishing feature to regions, contributing to a regional competitive capacity (Stockhorst, 2011). Polanyi (1966) noted that human beings are aware of various issues, which cannot be communicated to others in spoken form. He characterizes tacit knowledge as a kind of previous knowledge that therefore can only be ascertained with difficulty. By evoking collective learning effects within regions (Cotic-Svetina et al., 2008), tacit knowledge cumulates in the course of a human life. As a result, the importance of human capital moves to the foreground. For regions that rely on growth and competitiveness, a sector-specific, in human capital embodied mix of knowledge (e.g. synthetic, analytical and symbolic knowledge) (Asheim & Gertler, 2005) can mean an advantage over the competitors. The more types of knowledge a region bears, the more promising is the starting position of the region concerning national and international competition (Malecki, 2010).

In particular, Metropolitan areas benefit from the accumulated knowledge. As opposed to smaller cities and peripheral regions, they have an access to a larger pool of human capital. In contrary to the periphery, metropolitan areas are often characterized by a diverse

corporate landscape, attractive job opportunities and a well-developed infrastructure. These attributes seem to attract a large number of highly skilled workers. Thus, in the future regions will be under even higher pressure to compete for skilled human capital, as not only the quantity, but also the quality of workforce count.

Foremost, the highly qualified workers are said to contribute to regional economic development. Morrison (2008) suggests regional companies as gatekeepers of knowledge through their performance of knowledge searching, transcoding and sharing. Transferring his idea into the concept of human capital as knowledge carrier, the contribution of highly skilled workers could be described as follows: First, they identify knowledge and transfer/provide it to further regional actors. Second, the highly skilled workers examine knowledge due to its regional importance, and third, they exploit knowledge using their absorptive capacity. Al-Laham et al. (2011) and Cotic-Svetina et al. (2008) declare that regional tacit knowledge is embodied in the employees' skills and activities and unfolds in interactions with other employees. Despite the fact that proximity, human capital interactions and regional history matter for knowledge generation and exploitation, a continuous inflow of external knowledge is an essential precondition for regions' competitiveness and economic growth (Malmberg & Power, 2005; Butzin, 2000). In this vein, Martin and Sunley (2006) state that missing external knowledge can turn regional advantages into hazards, which result in regional inflexibility. Above all, there are regional branches and clusters that rely on a variety of knowledge for innovation. As noted before, intra-regional knowledge transfer is important, but not sufficient for innovation processes. It is rather about inter-regional interactions, which contribute to the knowledge flow. In literature, geographers and innovation researchers discuss the possibilities of how knowledge can be transferred and later anchored regionally in order to make it useable. In a study on knowledge use and circulation, Smed Olsen et al. (2010) suggest four main interaction channels, through which knowledge enters and is re-circulated into regions. In addition to events, acquisition of codified knowledge and firm-level interactions, they present job-related mobility as a knowledge inflow and re-circulation channel. By job-related mobility the authors understand both, employees moving/circulating within an organization, but also individuals migrating or employees' inner-firm migrations from abroad. Also Faggian and McCann (2009) regard human capital migration as a recognized means of knowledge to be transferred between regions. However, in the context of regional innovation study, very little is known about the ways of such knowledge transfer and probably it is not possible to identify exact mechanisms of such knowledge spillovers. What is known so far is that mobile citizens' knowledge still is not used entirely regarding their migration processes.

The current literature defines highly qualified in terms of academics and skilled workers, who possess special knowledge and a high level of creativity and talent. Stockhorst (2011) provides a differentiated view on highly qualified workers, which is based on their abilities. Thus, he uncouples the notion from certificates and degrees, but assesses staff with regard to their actually performed scope of activities. Stockhorst pleads for a new classification of the highly qualified. He also counts employees without a tertiary education under this term. Thereby, he adds an important aspect to the discussion of the use of the recognition of qualifications in immigration countries. Even if the EU proposes mutual recognition of e.g. diploma or scientific degrees of labour migrants, reality often shows national entrance barriers and obstacles. Thus, he proposes a simplification of current procedures to make full use of the potential of knowledge and skills of mobile citizens, instead of wasting brains.

3.3 FROM BRAIN DRAIN TO BRAIN WASTE – MOBILE CITIZENS' UNUSED POTENTIALS

Brain flow is a natural phenomenon anchored in migration processes. It describes highly skilled knowledge flows from emigration to immigration countries or regions. At the first glance brain flow leads to positive effects on receiving regions, which benefit from the impact of human capital (brain gain) by absorbing the inflowing knowledge and optionally utilizing it for regional products and processes. In turn, home regions suffer a brain drain. Brain drain was coined in the 1960s (Breinbauer, 2007). It originally describes the emigration of highly skilled workers from developing to developed countries and the loss of skills and knowledge, which can reduce the potential for economic growth.

Nowadays, the term is also used as part of an inter-regional labour migration. Brain drain can hit each region. Even economically strong regions complain about knowledge drain. In contrary to less successful regions, these can compensate the knowledge loss by new knowledge flows from abroad. Thus, primarily peripheral and economically weak regions are affected by brain drain and its long-term consequences. Hence, knowledge loss can lead in structurally weak regions to an economic, cultural and social collapse. A further effect of highly skilled outflow on regions is the loss of symbolic, social and cultural capital (Bourdieu, 1983).

As an ideal state of the brain flow phenomenon and a win-win-situation for all involved, the brain circulation (Ladame, 1970) can be introduced. Brain circulation and brain exchange seem to be roughly the same. Even so, brain circulation differs from the brain exchange concept by the adoption of a permanent (on-going), inexorable knowledge circulation as a result of a high mobility of the knowledge elite. In addition, the brain circulation concept

(process-oriented) assumes a definite return of highly skilled professionals into their home regions. In the case of return migration, a complete use of the re-circulated knowledge is expected. But brain circulation in terms of entire knowledge exploitation occurs infrequently due to national and regional restrictions. Thus, by speaking about brain circulation, in most cases, the brain exchange concept is meant – a selective spatial inter-regional knowledge exchange through mobility and new communication and technology channels.

In the case of highly skilled immigration, the seemingly for the home region lost knowledge is theoretically an available resource for the arrival region. Especially in western European countries, knowledge transfer is seen as an additional opportunity besides the mobilisation of own untapped potentials to counteract skills shortage. In this context, predominantly the phenomenon of brain waste is discussed. Brain waste occurs by excluding labour migrants through the non-recognition of the original qualification and maintaining high entry barriers to the regional labour market and the society. A further distinction can be made between the internal and the external brain waste. While internal brain waste is a home region related negative knowledge effect, external brain waste refers to receiving regions. Both effects describe no utilization or the wrong utilization of existing regional skills or new inflowing/re-circulated knowledge in the region. Hence, brain waste hits both: the arrival and the home regions. Through migration flows mobile citizens acquire new knowledge in form of language, soft skills and intercultural competences on the job. Returning home, these skills could lead return migrants to better job opportunities, but in some cases these are often simply not required, especially with regard to low-skilled workers.

Thus, the obtained knowledge gets wasted. In literature, return migrants were long time considered as regional innovators. The mix of notorious structures and new acquired skills abroad was regarded as a generator of new economic impulses in home regions – a phenomenon called *inter alia* New Argonauts by Saxenian (2007). Saxenian (2007: 27) describes the New Argonauts “[...] ideally positioned as insiders and outsiders at home and abroad” and declares:

“The new Argonauts are [...] at once the product of search networks among the professionals and companies for whom they have worked and with which they associate, and - in collaboration with parts of government and other domestic public institutions – the co-architects of further networks that extend and adopt to home-country conditions the web of relations they already know.”

To fully use highly skilled and low-skilled return migrants' knowledge for regional development, regions are still in charge to develop new policies. Particularly, low-skilled mobile citizens are often not aware of their newly acquired skills. In addition, a lack of regional structures in the home region, providing the returnees with information about possibilities to use the re-circulated knowledge, complicates their (re)-integration into the domestic labour market. Hence, current studies dissociate from the solely positive view on return migration effects. Apart from positive brain gain effects, they consider negative brain waste effects of return migration in home countries and regions. Consequently, this chapter continues considering migration-related knowledge effects on both, the home and the arrival regions. By this means, the authors emphasize the increasing need for action to improve regional policies to better absorb incoming knowledge from abroad. So far, the focus on migration-related knowledge effects on regions was dominated by the view of the arrival countries. Against the background of new migration patterns, caused by the European phenomenon of open borders, new communication and technology systems, migration-related knowledge effects call for a differentiated approach.

3.4 MIGRATION-RELATED KNOWLEDGE EFFECTS

So far we argued: that if regions do not recognize, safeguard and use migration-related knowledge flows, transferred knowledge often results in negative effects on regions such as brain drain or brain waste. Based on this categorization, in the following a distinction between cases of migration patterns and the resulting migration-related knowledge effects on home and arrival regions is made. Using these categories is promising in order to identify different kinds of migration patterns bringing forth possible knowledge effects on home and receiving regions. The following table provides frequently occurring European migration patterns which vary in reality widely. Notwithstanding this, the outline serves as an overview in order to increase possible regional absorption strategies to make full use of labour migrants' skills

	Home Region		Receiving Region	
	Emigration	Return Migration/ Knowledge Transfer	Immigration	Return Migration/ Knowledge Transfer
Seasonal Migration	without effects	low effects	without effects	without effects

Circular Migration	brain drain	internal brain waste/brain gain	external brain waste	without effects
Long-term Migration	brain drain	internal brain waste/brain gain/brain exchange	external brain waste/brain gain	brain drain/brain exchange
New Nomads	brain drain	internal brain waste/brain gain/brain exchange	external brain waste/brain gain/brain exchange	brain drain/brain exchange
Permanent Migration	brain drain	brain exchange	external brain waste/brain gain/brain exchange	-

Table 3.1: Migration-related knowledge spillover effects on regions. Source: David, 2012.

3.4.1 SEASONAL MIGRATION

As European seasonal migration mainly refers to harvest-work, consequently it is largely tied to harvest periods. As a general rule seasonal migration takes some weeks. A large number of seasonal workers are students or jobseekers. For them, seasonal migration is an option to earn “quick money” and to rapidly return home. That is why seasonal migration does not have any effects on both: neither on the home nor on the receiving region. The drained knowledge is in the near future again available for the home region. The return migration effects on the home region are low but present. Return migrants possess new acquired basic language skills and intercultural experiences. Theoretically, these skills may find use in the domestic labour market. Practically, the new knowledge acquisition is too marginal to be absorbed regionally.

3.4.2 CIRCULAR MIGRATION

In contrast to the seasonal migration, the circular migration can be repeated a number of times – thereby the labour migrants circulate between the home and arrival regions. Circular migration is not limited by time duration. In the 1990s circular migration replaced to a large extent the permanent European migration and was for a long time the most popular migration form between eastern and western European countries. The central controlling process of circular migration is the migrant’s financial profit given by job opportunities and higher wages in the receiving regions. By achieving the financial goals, circular migrants return home for an

undetermined duration. In case of spending the abroad-earned money, the labour migrant tends to do a renewed emigration in order to gain revenue. Especially in border regions these kinds of circular migration processes are well established. Predominantly, the effects of circular migration lead to brain drain effects on the home regions due to the lack of out-migrated knowledge for an undefined time. In case of making no full use of the incoming knowledge, circular migration can lead to an external brain waste in the receiving region. Such cases seem to occur frequently, since it is circular migrants who, in many cases, work far below their skill level in the arrival regions. Circular migration is one of the examples illustrating that the knowledge re-circulation to the domestic economy holds both possibilities and problems/negative side-effects: an internal brain waste and a brain gain. It depends on the home regions' absorptive capacity and inclusion if the newly acquired knowledge leads to positive or negative effects.

3.4.3 LONG-TERM MIGRATION

Taking the time dimension into consideration, the long-term migration should be positioned between the circular and the permanent migration. In both cases, the migrant's homeward journey is initially planned or the migrant is forced to return home by external events. In this context, a special focus lies on the choice of the return area of long-term migrants. While circular migrants usually chose their home region, long-term migrants often select an economically well-developed region to return. Among these, especially long-term migrants originating from peripheral or economically weak regions hike back to metropolitan areas of their homeland. In economic terms, these areas offer wider implementation opportunities for the migrants' abroad acquired skills. With regard to the long-term migration knowledge effects, a loss of knowledge (brain drain) can be stated for the home region by emigration. The effects on the receiving region can lead to both: brain gain and an external brain waste effect. In that case, brain gain is justified in the length of the migration and thus differs from the previous two cases. The long-term migrant is assumed to be better integrating into the receiving society and its labour market. Hence, their skills are better absorbed. In contrast to a brain gain, an external brain waste occurs in the receiving region, when the knowledge absorption of the long-term migrant is not successful because of a failed inclusion. Unlike the first two examples, in the case of a return the long-term migrants leave behind a brain drain effect in the receiving region, depending on their regional integration level and labour market involvement. Due to the workers' long migration experience, the preparation activities for a possible return home include among others a better implementation of skills into the domestic society and economy (Cassarino, 2004). This well-planned preparation leads to a

brain gain through knowledge re-circulation to the domestic area. Brain gain can turn into internal brain waste, when the knowledge of the returners stays unutilized. Alongside brain gain and brain waste, long-term migration also leads to the brain exchange phenomenon. Caused by the long stay in the receiving region, the mobile citizens spin personal and professional networks. Using these they interact and exchange knowledge. Returning home, these networks are under certain circumstances still active and at the best provide both sides with knowledge and information or further capital.

3.4.4 NEW NOMADS

In the broader sense, new nomads can be regarded as circular or long-term migrants. The new nomads are a small group of highly skilled professionals at the age of 25-29, starting migration between multiple regions after graduation. They are characterised by a high mobility and flexibility. Good wages and job possibilities are the key motivation for their frequent migration flows. By the phenomenon of transmigration, Pries (2001) provides a concept which makes the migration patterns of new nomads comprehensible. As transmigration he understands a meaningful ideal type of international migration, in which the shift between different places in various national societies is not a temporary exception, but a recurring part of a (survival-) oriented strategy. By migration flows from one region to another, over the time new nomads spin multilingual networks, which they can later use for a transfer of capital. Emigrating, new nomads leave behind a brain drain in the home region, which in case of a good (re)-inclusion is neutralized by their return migration. The feasibility of an internal brain waste by knowledge re-circulation also depends on inclusion opportunities and the exploitation of the absorbed nomads' skills. Through the immigration of new nomads, the receiving region can expect a knowledge increase, which is characterized by their migration experience in the intercultural context. An external brain waste in the arrival region occurs when the transferred skills cannot be used regionally by the come-into-effect of national and regional restrictions. These restrictions disrupt an efficient inclusion and integration into the labour market and the society and are the selection criteria for new nomads to choose the next region of destination. It is common that new nomads accept a job offer before leaving their home region - a procedure reducing the risk of an external brain waste. Due to the remaining transnational network structures of the new nomads they are often good examples how brain exchange for all involved regions can work.

3.4.5 PERMANENT MIGRATION

Particularly within Europe the permanent migration has long roots and traditions. It already reached its first peak in times of industrialization. In those days, strong migration networks occurred, which are partially still valid to the present day. During the past years, the permanent migration has declined due to Europe-wide political changes. According to the newest trends and the current European crises, permanent migration is popular again. For the domestic regions this has grave consequences of brain drain, especially when losing the knowledge elite. For the arrival regions the knowledge effects shift between brain gain and external brain waste. To a great extent it depends on the regional absorption and inclusion capacity if knowledge effects turn out positive or negative. The higher the qualification degree of a mobile citizen is, the better are the opportunities to gain a foothold in the foreign labour market. The permanent migration excludes any return to the home region. Permanent migrants can bring gain for both regions by using their inter-regional networks for brain exchange.

3.5 MAKING FULL USE OF KNOWLEDGE – REGIONAL INCLUSION AND ABSORPTIVE CAPACITY

So far, we have argued that migration process-related knowledge spillovers do not exclusively lead to positive effects on regions, but contain the possibility of knowledge loss through brain drain and brain waste effects. The accomplished conceptual approach (Table 3.1) reinforces with its ideas our argumentation. It even goes one step further and suggests that under certain circumstances brain drain and brain waste effects can occur in home regions. This problem arises when the highly skilled workers cannot find adequate employment possibilities or when they are paid inappropriate for their work. Furthermore, Table 3.1 outlines the possibility that emigration does not guarantee an improvement in living conditions in the region of destination. Arriving in a foreign region, mobile citizens still face insurmountable barriers to enter the regional labour market and society. Moreover, Table 3.1 submits that different migration patterns can cause both: positive and negative knowledge effects. It depends on regional structures which of these effects prevail. In the further course of this text it will be analysed how and which structures can convert negative brain drain/brain waste effects into positive brain gain/brain exchange effects on regions.

Additionally to the results of Table 3.1, the literature overview summarizes that the following: First, knowledge is a key resource to regional innovation connected with highly skilled workforce. Researchers understand innovation as a result of regional interactions and knowledge spillover effects arising from cumulative learning. Thus, a stock of a highly skilled

human capital is of high relevance for regions. Second, despite regional proximity and shared knowledge creation through regional cumulative learning effects, Caragliu and Nijkamp (2008) and Malmberg and Power (2005) regard the continuous inflow of external knowledge through exchange channels (pipelines) as essential for regional growth. Faggian and McCann (2009) ascribe the role of knowledge provider between regions to human capital. Following this argumentation, the labour migration is considered one of the most important channels of knowledge transfer. Hence, the need for regional policies grows which recognize, safeguard and exploit inflowing knowledge and in doing so counteract brain drain and brain waste. To suggest possibilities to avoid negative knowledge effects on regions, the approaches of regional inclusion and absorptive capacity will be discussed in the following. In this context, the role of actor networks in the development of regional policies and as supporting mechanisms to better knowledge identification and exploitation will be examined.

One of the requirements to fully utilize inflowing knowledge in the home and receiving regions is the regional inclusion of the mobile citizens into the labour market and the society. In this context, regional inclusion creates the basis for trust, which, as was learnt, is essential for the interaction of the actor. These interactions again are considered as crucial for knowledge spillover effects. The concept of inclusion is indeed frequently used in the context of migration, but is extremely difficult to distinguish from the better-known concept of integration. In this thesis, integration is understood as the involvement of minorities into majorities, such as the labour migrants into the society of a region. Integration is all about approximation, the understanding of the other person and the discovering of common ground. Integration should not be equivalent to the loss of the culture and identity of migrants in favour of the new living environment. Nevertheless, integration often claims unconsciously for migrants' assimilation to the regional context.

Maintaining the migrants' roots applies equally to the term inclusion. We differentiate between integration and inclusion according to the viewing angle. While integration works with instruments assisting immigrants to operate within a society (by e.g. language courses), the inclusion moves one step further. Inclusion ensures each individual an entry into the society, without too high expectations from the beginning or too many certain conditions to be fulfilled. Thus, the inclusion does not put higher requirements on the labour migrants than on the society, but expects the society to open up and to fully include minorities into its given structures and claims for an active support of regional actors in the processes. Hence, in this thesis inclusion describes more than political framework conditions, but regional actors' ability of a full embeddedness of (return-) migrants into the respective societies. To counteract the waste of knowledge, full inclusion can take place through differentiated

consideration of the migration patterns of mobile citizens and their individual knowledge potential. Thus, individual knowledge potentials can better be exploited regionally and provide (re)-inclusion of labour migrants into the home or receiving region. With the increase of migration dynamics and diversity, inclusion is without doubt a challenge. In return, regions depriving inclusion run the risk to waste migration-dependent knowledge.

By giving the example of the return migration, Cassarino (2004) demonstrates how important it is to understand every single migration process due to the various types of returnees. Alongside, he describes the factors that lead to a successful knowledge absorption within regions. Based on a literature review, Cassarino (2004) pleads for a differentiated view of the plans, motives, desires and experiences of return migrants. Thereby, he hopes for a better insight into the “[...] who returns when, and why; and why some returnees appear as actors of change, in specific social and institutional circumstances at home, whereas others do not” (Cassarino, 2004: 254). Cassarino (2004) assumes that the difference between whether a migrant is able to contribute to the regional economy through knowledge and skills or not, results from further motives than solely the qualification degree. He cites two factors for a successful return migration, coupled with positive socio-economic effects: (1) resource mobilisation, and (2) the returnee’s preparedness. These factors are influenced by two components, which are the time and the type of made experiences. The impact of the return of a migrant on the regional economy is higher when the migrant has spent enough time in the foreign region to collect optimal and positive migration experience, and when he has had enough preparation time to mobilise the resources for a possible return. In this context, Cassarino (2004) does not only consider the experience the migrant went through during the migration process, he also takes into account the political, economic and institutional changes that took place during the absence of the migrant in the domestic region. These changes are necessary for the resource mobilisation in the case of a return. They are regarded as providers of structures in order to implement the migrant’s potential coming back to the domestic economy. In this vein, it is argued that a successful inclusion in the foreign region, which enables optimal migration experiences, contributes to positive knowledge effects and a faster (re)-inclusion to the home region in the case of a return migration. By the preparedness of return migration, the mobile citizen opens up to include his newly acquired skills to the domestic economy, and thereby simplifies the absorption of his knowledge.

The idea described above claims that a full inclusion of the labour migrant to the domestic and foreign regional structures is necessary so that trust-based interactions and knowledge transfer can take place. The so-called absorptive capacity of a region is regarded in this chapter as a possible continuation of the presented inclusion concept. In 1990, Cohen and

Levinthal created the concept of the absorptive capacity. Originally the concept referred to a company's ability (a) to identify, (b) to assimilate and (3) to use the value of new, external information. The authors name individual cognition as the basis of the absorptive capacity approach. Transferring this idea from the company (Cohen & Levinthal, 1990) to the regional level, the already existing regional knowledge base is the basic framework to absorb external knowledge. Cohan and Levinthal (2009) claim that the already accumulated knowledge base possesses the capability to attract new knowledge, absorb it and retrieve it at any time. Moreover, the concept of absorptive capacity expects external knowledge to be fully recognized and utilized if it is similar to the already existing regional knowledge base. The more contact points are given between the already existing regional knowledge and the new transferred knowledge, the higher the absorption probability (Klagge & Klein-Hitpaß, 2010). On the contrary, if there are major differences between the external knowledge and the regional knowledge base, it cannot be abundantly absorbed and a brain waste effect might occur. Caragliu and Nijkamp (2008) call such a phenomenon the "lack of local absorptive capacity". The absence of absorptive capacity increases the risk of the unused knowledge to move on to a different region. The loss of knowledge leads to a loss of possible regional innovation. This thesis shares the view of Caragliu and Nijkamp (2008). It therefore recommends making greater investments into regional human capital and regional R&D activities to increase the regional knowledge base. In turn, a broad regional knowledge base (including several knowledge types) implies higher probability to identify new knowledge and lately to absorb and include it, in a way that allows its further usage.

3.6 THE ROLE OF NETWORKS – STRUCTURE DEVELOPMENT FOR KNOWLEDGE ABSORPTION AND INCLUSION

It was argued before that both, (1) the regional inclusion and the (2) absorptive capacity, can influence the quality of migration-related regional knowledge effects. The ability to recognize inflowing knowledge and exploit it creating new regional technologies and knowledge-intensive labour processes can positively raise the regional firm performance (Boshuizen, 2009). Again, innovation is an important factor for companies to stay competitive in times of globalisation.

Regions therefore need structures to elaborate concepts in order to foster inclusion and enhance regional absorptive capacity. This is necessary to abundantly exploit inflowing knowledge. In this context, intra- and inter-regional social networks (e.g. policy networks, stakeholder networks, migration networks), as defined in section 2.5.3 of this thesis, can function as facilitators in a twofold manner: they can promote knowledge spillovers and they

can identify and exploit knowledge regionally. Despite the wide use of the term network, the different understandings imply common characteristics. Networks can broadly be defined as social organizations (Cooke, 1996) that follow a specific temporal dynamic and life cycle (Butzin, 2000). A critical network component is the interweaving of autonomous actors, which should be composed of at least three equal parties. Fürst and Schubert (1998) define networks as loosely coupled and highly branched organizations that refer to clearly defined subjects and a dispose of horizontal communication structures without strong hierarchies. Bressers et al. (1998) refer to policy network relations and state, "The intensity of actors' interactions and the way in which objectives are distributed among the actors are the basic characteristics of network relations". Polanyi's (1944) idea of embeddedness, which was continued by Granovetter (Boshuizen, 2009), bases on the key terms trust and reciprocity and emphasizes that economic network relations are embedded in social network relations. Referring to Coleman (1990 quoted in Boshuizen 2009: 30) trust within networks means "[...] a willingness to commit a collaborative effort before you know how the other person will behave". In that line, reciprocity is declared as "[...] understanding that a given action will be returned in kind" (Hansen, 1992 quoted in Boshuizen, 2009: 30). Thus, social networks based on trust and reciprocity can foster inter-firm collaborations also in terms of inter-regional conjunctions. Aside from trust and reciprocity researchers state that first-hand contacts (direct ties) are needed for a network formation (Ahuja, 2000), but it is Granovetter (1973) who defines the importance of weak in addition to strong ties within networks in order to access new information, different views and opportunities. Weak ties reduce the risk of lock-in effects within networks. Social structures such as networks increase the availability of resources and information by acting as pipelines that transfer e.g. knowledge from one region to another (Klagge & Klein-Hitpaß, 2010). Thereby, networks form and are at the same time social capital that is embedded in the network structure itself (Coleman, 1988). Boshuizen (2009: 38) declares that the "[...] principle of social capital is that individuals are able to access resources via others".

The view on regions has changed in the recent decades. Nowadays, regions are no longer seen as geographical locations of individual business units, but as a pool of collaborations and interactions, which are intra- as well as inter-regional. "If combination is the key to innovation, then social network activity may be an important predictor of people's involvement in innovation" (Boshuizen, 2009: 38). Networks are crucial to the regional success by elaborating solutions to region-specific tasks and challenges (Fürst & Schubert, 1998) such as migration-related knowledge spillovers. To build structures for an effective recognition and utilization of labour migration-related knowledge particularly regional

stakeholders and policy networks can matter. Including actors from the public sector, corporations, and educational institutions as well as engaged citizens, networks seem to be an appropriate policy instrument to develop new structures for a better regional knowledge absorption and inclusion. Moreover, in the context of labour migration-related knowledge spillovers a special importance should be given to migration networks. Based on the social network theory it can be assumed that return migrants are mainly carriers of material and immaterial resources (Cassarino, 2004) that diverge depending on the migration experience. Doing so, migration networks can increase the regional knowledge base that leads to a better inflowing knowledge identification and exploitation. Thereby, migration networks are inter alia an important source to build regional social capital.

Migration networks are distinct with regard to their degree of formality (formal/informal), purpose (professional/private) and background (family/friendly). Likewise, migration networks can be divided into personal networks and second-hand networks, to which the access grounds on the involvement of a third party. Despite these distinctions, migration networks possess common features: social relations of citizens from the home and the arrival region shape them. Apart from the function as knowledge transfer platforms, migration networks are often decisive for the migrants' selection of their region of destination. On the one hand, they facilitate access to the labour market and contribute to the social inclusion of mobile citizens in foreign regions. On the other hand, migration networks act as carriers of economic, symbolic, social and cultural capital (Bourdieu, 1983), which they transfer from one region to another. In creating social structures migration networks facilitate mobile citizens before their emigration with information concerning job opportunities, living conditions, political framework, and the society of the receiving region. Planning a return migration networks act as intermediary between the home and arrival region in the process of the return preparation. Pries (2001a) underpins the importance of migration networks and argues that individuals and households meet their migration decisions in the context of migration networks. Thereby, the transportation of people, goods and information is organized and the socio-cultural symbol systems interact with each other at individual locations (e.g. mental maps, languages, customs and traditions etc.). He further argues that due to migration processes the distance is less important than the nature of migration networks between home and receiving regions. Within the migration networks social interactions are based on trust and long-term predictability (Pries, 2001a).

Although today's highly skilled labour migrants do not depend as strong as their predecessors on migration networks, they still function as reliable social structures between the domestic region and the region of destination and contribute directly and indirectly to

regional economies. Bearing in mind the ever-changing migration patterns, a new role can be attributed to migration networks.

3.7 NEW FORMS OF MIGRATION NETWORKS

Distinctive forms of migration networks related to the new nomads are the transnational migration networks. Opposed to bi-directional network structures, transnational migration networks maintain social structures within multiple regions due to the fact that “(a) small but growing number of migrants have even become fully ‘transnational’ – with dual citizenship and residences in both their home and their adopted countries” (Saxenian, 2012: 28). Transnational migration networks are type casted by transnational social spaces. Schmiz (2010) describes the ideal type of a transnational social space as a trans-boundary space without a centre that is spread out between different places, regions and countries. Thus, transnational social spaces do not base on the traditional emigration and immigration motives, which are expected to be, centred in the receiving region as on-going coordination mechanisms for resources such as remittances, lifestyle (e.g. a weekly correspondence with the region of origin by e.g. phone) or personal interests considering career or educational issues. Schmiz decouples the transnational social spaces from the geographic and social spaces. He defines transnational social spaces by the e.g. transmigrants’ activities in the so-called third space, which can mainly be marked as context-related. By moving between diverse locations, the migrant lives in different transnational spaces, in which he functions as facilitator and/or supporter of resources and recreates links from transnational spaces to his domestic region and economy and vice versa. By acting in the third space and using it as an exchange platform, transmigrants accumulate knowledge arising from their transnational interactions. As required, they make their knowledge available to the geographical spaces, in which they operate. In doing so, they contribute directly with their knowledge to regional developments.

In the past decade, authors as Saxenian (2012) and Iglicka (2010) discussed the importance of diaspora networks. Diaspora does not seem to be a new phenomenon, but it moved again into the spotlight in the context of highly skilled labour migration. Considering east-western European migration “Polonia” is an example of a well-organized migration network of Polish migrants abroad. Diaspora is mainly characterized by personal relationships between the home and receiving countries, based on a collective cultural identity. Diaspora functions as provider of information and thereby as an exchange channel. One of the characteristics of diaspora is their geographic concentration and organization. In almost all metropolitan areas diaspora networks have established their own infrastructure (shops, churches, restaurants,

media, etc.). Moreover, diaspora can lead to a regionally concentrated settlement of migrants in the receiving country. With a view on earlier research the today's diaspora effects on regions have changed. Saxenian states that, while in past days diaspora likely contributed to the domestic economy by remittance or direct investments, the current research regards diaspora as knowledge networks transferring knowledge and/or technology. Thereby, diaspora shift negative brain drain effects to brain circulation: "Low transportation and communication costs now allow those who go abroad for further training or in search of work to interact and collaborate with their home country counterparts for more extensively than was feasible in earlier eras of emigration" (Saxenian, 2012: 28). Even if direct diaspora effects on development are hard to measure, incremental effects can be assured.

Similar to diaspora networks, alumni networks are a previously known phenomenon, but new in the context of highly skilled workers mobility. These constitute a new form of migration networks and come into play when other migrant-related personal and professional networks between the home and adopted region fail. In addition, alumni networks function as interconnections among alumni groups abroad and allow alumni to find each other (worldwide) to keep in touch and exchange knowledge (Saxenian, 2012). Especially in the case of a return preparation, alumni networks can provide their members with information concerning regional economy, such as job offers. Furthermore, they can contribute to regional migrants' (re)-inclusion as first-contact points. Although alumni networks currently still function as information intermediary; their scope of activities should be broadened in the future (David & Coenen, 2014).

Finally, migration networks have their raising importance for regional development to the new communication and technology channels. Particularly virtual social communities, which are decoupled from time and space, provide migrants with opportunities to stay in touch anytime, anywhere, and share intellectual property. The relevance of these networks is growing steadily. Thus, the influence of migration networks such as the ones presented in this chapter should remain a key part of the investigation of migration-related knowledge effects on regions in order to avoid negative brain drain and brain waste effects and to foster brain gain or even brain exchange.

3.8 CONCLUSION

This chapter has aimed to conceptually present labour migration-related knowledge effects on the home and recipient regions with a special focus on highly skilled workers. In addition it also presented the importance of several networks for knowledge spillover effects. It was

argued that in times of skills shortage and increasing European labour mobility migration-related knowledge spillovers still lead - under circumstances - to negative brain drain and brain waste effects, e.g. by national obstacles such as the non-recognition of qualifications and regional high entrance barriers to labour markets and societies. At the same time, the literature analysis could present that knowledge, embodied in highly skilled human capital, is crucial for regional development and firm-related competition. In that sense, regions depend on external knowledge flows to counteract lock-in effects. Hence, we suggested, that regions should develop complementary structures and even policies to respond to knowledge loss and support brain gain and optimum brain exchange. This idea has led us to the presentation of possible supportive concepts: the regional inclusion and the regional absorptive capacity. Both aim at the fast identification of inflowing knowledge, its safeguard and entire exploitation into regional products and processes. Presently, some regions already demonstrate concepts of an inclusive welcome culture in order to attract highly skilled workers. Doing so, they e.g. support regional companies in training programmes for employees to increase intercultural competences. Such programmes are just the beginning and should be extended also with regard to low-skilled workers labour migration. In this context, the chapter pleads for a differentiated consideration of individual migration patterns to recover each mobile citizen's skills and use it adequately. In this context, social networks, and in particular policy and migration networks function in a twofold manner: as knowledge providing and supportive mechanisms. In both ways they create and are regional social capital and thereby contribute to a broad regional knowledge base, which again is important to absorb inflowing knowledge. Following these argumentations the chapter finally presented new forms of migration networks, which, as it was argued, should still be on the agenda of the labour migration discussion.

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Further material the chapter refers to:

David, A., Rehfeld, D., Coenen, F., Kopper, J. Kullgren, I. (2013): Using Alumni Networks for Regions - BRAND. Border Region Alumni Network Development. Gelsenkirchen: Institute for Work and Technology. Project Brochure.

David, A. (2013): Fachkräftesituation in Ostwestfalen-Lippe. Gelsenkirchen: Institute for Work and Technology. BUTTON – Towards tailored Policy Measures to Attract and Retain Highly Educated Workers. Pushing the Right Button. Project Deliverable.

Dankwart-Kammoun, S., David, A. (2011): New Argonauts - A Concept for Regions? Contribution to the 4th Summer Conference in Regional Science, 30th June – 1st July 2011, Dresden, Topic: Regional Economic and Labour Market Policies: Concepts, Results, and Challenges. Gelsenkirchen: Institute for Work and Technology.

Dankwart-Kammoun, S., David, A. (2011): Die Rolle von Netzwerken bei der Sicherung und Gewinnung von Fachkräften. Internet-Dokument. Gelsenkirchen: Institut Arbeit und Technik. Forschung Aktuell, Nr. 09/2011.

PREFACE CHAPTER 4

In the previous chapter 3, the reader gains a deeper insight into new migration patterns, which can be accounted for by highly skilled migration. Chapter 3 regards highly skilled migration less as a new phenomenon, thus brain flow as a natural process, but rather as a stronger manifestation based on the shift to the knowledge-based society. A special focus of chapter 3 is on the possible migration-related knowledge spillover effects on domestic and receiving regions. In reference to that, chapter 3 argues that a better inclusion of migrants in regional societies using strategies such as an “inclusive welcoming culture” can have a positive impact on the knowledge spillover effects of highly skilled workers. Moreover, this chapter argues that the better a regional knowledge base is (see the framework conditions of the human capital model section 2.4) the better external inflowing knowledge can be identified, matched and absorbed by a region. Chapter 3 thus uncovers new forms of migration networks as co-creators and co-producers for the attraction of external highly skilled workers (pillar 4 of the human capital model) and regards new migration networks (e.g. transnational migration networks) as positive factors influencing regional inclusion.

Moving on to chapter 4, this concentrates on the mobilisation of local regional potential. It argues that when a region is not very attractive to highly skilled workers, regions can focus in parallel on vulnerable and marginalised groups such as (post) migrants, the long-term unemployed, people with disabilities etc. to further train and educate them, in order to overcome a regional lack of knowledge (skills shortage). These groups are therefore regarded as the untapped potential of a region. Social and learning networks as well as mentoring concepts such as innovative solutions for VET improvement are taken into closer consideration. Chapter 4 states that collective learning within networks generates and exchanges knowledge, which can be regarded as a contribution to regional social capital at the group level and individual level.

CHAPTER 4: INTEGRATING VULNERABLE AND MARGINALIZED GROUPS INTO VOCATIONAL EDUCATION AND TRAINING THROUGH INNOVATIVE SOLUTIONS^{*}

4.1 INTRODUCTION

Human capital is moving to the fore of the European agenda. In the topic-related literature, authors such as Morais et al. (2011), Florida et al. (2007) and/or Rodriguez-Pose and Vilalta-Bufi (2005) stress the function of human capital for regions in both socio-economical and socio-cultural terms. One mentioned reason for the increasing popularity of human capital, which in this chapter is understood as acquired personal skills, capabilities and knowledge which make people able to act in a certain way (Coleman, 1988), might be its recognised role as contributor to regional social capital. This contribution can be achieved by participating in social networks and the mutual exchange of information and knowledge within such networks as well as through untapped forms of learning like the social forms. Conversely, social capital allocated within families and outside family structures in, for example, social networks incorporated in school systems, VET systems and organisations and/or even work places, can contribute to the creation and increase of human capital. Coleman (1988: 101) states “Both social capital in the family and social capital in the community play roles in the creation of human capital in the raising generation”.

In the past decades, literature and research have mainly focused on the role of highly skilled workers as knowledge carriers or knowledge-holders (Grove, 2009; Florida, 2008). This can be explained by the fact that highly skilled workers possess a high quality and quantity of knowledge and are able to generate, exploit and anchor knowledge regionally (Smed Olsen et. al, 2010). Because of their fast access to new and external knowledge flows by e.g. co-operation and networking capability, the highly skilled are regarded as social capital shapers and accumulators. So far, the role of the so-called vulnerable and marginalized (VAM) groups such as (post) migrants (Yildiz, 2013), early school leavers and/or people with disabilities, has been neglected. To put this topic back into the spotlight, the main goal of the work described in this chapter is to present social innovative approaches, such as the use of social networks and platforms, which contribute to the improvement of vocational education

^{*} The current chapter is based on the article: David, A., Hamburg, I. (2013): Integrating Vulnerable and Marginalized Groups into Vocational Education and Training through Innovative Solutions. *In: Problems of Education in the 21st Century*, 56, 42-58.

and training (VET), in order to support and motivate VAM groups to (re)-integrate into education and the labour market. The role of VAM groups as contributors to regional social capital may, thereby, also be boosted. This chapter bases on the following theses:

1. Currently, VET seems not to be attractive enough and may not obtain enough possibilities for the (re)-integration of VAM groups. In this case, collective learning situations could be improved by using solutions such as Web 2.0 and 3.0, as well as social networking and unused forms of learning.
2. The regional social capital might grow through improved integration of VAM groups into VET structures due to learners' participation in social networks. This may also be supportive for new learning situations. To provide both theses this chapter first briefly argues the importance of human capital in terms of social capital for regions and vice versa. It presents the VAM groups as regional untapped potential. Later, the chapter summarizes some characteristics of VET and the vocational training scene. It then outlines the features of social media and social networks for collective learning (effects), as well as tools of Web 2.0 and 3.0, which could improve collective learning situations. Subsequently, examples of the integration of VAM groups such as (post) migrants, people with disabilities and/or early school leavers in vocational education and training (VET) and continuing education and training (CVET) will be offered. The chapter concludes by summarising some advantages of the development of innovative approaches such as social networks and unused forms of technology-based learning and discusses their role in the process of building regional social capital.
3. As the methodological basis of this chapter a mix of qualitative research was accomplished, which was extended by quantitative questionnaires. The methodological mix includes a basic research on social and human capital by using literature overview and studies. Moreover, an applied research was conducted on the improvement of the current VET system situation and the learning methods to support the (re)-integration of vulnerable and marginalized groups into VET and later into the labour market. For the qualitative research results of focus discussion groups and evaluations of developments in VET systems and in carried out projects were used. A questionnaire for experts of LLL and experts of education were added as the quantitative part. The realization of the described research was supported by LLL Leonardo da Vinci sub-programme "Transfer of Innovation" including the projects IBB2, DIMENSAAI and NetKnowing 2.0

4.2 HUMAN CAPITAL, SOCIAL CAPITAL AND SOCIAL NETWORKS

In this chapter, social capital is defined as both individual-focused, (bringing advantages for individuals) and group-focused (sharing common advantages within and throughout a network). Both definitions are understood as network-related benefits for network members. Regarding network members as regional actors and multipliers (Bourdieu, 1983) their individual and group-related benefits can, by sharing the acquired knowledge with the outside world, bring potential advantages for regions and depending on the information, be a possible boost for regional growth. Putnam (1993) points out, that an existing regional stock of social capital can be important for economic development. Correspondingly, Bourdieu and Wacquant (1992) and Bourdieu (1983) define social capital as a sum of actual and potential resources that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalised relationships of mutual acquaintance and recognition. In other words, social capital is a resource, basing on the belonging of persons to a group (Bourdieu, 1983: 191) built on mutual exchange. Putnam (1993: 36) quotes, “[...] “social capital refers to features of social organizations, such as networks, norms, and trust, that facilitate coordination and co-operation for mutual benefits”. Boshuizen (2009: 25) summarises these ideas in the following terms saying: “The principle of social capital is that individuals are able to access resources via others”. Thus, “[s]ocial capital is defined by its function” (Coleman, 1988: 98) and is “[...] less tangible yet, for it exists in the relations among persons (Coleman, 1988: 101).

In the context of lifelong learning solutions social capital might be recognised as e.g. a faster access to resources such as information and knowledge. Within the networks knowledge transfer, knowledge generation and exploitation can be the added value, which at its best may result in regional innovation (Malecki, 2012). Moreover, social capital may help solving problems of individuals and their learning situations. “[These] effects may vary depending on the needs and the human capital of those accessing social capital” (Greve et al., 2006). Or as Putnam (1993: 36) notes: “Social capital enhances the benefits of investments in physical and human capital”. This chapter focuses on the contribution of VET and, in particular, social innovative approaches for (re)-integration of VAM groups into education and labour markets. In this context, it would like to assign an essential role to the individual and common learning effects, which are regarded as social capital, emerging within and throughout network co-operations. Referring to Coleman (1988: 101) “[...] the concept of social capital allows taking such resources [which occur through co-operations and trust-related behaviour in co-operations and] showing the way they can be combined with other resources to produce different system-level behaviour or, in other cases, different outcomes for individuals”.

Common learning possibilities can emerge within bilateral relations such as the concept of a mentoring process, but foremost within social (learning) networks, which are characterised by the interweaving of autonomous actors, which should be at least three equal parties (Butzin, 2000). These networks can be supported by new web solutions such as Web 2.0 and 3.0, which can bring added value to all members participating. Scholars such as Granovetter (1974) have already emphasised the positive effects of contacts and co-operations within social networks for individual career paths. Granovetter (1974) presents in his studies “Getting a job”, that co-operations and contacts can boost carriers. In relation, he particularly stresses network relations and the ties between the network members who bring in new knowledge and information flows (Granovetter, 1973). Therefore, VAM groups should also make full use of the networks for their educational and job-related paths to increase skills and their capital. Additionally, if the knowledge carried by workers, which they had acquired in the networks, (Lawson & Lorenz, 1998) can be absorbed by and utilized in the region, or vice versa if workers are capable and aware of the how and the where, they can use their knowledge within a region, human capital is more likely to become social capital (Faggian & McCann, 2006; Storper & Scott, 2009; Caragliu & Nijkamp, 2008). In other words, human capital may become social capital if workers’ knowledge is able to unfold regional effects, thereby realising collective regional advantages and benefits. Thus, knowledge is recognised as one of the key factors for regional development (Malecki, 2010; Cotic-Svetina et al., 2008) setting up common regional learning effects leading to a common regional knowledge base. In turn, this knowledge base acts as an attractor for further knowledge carriers by absorbing external knowledge flows. At best, the absorbed knowledge flows into the regional innovation systems, which consist of organisations and institutions (see Triple Helix based on the work of Etzkowitz, 2008) conducting research, generates new knowledge and commercialises that knowledge to the outside world (Cooke, 2007). Blöcker (2012) argues that humans make innovation. She regards innovation as work and justifies this by claiming that innovation is generated, transformed and exploited in knowledge-intensive working processes (Blöcker, 2012).

4.3 VAM GROUPS’ UNTAPPED POTENTIAL IN A CHALLENGING EU

The present discussion on human capital is enhanced by phenomena such as ageing society (demographic change), rising migration (OECD, 2013) and recent high (youth) unemployment rates in several European countries (Barbagelata, 2012) caused by, among other things, financial and economic crises. The challenging effects on the EU are manifold. Skills shortages have created a demand for workers in particular economic sectors in some regions, especially in MINT-based professions (mathematics, informatics, natural sciences,

and technology). There is also a high brain drain incidence in specific EU-regions caused by the emigration of young and middle-aged people searching for better job opportunities. Regions affected by a brain drain, for whatever reason, are often negatively affected by a lack of knowledge in their regional knowledge base and their regional innovation systems. Often, it is particular peripheral and border regions which increasingly suffer a loss of knowledge carriers when the balance between immigration and emigration is disturbed (Stockhorst, 2011; Coenen & Flikkers, 2010). These regions can also experience an absence of internal social and learning networks and the connection to external knowledge flows.

Young people in particular, despite their skills and good qualifications, are often unsuccessful in job searches due to ineffective labour market regulations and the unsatisfactory conditions found in poorly functioning institutions. Often the difficulty in finding a job lies in the lack of information on job opportunities as well as in less information on the regional company structure. In addition, the consulting of young unemployed people seems in some cases to be inflexible and little goal-oriented. Especially in cases of early school leavers and young people who grew up in families facing difficult social circumstances, the consulting and information management should be better organised. Just as in some EU-regions the labour market seems to be “nearly” closed to skilled young people, entrance to labour markets for (young) vulnerable and marginalized groups (VAM) such as (post) migrants, early school leavers and people with disabilities or/and without a VET history, is even more critical. Often held back by a serious lack of hard and soft skills these target groups enter a vicious circle of unemployment, social exclusion and psychological difficulties and later fall into age-related poverty as the Confederation of German Trade Unions stated in 2013. Employers’ growing requirements for trainees and employees make it increasingly difficult for VAM groups to gain a foothold in working life. Entrance barriers differ from country to country compounding the transnational mobility of all workers and to an even greater extent, to VAM groups.

To prevent a possible brain drain and to compensate for the lack of regional knowledge, regions, regardless of the extent of their concern, need to develop appropriate concepts including strategies for the future set-up of a regional human capital agenda. This includes a mix of measurements based on four pillars of a human capital strategy: (1) exploitation of regional untapped potential, (2) retention of workers, (3) re-attraction of workers, who once lived in the region and finally (4) the new acquisition of workers. Of particular relevance for regions is the first pillar, especially with regard to the untapped potential of VAM groups as listed above. However, the previously cited literature on the role of human capital and its contribution to regional economy and innovation capacity through knowledge, mainly addresses highly skilled workers or even the so-called knowledge elite (Faggian & McCann,

2009; Trippi & Maier, 2007). In the context of knowledge generation and exploitation, the role of VAM groups remains neglected. However, these groups are of relevance for regions undergoing a brain drain. They are untapped potential and, at the same time, offer much capability for individual development. To go a step further, authors such as Yildiz (2013) and Saunders (2011) present a different view on VAM groups with a special focus on migrants or the so-called (post) migrants (Yildiz describes post migrants as the generation who did not have to accomplish the migration process themselves, but are second or third generation immigrants in the receiving country) and describe these as inventors and innovators within regional, and especially urban milieus and societies. Their cultural contribution to social and working life can initiate social changes and their international networks (migration networks) constitute new forms of cultural and social capital (Schmiz, 2010). Therefore, a special focus should be given to this group. In general, VAM groups should be even more integrated to social innovative concepts to develop fast and easy solutions for (re)-integration into VET and later into the labour market to make full use of their skills and knowledge.

Vocational education and training (VET) programmes, defined as “a collection of educational and training activities”, are organised to accomplish a pre-determined objective or the completion of a specific set of educational tasks. VET should be, and in many cases already is, part of lifelong learning strategies the remit of which is to meet the requirements of a knowledge society. It helps to develop and preserve human resources and knowledge, which are precious to society, and which need and depend on innovation, social cohesion and economic growth. Through fostering human resources, demographic developments should be equilibrated and vulnerable groups, and those marginalized to the point of exclusion, be helped to bridge the gap between a lack or non-recognition of qualifications and (re-)obtaining employment. VET includes initial education and training (IVET) as well as continuing education and training (CVET). A particular problem seems to be that VET systems in Europe are very diverse. Establishment of common rules to guarantee recognition of competences is necessary. Another problem is that the strategies of many European organisations, including the training ones, often fail to support lifelong-learners particularly those with special needs. E-Learning, utilizing social media including collective learning through social networks, Web 2.0 and 3.0 applications and techniques, mobile learning, social learning in connection with networking could all enhance knowledge sharing and efficient learning. Furthermore, social approaches such as mentoring can contribute, not only to the improvement of VET, but also to integrating people with special needs and requirements who wish to learn and work.

4.4 THE CURRENT VET SITUATION

In recent decades VET sectors have gained special attention from both research and decision making communities (Martin, 2012; Nevriye & Yazçayır, 2009). This has been demonstrated by changes in national policies and budgets allocated to vocational sectors. More public and private interveners have been involved in meeting the requirements and challenge of training new generations of appropriate manpower, which will in turn; fulfil the requirements of industry, trade and services.

It is difficult and potentially challenging to present a detailed picture of different forms of VET offered in Europe. Not only are the data inconsistent and incomplete, but also definition, particularly of CVET, is non-consensual (Bohlinger, 2004). For a programme to be considered as a VET programme it should comprise of at least 25% of the vocational and technical content. "In comprehensive systems when students choose among general and vocational courses, VET programmes would be those which enable students to choose vocational courses which provide at least 25% of the content of the programmes" (OECD, 2003). For the definition in this thesis, the term VET is used in the sense of including all forms of general and job-related education and training for the employed, as well as the unemployed and other groups at risk of exclusion from the labour market. The challenges for VET are to provide more opportunities for individuals to participate in vocational training courses, to improve the routes through which learners can use computers and IT for learning and to use approaches such as mentoring in order to integrate and to achieve the necessary competences and skill enhancements.

There should be opportunities for the validation of non-formal and informal learning (that are used by several people) so that people can (re)-integrate into society as well as into the labour market (ETUCE Conference, 2012). The importance of VET for all, particularly for those at risk of exclusion and unemployment and the aforementioned VAM groups, is clearly due to structural changes in the labour market. A decrease in demand for low-skilled work and the taking over of skills and decision-making by new technologies can be seen as structural changes in the labour market. European companies continue to shift production to low-wage countries where low-skilled and highly skilled work is estimated and paid at lower rates. The existence of structural changes in the labour market is generally accepted; many of issues of in-depth analysis of VET 'for all' are extremely controversial. Being at risk of unemployment and exclusion usually corresponds to inadequate, incomplete or obsolete qualifications or the non-recognition of qualifications achieved in several EU-countries (CEDEFOP, 2004; European Commission, 2003). One of the first problems is that the

number of persons receiving training is high, but many of the VAM groups are unlikely to participate in training because i.e. (Bohlinger, 2004):

- In many countries, such as Germany, accessibility to VET and CVET is linked with a minimum length of employment
- Young qualified males are over-represented in VET; female, older, (post) migrants and long-term unemployed people are less well represented.

Often VET programmes are not oriented to the needs of groups at risk of exclusion and those, which differ from the needs of young people or short-term unemployed mothers. People with special needs such as the VAM groups are uncertain about potential VET benefits, have a negative self-image and often harbour prejudices caused by negative experiences during education and ensuing working time. People able to motivate and help them to integrate, such as mentors, are not used in VET and diversity counsellors are still not in place. Additionally, many existing VET systems fail to take full advantage of new ICT capabilities for generating and sharing knowledge within networks and also fail to develop and update innovative skills. E-Learning, by enabling lifelong learning, has the potential to transform how and when employees learn to satisfy their work and life needs and acts as a catalyst for change and integration. ICT-supported social and mobile learning cannot be considered completely new forms of learning and should certainly be included in future VET programmes. In the following, we present a mix of approaches, which contribute to the improvement of VET and increase the human capital of VAM groups. In doing so, they indirectly constitute regional social capital.

4.5 INNOVATIVE SOLUTIONS FOR VET IMPROVEMENT

4.5.1 SOCIAL MEDIA, WEB 2.0 AND 3.0 IN VET

The concept of Web 2.0 (O'Reilly, 2005) facilitates a new level of interaction making it easier to collaborate and share information. A huge benefit of Web 3.0 is the move towards being able to access data from anywhere. This is mainly driven by the heavy usage of smart phones and cloud applications. The idea is to ensure that users can access as much data as possible from anywhere, not just their home. Thus, the web is moving beyond Web 2.0 and 3.0 but many VET programmes are not exploiting the services Web 2.0 and 3.0 offer. The development of technologies like Web 2.0 and the networked world, in which we live and move, necessitates a new learning approach – connectivity – which requires trainers and trainees to have the capacity to deal with knowledge on a network and to continually acquire

new information from within and outside the network. This corresponds to the increasing need for co-operation in companies and workplaces. Siemens (2005) recognised the importance of connectivity and pointed out that learning theories such as behaviourism, cognitivism and constructivism do not explore the impact of networks on learning. A mechanism to encourage “connection” would be a community i.e., a social network like Xing, LinkedIn or Facebook (Wenger et al., 2002). The current generation of web-based technology (Web 2.0), which is not mainly a technical revolution but primarily a social one, has a vast potential to create prospering environments that foster forms of learning which can be used flexibly thereby facilitating any-time and any-place interaction and communication and to bring forth individual and group-related social capital. Mobile learning and social learning are new and relevant trends for IVET and CVET. They can be regarded as social capital, i.e., the advantages people possess based on their location in a social structure and through social relationships, which in turn, benefit their way of learning and the learning content in several ways (Boshuizen, 2009; Burt, 2004).

Social media, i.e. media for social interaction, lends itself very well to the support of collaborative activities within a community. It supports the idea of connectivity developed by Siemens (2005) where: information is constantly changing, learning takes place in distributed networks of people, learning is based on diversity of opinions, content and services are adaptable and responsive to the specific needs of learners. Social media based on both Web 2.0 and 3.0 offers the premises for fast knowledge acquisition and also supports learning within the communities. Kaplan and Heinlein created a classification scheme for different social media types in their Business Horizons chapter published in 2010. According to Kaplan and Heinlein (2010) there are six different types of social media: (1) collaborative projects, (2) blogs and microblogs, (3) content communities, (4) social networking sites, (5) virtual game worlds, and (6) virtual communities. Technologies include: blogs, picture-sharing, wall-postings, email, instant messaging, music-sharing, crowd sourcing, and voice over IP, to name a few. Many of these social media services can be integrated via social network aggregation platforms. The technical skills needed to use social media are quite low. Another important characteristic of such applications and “spaces” is the amount of decreasing differences such as those between teachers and the taught, between formal and informal learning processes and between education and knowledge acquisition/management.

The use of social media with web services and E-Learning improves the ability of learners/members to socially interact with the technology used (communication with technology) and to learn with it. Social media tools like internet forums, weblogs, social

blogs, microblogging, wikis, podcasts, photographs or pictures, video, rating and social bookmarking are easy to use and can help to create a more dynamic community and provide an on-going conversation which benefits members. Social media contribute to fostering democratic processes and the creation of social capital. But in the context of today's social-networked society and the rise of social media tools, new perspectives for VET will have to be considered.

4.5.2 SOCIAL LEARNING AND MOBILE LEARNING IN VET

"Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behaviour is learned observationally through modelling: from observing others one forms an idea of how new behaviours are performed, and on later occasions this coded information serves as a guide for action." (Bandura, 1977)

The social learning theory proposed by Albert Bandura added a social element, arguing that people can learn new information and behaviours by observing others. This type of learning can be used to explain a wide variety of behaviours. Social learning is closed to communities (De Witt & Gangus, 2011). It is relevant for VET and contributes to achieving interaction, co-operation, communication and conflict-management skills in connection with new technologies. The widespread use of mobile devices like mobile phones, smartphones and tablet PCs, which are independent from power sources and can be permanently connected to networks, make mobile learning one of the future forms of learning in companies (MMB, 2011).

An overview of the main characteristics and potentials of these forms of learning for VET are shown in Table 4.1 (De Witt & Gangus, 2011):

	Mobile Learning	Social Learning and Social Media
Characteristics	Any-time, any-place learning; ubiquitous access to information; social networks and digital tools; personalised learning environments	Participation; collaboration; user-generated content
Didactic Potentials	Extending the places and times of learning; situated learning; contextualised learning; informal learning; micro-learning	Learning in social networks and communities; informal learning; collaborative learning
Potentials for VET	Linking learning venues and workplaces; improving co-operation between learning	Active co-authoring; collaboration between employees in dispersed locations; transparency of work

	venues	procedures
Limitations	Imparting and acquiring complex learning processes without integration into broader learning contexts	Traditional corporate cultures
Applications	Location-based services; augmented reality; QR codes; micro-blogging/social networking; GEO-tagging; RFID / NFC	Micro-blogging; social networking; social tagging; wikis
Technologies	Smart phones; Tablet PCs; e-book readers; mobile media players	Community platforms; micro-blogging tools

Table 4.1: Overview of the two forms of learning. Source: David & Hamburg, 2013.

These two forms of learning are suitable for IVET as well as for CVET. They facilitate interactions and communication between learners dispersed across localities and is particularly important during the work process. Social learning is a part of building social capital and contributes to building and revising shared beliefs, norms and contexts. It also takes into account new awareness and settings where collective decisions and individual actions are needed. The spreading utilisation of mobile devices is affecting communities around the world and altering the ways we educate and communicate, collaborate and engage with one another. At the same time they are “transforming our ideas about identity, discourse, community, technology, knowledge, space and time” (Traxler, 2008: 3). Mobile learning would be an interactive tool between technologies, learning and social context. The two forms of learning certainly have disadvantages and there are difficulties in trying to introduce them within the VET. Firstly, there is a problem of acceptance; many training institutions do not have the technical and didactical capacities to use web tools and adapt training materials to these forms of learning. Social media platforms or web sites, particularly in public institutions, may be blocked due to security risks. The learning for work process is often hindered by the learning culture of CVET in many organisations as well as various and diverse web applications. Additionally, learning attempted in inappropriate situations such as on the train, etc. is not a solution for long-term knowledge acquisition.

4.5.3 THE MENTORING APPROACH IN VET

Mentoring has been used in Europe for a long time and has deep roots in ancient European society. Odysseus entrusted his kingdom to Mentor when he went to the Trojan wars. In classical Greece, young men often lived with more experienced elders to learn, not simply knowledge, but also skills and attitudes. The mentoring relationship was evident in the guilds of mediaeval Europe and the forms of apprenticeship that evolved from them. Mentoring

involves not just guidance and suggestion, but also the development of autonomous skills, judgments, personal and professional master ship, expertise, trust and the development of self-confidence over the time involved (Hamburg, 2012; Richert, 2006; Kram, 1985). Many organisations generate approaches of mentoring for the integration and supported development of new staff. In the field of VET, CVET mentoring is particularly significant in trending institutions and companies. It is to be expected that the integration rate of people with special needs and the so-called VAM groups in such institutions is higher. At the moment, the use of mentoring in IVET is undertaken across conventional professional contexts i.e. visiting trainers as practice mentors. Mentoring can be applied within VET on-site if the company employs mentors. This has several advantages in that mentors are familiar with their company's work and organisational processes and know its routines and culture. They can estimate what types of knowledge are needed for company efficiency and what kinds of knowledge resources or knowledge base already exists. They are used to the working environment and can estimate hazards and situations, which could challenge mentees or their colleagues. A further advantage of mentoring relationships is the development of a mutual trust between colleagues, which may later become the basis of a mentee's daily work.

Becoming a mentor requires, in particular, social competences, professional competences and operating competences. Experience and expertise is necessary as well as being moderately extraverted. Motivation and responsibility are required in the mentor-mentee relationship. The mentee needs to be ready for professional development, open to learning and able to accept feedback. Time and initiative are also necessary. The company can gain benefits from mentoring within CVET by: introducing mentees quickly into formal and informal company structures, culture and demands, by facilitating a deliberate, systematic and smooth transfer of technical or internal knowledge, through providing opportunities to shape the workforce of the future in an international, deliberate way that meets company strategic goals and objectives and by providing training in social competences for mentees and mentors.

Mentees have the following benefits:

- Gaining a positive attitude and trust
- Help to focus on their future and on setting realistic career goals
- Encouragement of emotional and social growth
- Exposure to new experiences and professional backgrounds

Within CVET, mentees have the opportunity to meet with a trusted person, to access a work place quickly, to cope with initial problems and to discuss and resolve emerging job problems of a genuine nature and in relation to individual needs. Mentees are able to build relationships and be part of interactions, which allow them to strengthen and maintain their position and advance in jobs by choosing ways, which correspond to the work routines and social actions of other employees.

Mentors benefit from the following:

- Gaining personal and professional satisfaction particularly if helping a person at risk of exclusion
- Gaining recognition from their mentees
- Improving their personal skills, in particular their social competences and their social capital
- Obtaining a better understanding of diversity and societal problems

There is a broad range of mentoring relationships, which can be used in CVET, ranging from informal or spontaneous mentoring to highly structured and planned mentoring. Informal mentoring is created when the mentor has a special interest in the mentee, e.g., if the mentee has been identified as a potential employee. This form of mentoring is particularly suitable for mentees with special needs. Formal mentoring is when the relationship is supported by the organisation so that more participants can benefit.

Effective mentoring practices include:

- Involving mentees in deciding how the pair will spend their time together
- Mentors maintaining responsibility for keeping the relationship alive
- Respecting a mentee's viewpoint
- Separating mentor goals from those of the mentee
- Not focusing on the negative aspects of the mentee
- Seeking and utilising the help and advice of VET programme staff

Organisations are interested in using mentoring within CVET to improve job performance by increasing employees' capabilities to manage their own performance with an emphasis on trust, experience and supervision, to facilitate performance in the organisation and to support retention and leadership development. Mentoring relationships are one way in which

individuals can gain access to social capital, which includes information and social support that can be helpful in the VET and in the development of legal careers.

4.5.4 EXAMPLES

In the following some European projects are shortly described referring to the use of social media and mentoring. Fifteen representatives of SMEs from the business area software development, IT consulting, SME consulting, training, high education and research, CEOs, entrepreneurs, training responsible and IT have evaluated the basic course. The presentation and training by using the advance courses have been done in the “HAGENER Agentur” in Hagen/Germany (at the German network Wisnet) and at the Institute for Work and Technology (IAT) in Gelsenkirchen/Germany. A forum has been organized with the topic of using different forms of learning in CVET on the “provadis” platform, which is a communication platform for the Wisnet partners and also contains useful training solutions for the CVET in SMEs.

A project aimed at using informal and social learning, Web 2.0 and networking in CVET is NetKnowing 2.0 (www.netknowing.eu) (Hamburg & Marian, 2012; Hamburg 2011). Two main CVET products of NetKnowing 2.0 are a self-learning basic course which focuses on the benefits of informal learning for SMEs and how to learn using Web 2.0, social networks and net collaborating practices and an E-Learning advanced course which focuses on the implementation of Web 2.0 based informal learning, networking strategies and mentoring in SMEs and other organisations.

The screenshot shows the 'learning suite' interface for 'Module 1 Informal Learning and LLL strategies'. The main content area is titled 'MENTORING' and includes a section 'Mentoring as a guided informal learning process'. Below this, there are sub-sections for 'Mentoring, coaching, counseling'. The text explains that mentoring, coaching, and counseling are human resources development processes often used to induct and introduce staff into their new place of employment. It then lists key words for each process:

- Counseling:**
 - Has its origin in psychology and involves the development and maintenance of a two-way relationship.
 - Has as its main goal the identification and overcoming of barriers to performance and work fulfillment.
- Coaching:**
 - Has its origin in the sporting environments.
 - Is aimed more at giving guidance to individuals or groups regarding the development of specific skills that are needed to be applied in a specific job environment.
 - Is related to a job, and involves the technicalities of specific workplace skills.
 - Is called Diversity Coaching (DC) by utilizing diversity as a resource.
 - Shows as an end result task-related competencies.

Figure 4.1: Screenshot of the NetKnowing 2.0 learning suite. Source: <http://cop.netknowing.eu>.

NetKnowing project workshops with companies have been organised in partner countries to discuss tactics with SME representatives with a view to implementing a mentoring programme in their CVET. For a mentoring programme to be successfully deployed within the specific context of an SME environment, some factors have to be considered such as putting the specific working environment into context, researching the role played by the organisational culture or “climate” in the development, the maintenance and success of the SME, determining which knowledge gaps can be reduced by a mentoring system and the qualification needs of staff. SME managers have to be convinced that mentoring interventions are not bureaucratic and therefore have real benefits for CVET. Before a mentoring process can start, any barriers to effective mentoring/coaching issues that need to be incorporated within the mentoring/coaching intervention have to be cleared. Figure 4.1 presents a screenshot from the learning suite within NetKnowing 2.0 including a mentoring part (Hamburg & Marian, 2012). A community of practice (CoP) supported by a social platform (<http://cop.netknowing.eu>) using Web 2.0 and social media a facility (i.e. forums) has been connected to the CVET modules. Companies of all the European project partners have tested the CVET module. Improvements, particularly for the self-learning module, have been made i.e. with reference to the correlation between text and graphics, exercises, etc.).

The LdV innovation transfer project IBB2 (Inclusive Disability Care – www.lebenshilfe-guv.at/ueber_uns/eu_projekte/ibb_2) aims to support an inclusive CVET of workers with learning disabilities to help them during job entry. The main project result was a support system geared toward the needs of all people involved in the process (employers, colleagues, and inclusive care workers). The model is based on three modules, which provide an analysis of the future workplace and the legal framework (laws and regulations) plus the development of a special Diversity Team Workshop, which the inclusive care worker can use shortly before job entry. The final module deals with the mentoring process taking place between the inclusive care worker and the mentor. The model is supported by a web-based platform (www.ibb2.com) and tested by the use of social learning methods in each of the partner countries. It has been improved and distributed in many European countries. The employment of people with disabilities and supported by mentors has been one of the care sector’s positive results.

DIMENSAAI (Diversity and Mentoring Approaches supporting Active Ageing and Integration – www.dimensaai.eu) is a European LdV innovation transfer project. By transferring a mentoring model from former European projects like IBB2 to Germany and other partner

countries, the consortium intends to improve participation in VET and employment, particularly for disadvantaged groups, by using a social innovative VET process which includes mentoring that focuses on social networking and health and care sector workplaces (Hamburg, 2013). Focus Group Discussions with educators, social actors and target group representatives (one group consisted of people with disabilities) were organised in all partner countries to discuss target groups' needs for VET and work integration and how a mentoring process could support these processes. The results were used in the next steps: the development of a catalogue of competences for target groups' mentors, workshops on diversity and the development and testing of the mentoring process. Social competences training will be carried out alongside training of professional and diversity competences. It was discussed how social networking using social media can support social learning which is an important element for people with special needs. A social network supported by a web-based platform (Figure 2) for innovative online training, with forums for information exchange, solving problems and collaboration is being developed within the project (www.platform.dimensaai.eu).

To develop platforms in the three projects the tool TikiWiki CMS Groupware, a free and open source wiki-based content management system was used, which facilitates social media applications. It is important to discuss integrative VET with the organisations' employers and the VET organiser in order to improve the building of social capital in their programmes through social learning in co-operation-based interactions.

4.6 DISCUSSION

The summarised results from several Europe-wide accomplished projects based on the analyses of VET structures, confirm that VET programmes need improvements to support VAM groups in their (re)-integration. This chapter argued that using new forms of learning, especially in social networks, could, under certain circumstances constitute, regional social capital firstly by its ability to co-operate in a network and secondly by producing knowledge and information as added value to each single network member. To improve VET integration for VAM groups, the findings would suggest the use of social media and web facilities, which make VET more attractive and flexible, particularly to young people. The building of social networks and their use alongside traditional learning forms can be fruitful and create benefits for all individuals involved in network-based learning situations as well as for groups of learners. In line with this idea, this chapter believes that social mobile learning should be a complementary form in VET although it is important to stress, that this form is not practicable for long learning periods. Even if network-based learning situations are often characterised

by the constitution of social capital, this can also occur in bilateral relationships such as that of mentor-mentee. Ideally, the mentor approach is based on a trust-driven mentor-mentee relationship and supports a fast, and in many cases uncomplicated, (re)-integration of the mentee into work, by quickly overcoming possible teething problems.

Even if these new learning solutions valorise the attractions of VET and bring advantages to the VAM groups' learners, one must not forget the other side of the coin. The listed approaches have their limitations. For VAM groups, and in particular, people with disabilities, new technologies bring not only advantages but also hazards, which must be overcome. Moreover, in the context of new web solutions security barriers might appear which complicate free access and participation in social networks and network-related opportunities and which are not able to make safe the transferred information and knowledge within such a network. Another difficulty in improving VET programmes could be the VET trainers' insufficient knowledge in terms of content, integrative aspects and the use of new media and new learning solutions. If the social media, including social networks, cannot be used in an adequate way, a lack of added value and a loss of possible social capital may result. In addition, colleges and VET institutions complain of a shortage of skills in mentoring, showing several parallels to shortages in the care and health sectors. Another difficulty this chapter would like to draw the attention to, is the matching-problem in some mentor-mentee situations. In terms of diversity, mentors need a broad knowledge base and, as well as the required hard skills, they must also possess several soft skills to handle new learning and working situations with the mentee. The mentor-mentee relationship, in addition to its professional function, is a relationship between two human individuals. Both need to find the human base/level to communicate and to appreciate each other's perspectives and be able to tolerate differences.

4.7 CONCLUSION

The argument in this chapter is that to date, discussion about human capital has been very much related to discussion about highly skilled workers, their knowledge contribution to regional knowledge base and their feasible role in regional innovation. In the future, human capital will move to the fore on the European agenda, accentuated by demographic change, an anticipated skills shortage, the loss of workers through emigration, the search for adequate job opportunities all over Europe and high (youth) unemployment rates. Therefore, regions need to constitute a holistic human capital agenda, which focuses on regional untapped potential such as the so-called vulnerable and marginalized groups (VAM).

In contrast, it was stated that in this context, analysis of the roles of vulnerable and marginalized groups (VAM) has so far not been adequately carried out. However, VAM groups are also carriers of knowledge and through co-operations can contribute to the constitution and accumulation of social capital. To do so, a strong focus should be put on the skills, ability and knowledge of VAM groups. A step in the right direction would be (re)-integration into the VET system, and later into the labour market, of groups such as (post) migrants, early school leavers and/or people with disabilities. In this context, one must firstly consider the attraction of VET programmes for VAM groups, which in the chapter's opinion, currently suffer from several deficits and need to be improved. Secondly, this chapter argued, that an improved integration of VAM groups into VET and labour markets could increase VAM group members' human capital and by co-operation, also the individual and regional social capital. Therefore, this chapter advocates the improvement of VET through existing services such as Web 2.0 and 3.0 and social media including networks and innovative forms of learning such as social learning and mobile learning. Following on from this, the role of social networks such as Facebook should be also mentioned, which have grown into global phenomena and are used widely for business, learning and overall exchange activities, such as blogs and wikis. As yet however, the benefits of these supporting platforms and Web 2.0 services are not being widely used in VET. Social networks are useful for improving VET strategies, for co-operation and keeping experts and learners in touch. They make a significant contribution to informal learning and can be used optimally if work-oriented content and suitable learning platforms are provided.

Furthermore, this chapter wishes to stress the importance of approaches such as mentoring, which can contribute, not only to VET improvement, but also to the direct integration of vulnerable and marginalized groups with special requirements who wish to work. Similar to networks, such bilateral relationships are based on trust and common understanding. They are an alternative to theoretical learning through the concept of direct integration of VAM groups into given work situations. In this way, initial problems and hazards can be identified and resolved immediately. The mentoring approach particularly addresses people with less human and social capital and social support and has been proven as instrumental in improving the awareness of both terms.

In summarising, the chapter pleads for the improvement and enhanced accessibility of VET technologies and an increase of support in the (re)-integration of people such as those in the described VAM groups. In the future, VET should include approaches that enable individuals to develop their full potential. VET should also support knowledge development and creativity through their engagement within social and cultural networks; experience from academic

context can support this process. These innovative solutions may also change the way in which the VET staffs learn to interact with the learning content and technology in a social context and how to communicate this to peers. It is important to help the VET staff to have an open and adaptable attitude to new tools that can be exploited in the learning process. Situations, environments, frames and projects have to be created to develop critical thinking, to further develop staff skills and to prepare VET teachers to be effective in a globalised and competitive society. In this way they will be able to contribute to the building of regional human capital and social capital.

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Further material the chapter refers to:

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PREFACE CHAPTER 5

Chapter 4 illustrates that (highly) skilled workers as knowledge carriers should not solely be regarded in terms of their education level or professional degree. Developing a sustainable regional human capital agenda also means taking regional untapped labour potential into consideration. By untapped potential, chapter 4 understands vulnerable and marginalised groups (VAM), which are target groups that include early school dropouts, the long-terms unemployed, people with disabilities, (post) migrants, elderly people etc. Chapter 4 pleads that in future times the demographic change will trigger regions and their economies even more and brain flow will sometimes be hard to achieve. Therefore, the mobilisation of such a regional untapped potential is meaningful. Up to now, very little literature has been published regarding these groups as innovation potential. Thus, chapter 4, considers these groups in that way and even regards their knowledge accumulation as part of regional social capital, in both senses: the group level and the individual level social capital. In that line, the role of (ICT-based) social and learning networks is discussed and regarded as innovative solutions for VET (re)-integration. In doing so, chapter 4 presents regional strategies, which are summarised under the action called “mobilising of own potential” (pillar 1 of the human capital agenda). It also makes a significant contribution to the informal learning approach by presenting concepts known under the term “mentoring”.

The mobilisation of own regional potential addressed in chapter 4 is expanded in chapter 5 with further human capital strategies for retention and (re)-attraction of highly skilled workers. Here, the focus lies on the assumption that highly skilled graduates/workers who were born in the region or spent study or working time there, and thus have closer ties to it, as external “customers”. Thus, for many regions, especially the non-core regions (border and peripheral regions), it is easier to emphasise the mobilisation, retention and (re)-attraction aspect of the human capital agenda, than to attract new external highly skilled workers. This is in line with the overall discussion of regional attraction. It has been demonstrated in several studies that metropolitan areas seem to be more attractive to highly skilled graduates than non-core regions. The concept of “warm city/place marketing” seems to be an option for many non-core regions. Chapter 4 addresses the second and third pillars of the human capital agenda (section 2.4) through the usage of (university) alumni networks for retaining and (re)-attracting a highly skilled workforce.

CHAPTER 5: ALUMNI NETWORKS – AN UNTAPPED POTENTIAL TO GAIN AND RETAIN HIGHLY SKILLED WORKERS?*

5.1 INTRODUCTION

This chapter deals with an explorative descriptive study into the goals, structure and function of so-called alumni networks. Alumni, as regarded in that chapter, are graduates of higher educational institutions. But also former employees and associates of universities or similar educational institutions can be considered as alumni (Rohlmann & Wömpener, 2009; alumni-clubs.net). The term *alumnus* is known from Latin. The exact translation of *alumnus* means fellow, companion or pupil. At one time it was used in the context of church education institutes (Niebergall, 2007). History shows that alumni networks are about 200 years old and were fixed at the first graduates' meeting in Yale. Primary American universities formed the term *alumni* in the sense of how it is used today (Rohlmann & Wömpener, 2009). There still is a lack of empirical research into the goals, structure and function of alumni networks in the northwest European context (Rohlmann & Wömpener, 2009). This chapter wants to explore a particular potential function of alumni networks, namely the role alumni networks can play in brain circulation and return migration. Under brain flow this thesis defines a natural phenomenon of highly skilled human capital moving from one country or region to another. Brain circulation describes the highly skilled workers migration and subsequently (re)-migration processes between two or even more regions including passing national borders. It is a brain flow from one country or region to another, where the brains return after a certain amount of time. In contrast to knowledge transfer, brain circulation describes the *de facto* movement of persons between several regions. Knowledge transfer concerns the transfer of knowledge in possession of highly skilled workers from one region to another through migration processes. This thesis defines the term *region* in the sense of NUTS2 (statistic regions). Research shows that people who once lived in a specific region for instance to study, will have (stronger) ties to their place of birth or place of study, and are more willing to move back to their study or birth region for a job, than people who are completely unfamiliar with a region (Smeulders & Latten, 2009). As Hospers (2010: 188) formulates “[...] keeping existing customers is more profitable than acquiring new ones”. These ties to a region are

* The current chapter is based on the article: David, A., Coenen, F. (2014): Alumni Networks: An Untapped Potential to Gain and Retain Highly-Skilled Workers? *In: Higher Education Studies*, 4(5), 1-17.

not only built on the personal experiences of living there but also on established networks and interconnection with people in this region. In that context a special meaning is assigned to migration networks (Andrews, 2012; Lowe et al., 2012; Pries, 2001b). These are, to a great extent, responsible for migrants' choice of staying, leaving or returning to a region.

This chapter discusses that such a return mechanism not only depends on "warm place" feelings (positive experiences connected to a specific region) but also on social networks that cultivate the ties with the region. And that "warm place" feelings and "warm ties" in itself are normally not a sufficient reason to return to a region, but that there also needs to be an established communication about opportunities in the region for returnees and networks, which support the decision of a return.

Given the argumentation above, this chapter asks the following questions:

1. What is the relation between brain flows and alumni?
2. Under what conditions can alumni networks supply to the retention and (re)-attraction of alumni in a particular region?
3. What is the present form and function of the studied alumni networks in northwest Europe and do they fulfil the formulated conditions?

5.2 BRAIN FLOWS AND ALUMNI NETWORKS

5.2.1 ALUMNI AS CARRIERS OF KNOWLEDGE

University alumni are a potential source of high educated staying or coming to a region. Regions and their economies strongly depend on skilled employees because they are recognized as the carriers of knowledge (Trippel & Maier, 2007). "In innovation systems competence and human capital as a whole are important resources." (Seppänen, 2008: 10). A strong pool of human capital is the main competitive factor for each region (Grove, 2009; Heßler, 2008). Highly skilled workers dispose of unique knowledge which foremost is required in high technology and knowledge-based sectors. Therefore, the success of regional economies depends on the quantity, but even more strongly, on the quality of human capital, which is mainly available in the form of talented and aspiring workers (Champion, 2011; Florida, 2008). Talent contributes to regional performance in the form of: (1) knowledge generation, (2) knowledge exploitation and (3) knowledge exchange. In addition, the continuous inflow of external knowledge is an essential precondition for regions' competitiveness (Martin & Sunley, 2006; Malmberg & Power, 2005; Butzin, 2000). Labour migration is the main source for absorbing external knowledge (Faggian & McCann, 2009).

Following these lines, Brain Flow is a normal occurrence, which describes the mobility of highly skilled workers. Through moving across regions, the highly skilled workers may contribute to regional innovation systems and can be even seen as innovators (Pries, 2011). Thus, the importance of highly skilled workers to regional economic and social growth cannot be denied (Danzon & Ulku, 2011; Saxenian, 2007; Cassarino, 2004; King, 1978).

5.2.2 ALUMNI AS RE-MIGRANTS

Regions profit from migrants or mobile people coming to a region and sharing their external knowledge (Klagge & Klein-Hitpaß, 2010; Saxenian, 2007). An outflow of graduates can be regarded as a positive phenomenon if they acquire competences, experiences and contacts elsewhere and actual return at some moment in their life to their domestic or study region and make there a contribution. Brain drain in terms of people leaving a region is not a problem in itself (Coenen & Flikkers, 2010). But if a region lists a higher outflow of skilled people and a lower inflow from elsewhere regions run the risk of imbalance, if a shortage of skilled people is created. In such a case, the region loses competencies (Stark & Byr, 2012; Stark, 2005), which can lead to social and economic disadvantages. Regions with high brain drain levels report loss of knowledge, a reduction in purchasing power and the absence of cultural activities (Wagner et al., 2013; Malecki, 2011). Surveys have shown (Stockhorst, 2011) that brain drain particularly affects less attractive non-core regions such as border and/or peripheral regions. This chapter understands non-core regions as regions that are not considered to be one of the more important economic regions in their country. The case regions analysed for this publication were also border regions, being relatively close to a neighbouring country.

For these non-core regions finding a balance between outmigration and immigration might be a problem and the attraction of highly skilled workers is a challenge due to their specific regional socio-economic and geographical characteristics. Highly skilled workers may assume that desirable jobs are found mostly in metropolitan areas (Florida, 2008), all of which are seen as attractive. But actually knowing a region because one lived there might change the ideas about job opportunities and quality of life, so for non-core regions return migrants are even more important. This chapter supposes that return migrants as mentioned before have “warm feelings” or personal ties to the region of origin. Following this argument, alumni networks regarded as social networks own the potential to cultivate these personal ties and to create a warm feeling about the region itself and in that sense (re)-attract the alumni. Focusing on university alumni as (re)-migrants meet the two above-mentioned conditions as graduates of a specific regional university they are (1) considered to be among

the highly skilled workers, and (2) at its best they are bond emotionally to the region itself. The latter aspect should be differentiated in the way, that the emotional bond and even loyalty can only be seen as a supportive advantage for (re)-migration, if the emotions are positive in the sense of a “warm feeling”. Universities can support the building of such a feeling, by establishing social networks such as alumni networks and by acting as a pipeline transforming global trends to local demands.

5.2.3 UNIVERSITIES AS GLOBAL/LOCAL PIPELINES

Since finally Etzkowitz and Leydesdorff (2000) expended the understanding of the university within an innovation system, at the same time they explained the important role of universities in the regional context. The authors did it by describing the path shift from “mode 1”, which was the traditional concept of knowledge generation by means of a hierarchically, disciplinary and homogeneous approach (Gibbons et. al, 1994), moving to the path of “mode 2”, which in addition to a knowledge generation, is also knowledge production and even distribution. This new understanding of the role of a university could also be called in a broader sense the “commercial” role of a university. In that sense, university was no longer regarded only as a knowledge incubator, generating knowledge exclusively for the academic world, but rather as a stakeholder and a contributor to regional economy by e.g. university spin-offs. In that open up process to the outside world, universities are viewed as involved in deeper anchoring processes into global networks. By considering regions as places where global resources flow by using several channels of exchange (Appadurai, 2008 uses the term “scapes”), which can be embedded into local regional innovation systems (Cooke, 2001), each drawing on their own global networks (Benneworth & Hospers, 2007), universities offer regions access points to global networks and on the other hand transform the external flows/ trends to answer local demands. Since being considered as a node in a network (Granovetter, 1973), universities can act as global and local pipelines (Bathel et al., 2004). Following these lines, universities are attributed to the tasks to interact with several actors in the outside world, among them also non-university stakeholders - such as private companies or public administration - and thereby they contribute with their knowledge and global academic and commercial links to the regional development, which is called in literature the universities “third mission” (Kroll et. al., 2013).

5.2.4 BUILDING SOCIAL NETWORKS FOR REGIONS

There are several studies, which point out the importance of networks for regional economies. All these networks, if these are company’s networks such as clusters (Porter,

1998; Rehfeld, 1994) or governance networks (Bressers & O'Toole, 1998) or the so called innovation networks such as the Triple Helix, the co-operation between universities, industry and government (Etzkowitz & Leydesdorff, 2000), or even the Quadruple and Quintuple Helix, expanded by civil society and media and culture-based public (Carayannis et al., 2012) have one element in common. They are in broader sense social networks. Social networks are characterized by the interaction, exchange and even co-operation between the participated members (Boshuizen, 2009). Thus, they are not black boxes, but in best cases fluent "give-and-take" platforms. Alumni networks can be considered as social networks and a component of regional based universities. Therefore, they are the live string of contact between former university students who had lived in, or were even born in the region. Generally, alumni networks make contact with university students before they graduate and continue the contact when the students later become the universities' alumni.

The main characteristic of networks is the interdependency between actors and the exchange of resources. Different kinds of networks are based on different resources. Alumni networks are social networks and constitute to social capital (David & Hamburg, 2013; Fürst & Schubert, 1998) if they provide their members with knowledge and information, which is an added value for their members, and at the same time, the members' exchange among each other creates an added value for the regions by knowledge generation and exchanged and information transfer (David & Hamburg, 2013). The idea of a social network suggests the importance of emotional engagement for a specific network and not just relation based on service for money. If an alumni network as representative of the university, once part of (alma mater), is only providing services for money without this emotional engagement and without members exchanging among themselves, there is only a seller-buyer relationship. Social networks are driven by the members of their community (in both directions) and therefore contain social capital. They thrive on relationships and are built on the fact that members share commonalities. Social networks are motivated by emotions, but also by expected benefits. The described emotions can be influenced during the time of their study. Literally spoken if a warm and positive feeling about the network is transferred and a kind of return investment is given, alumni relations can flourish through binding students to the university and even the region. Hence, the success of social networks, and in this special case of alumni networks, depends on the input level of individual members and the social capital as added value for each single network member (Boshuizen, 2009; Castells, 2008; Granovetter, 1973). Members' commitment depends on (1) the benefit members expect from the network participation and (2) the level of the connectivity to the network. According to both determinants, members of alumni networks weigh up what they can bring and what they

can get in return or what they have already received. When deciding whether to join a network, alumni consider the services they will receive from the university and if they will improve their career opportunities. Therefore, the level of commitment of the alumni depends to a large extent on how they rate the quality of their higher education, their assessment of how well they were prepared for their career and what positive influences were exerted by individuals at the faculty (Weerts et al., 2009). So potentially alumni networks as social networks can contribute to (1) creating a warm feeling which binds students emotionally to the alma mater and university region and by (2) informing the later alumni (wherever in the world they are) about the latest university developments as well as economic developments in the domestic regions or former study regions.

5.2.5 THE FUNCTION OF ALUMNI NETWORKS FOR UNIVERSITIES

5.2.5.1 THE FRIEND- AND FUNDRAISING FUNCTION

Alumni networks are an old idea. In the 1920s (Niebergall, 2007) alumni organisations were originated in America at the private higher education institutes. Following, public universities used alumni mainly in terms of financial manners. There is a strong commitment of American students and alumni for their alma mater. This can be put down to a different education system as Niebergall (2007) presents. Public higher universities employed the concept of alumni according to the motto: building a relationship to students not only for the years of study but rather for a lifetime brings lifelong benefits to both – the university and the alumni. Professional alumni networks and alumni relations remain part of each American private and public higher education institution. To understand the commitment of American students and alumni for their alma mater means to look behind the scenes of American donating, associating and higher education culture. This extremely differs from the European higher education culture. In contrast to numerous European higher education systems, the American system is intensely supported by funding instruments and students' fees. These funding instruments rely on students' and graduates' "friend-raising", fundraising and sponsoring activities. American universities understand their calling in a different perspective to most of those in Europe.

They regard themselves not only as higher education institutions - even if the quality of study is one of the main factors for alumni to be proud of their alma mater - but as service providers. Enrolling to study involves obtaining a wide range of educational, cultural and social activities (Stifterverband, 2000). Therefore going to a university means going for a certain future way of life that will be designed by the educational image and activities

provided by the university. Moreover, the choice of university is heavily influenced by its alumni. Who the alumni are or have become and whether their private and working lives are proceeding in a positive way, impacts on visions of the future held by university students who want to follow a similar route and who share the same alma mater. American universities wish their students and alumni to take an active part in their universities' strategic and daily business both during and after their studies. Alumni adhere to the concept of giving something back to their alma mater, in the sense of investment return. They are part of the university advisory board before and after graduation. They give lectures, provide job opportunities for students and graduates, establish their careers, act as ambassadors or prominent university alumni through advertisement, acquire new students, act as mentors and give financial support to the university (Weerts et al., 2010).

5.2.5.2 ALUMNI NETWORKS AS COMPETITIVE FACTORS IN THE GLOBAL EDUCATION MARKET

At European universities, the importance of alumni and alumni networks began in the 1980s and was mainly driven by international and global pressure on universities to stay competitive and attractive (Rohlmann & Wömpener, 2009; Niebergall, 2007). Later in the 1990s, alumni became an active part of universities as their roles changed from knowledge generators and producers to knowledge providers. These effects were later enhanced by new media including E-Learning, faster communication and increased student mobility within the European Union (EU). Over time, the role of alumni and alumni networks seems to have been under constant change. Up until 2000 there were only a few publications on the broader topic of alumni in Europe (see Stifterverband, 2000). Later there were several publications, which looked at the role of alumni networks in the context of overall university strategies and the alumni role being used as a financing instrument (McDearmon, 2011; Rohlmann & Wömpener, 2009; Weerts et al. 2009; Sung & Yang, 2008; Niebergall, 2007). Set against this background, it would seem that alumni networks are an innovative idea for new European university structures. In the last few years, alumni networks have attracted more interest in public discussion brought about by the switch of several European higher education systems. Under the pressure to stay attractive and competitive, already in the 1980s first university changes appeared creating a new university profile. The new profile was an opening up process of European universities running parallel with a decline of public funds in some EU states. At the time alumni networks were identified as a competitive factor and further financial source.

5.2.6 THE FUNCTION OF ALUMNI NETWORKS FOR REGIONS

5.2.6.1 ALUMNI NETWORKS CONTRIBUTING TO KNOWLEDGE TRANSFER AND THEIR POSSIBLE AMBASSADOR FUNCTION

The supposed third mission of European universities (Sá, 2010; Wolfe, 2005; Benneworth & Hospers, 2007) implies a transformation. The universities once regarded as knowledge generator expanded their role to knowledge (service) providers. In that process a strong co-operation with regions in form of their economies, policy makers and further regional authorities was demanded. In this way, alumni are welcoming instruments, supplying to the new mission of universities. Doing so, they can also contribute to regional development. Alumni who remain in the regional labour market may act as a conjunction between universities, companies and public institutions. Inducted alliances between the economy and research can promote knowledge spillover from universities to the region. This again may raise the regional knowledge base. Successful alumni affairs can provide universities with an enhanced reputation and image, which is a positive effect when regarding the universities' competitiveness. Furthermore, if alumni inhabit influential positions in businesses or public organisations, maintaining strategic contact can result in good representatives for universities. Overtaking guest lecture, agency for internships or research projects, alumni deliver students with insights into working life. This can even possibly lead to the opening of new doors for students and graduates. Alumni, who after their graduation still are in touch with their alma mater and share a positive feeling based on positive experiences made in the region during their stay can develop into advantages for the university itself and the region.

Especially in case of first living the region for a while, they can overtake an ambassador function for the university as well as the region. What is the ambassador function of alumni? Leaving the region, after a successful time of study, alumni can recommend their alma mater and the region of study to people and foremost potential students. Being themselves "successful" in life and career can be used as a marketing instrument and argument for potential student to follow the way and enrol to the same university in the same region, as their forerunner once did. Financial resources that can be generated through alumni donations or contributions must also be considered. But, the success of possible alumni contribution always depends on the input level made by individual members within their relationship with their alma mater.

5.2.6.2 RETURN MIGRATION FUNCTION

As discussed above alumni networks can contribute to return migration alumni that have lived in a specific region might have a “warm place” feeling about the region they graduated in and therefore might be more eager to return. Conditions is that these alumni through the alumni network communication channels are informed about the developments and opportunities in the region

5.2.7 CONDITION FOR ALUMNI NETWORKS TO CONTRIBUTE TO RETENTION AND (RE)-ATTRACTION

The answer to the first question, what is the relation between brain flows and alumni, leads us to our second question. *Under what conditions can alumni networks contribute to the retention and (re)-attraction of alumni in a particular region?* From the discussion above for alumni networks to contribute to retention and (re)-attraction activities, three conditions have to be considered:

1. They need to be a social network
2. They need to have the intention to use the alumni communication channels for the region
3. They need to actively pursue through activities in the network the retention or (re)-attraction of alumni

Ad 1 If an alumni network only offers services to its members and does not stimulate the emotionally binding it will only limitedly be able to contribute to retention and (re)-attraction.

Ad 2 If an alumni network serves the sole purpose of keeping contact between student and alma mater and abstracts completely from the university region, than there is no basis to contribute to retention and (re)-attraction.

Ad 3 Through activities within the network the choice of alumni network members to stay or return can be influenced. Here we can learn from migration networks, which like alumni networks are social networks. Migration networks can be described as personal networks, mainly consisting of family members or closely related persons originating from the same domestic region (Pries, 2001c). Migration networks influence the decision of migrants because they function as door openers for the arrival region, helping migrants to enter to local society and labour markets. Moreover, migration networks are known as transnational (Schmiz, 2011) exchange platforms of economic, symbolic, social and cultural capital (Bourdieu, 1983). Due to new communication technology and faster mobility between

regions, migration networks seem to becoming stronger as the out-migrated and migration networks exchange becomes more constant thereby enabling transnational living spaces to occur and develop freely. So communication about opportunities, welcoming culture and “what to be found” in the migration region is crucial for the migration patterns. Similar alumni networks can open doors to the region of origin and influence students’ choice on staying in the region after graduation or later, as alumni, to choose whether to return. But this needs activities that also bring the region and it’s opportunities under constant attention of the alumni.

5.3 METHOD

The empirical material is taken from the sub-project “BRAND–Border Regions Alumni Network Development”, as part of the INTERREG IVC Mini Programme “Brain Flow”. It follows an embedded case design. The unit of analysis is university alumni networks in five countries, the Netherlands (NL), Germany (North Rhine-Westphalia) (NRW&GER), Norway (NO), Sweden (SE) and Switzerland (CH). Given its size and its influence on higher education policy, this chapter considers the German Federal State of North Rhine-Westphalia comparable to the other nation states.

In-depth case studies in the aforementioned countries were accomplished in five specific border regions such as Hedmark (NO), Värmland (SE), Münsterland and the Ruhr Area in North Rhine-Westphalia and NRW (GER), Overijssel (NL) and Basel (CH). It was expected that the context of the in-depth case studies would be more similar than taking random alumni networks from the whole of these countries. The first research step was to look into the context of the border regions, to consider regional migration patterns and find possible motives for the demand and outflow of highly skilled workers. In addition, the project looked into overall regional facts such as numbers of inhabitants and the size and infrastructure of regions. It also characterized regional education systems including regional universities and their interplay with regional economy. The goal of the 13 in-depth case studies was, against the background of their regional context, to explore the function, form and activities of alumni networks. To obtain a broader overview of the alumni networks’ scope of activities, the analysis has chosen different networks according to their affiliation, life cycles and organizational and regional origin.

	University Alumni Network	University of Applied Sciences Alumni Network	University Faculty Alumni Network	Umbrella Alumni Network
North Rhine-Westphalia, Germany	XXX	X	X	
Overijssel, Netherlands	X	XX	X	
Värmland, Sweden	X			
Region Basiliens, Swiss	X			X
Hedmark, Norway		X		

Table 5.1: In-depth case studies categorized according to their organizational and regional origin. Source: David & Coenen, 2014.

A standardized questionnaire addressed to alumni network managers were used for face-to-face interviews in the in-depth case studies and desk research on these networks was accomplished. To gain further insight into what alumni networks do and how they are organized, a complementary web survey was added to the eleven alumni network case studies of the five border regions. The web survey focused on the same countries: The Netherlands, Norway, Sweden, Switzerland and the German Federal State of North Rhine-Westphalia, but the web survey sample was taken from universities in all regions in these countries not just the border regions. The web survey limited itself to universities rather than on applied science universities. The reason for this purposeful sampling was that status, size, scope and position of applied science universities varies considerably among the countries surveyed causing comparison difficulties. The sample for the web survey consisted of 47 university alumni networks, 14 from the Netherlands, 8 from NRW (Germany), 8 from Norway, 8 from Sweden and 9 from Switzerland. It also looked into 38 faculty networks, 14 from the Netherlands, 14 from NRW (Germany), 3 from Sweden and 7 from Switzerland. Because of the diversity and unbalanced country sample the main focus of the web survey was put on the overall university network; faculty networks analysis was then used for comparison. The web survey provided less in-depth information on the scope and structure of the networks compared with the case studies, which were based on face-to-face interviews and extended document analysis even though the focus had been put on the same questions and issues. The variables and analytic elements used for the web survey were taken from the explorative in-depth case studies.

5.3.1 PRESENT FORM AND FUNCTION OF THE NETWORKS

The empirical analysis of the network serves to answer the third question in this chapter; *what is the present form and function of the studied alumni networks*, is answered with the network description from the case studies and the web survey. In the in-depth case studies, analysis was made with the help of interviews and documents, analysis characteristics such as year of founding, their initiators, number of members enrolled and their structure. Further questions with regard to alumni network membership structure, finances in terms of funding, fundraising, sponsoring or members' fees, as well as organizational structure including full-time equivalences, were asked in order to assess the level of professionalization of networks. The alumni network managers were also asked about the networks' scope of activities and whom the activities were targeted at. Given this chapter's interest in the role of alumni networks in retention and (re)-attraction instruments, the questions asked were focused particularly on the networks' information and communication activities with regard to their individual regions. A further question was whether networks informed alumni (including those abroad) about regional news, events, economy structure, companies and job offers and if the networks already had binding instruments and activities. The case study and the web survey provided complementary information. Whereas it is difficult to generalize the description of the in-depth case studies to a larger population, the web survey information lacks detail. Based on the results of the in-depth case studies, the web survey was used to look at three groups of alumni networks characteristics:

- Organizational structure
- Network activities
- Network goals

The in-depth-case studies were used to select characteristics and to operationalize categories for the web survey. For organizational structure it looked at the same characteristics of the network as used in the in-depth case studies such as number of members enrolled, alumni network membership structure, finances in terms of funding, fundraising, sponsoring or members' fees, as well as organizational structure. Detailed information on characteristics such as initiators or full-time equivalences of the alumni organizations were difficult to obtain in the web survey.

The survey regarded the available information on networks' scopes of activities for descriptions of the activities and at whom the activities were targeted. The general activities for the web survey were designated six categories based on the overview of activities in the

in-depth case studies; namely, running a webpage, offering social network or exchange possibilities, offering forms of education or courses to alumni, distributing newsletters and special magazines and an overflow category for other activities. For the overview of the goals of the network for the alumni networks, the analysis looked into the formulation of the mission, goals and tasks of the networks as published on their websites. On the basis of the in-depth case studies the goals concerning the (1) promotion of the university for future students, (2) finding future staff for the university, (3) maintaining contact and fundraising and (4) promotion of the region were considered as separate goals.

5.4 RESULTS

5.4.1 ORGANIZATIONAL STRUCTURE

The in-depth case studies show a low level of alumni network professionalization. With regard to management capacity, the number of employees and the full-time equivalence within the analysed networks was in generally low. Alumni networks are often led and controlled by one part-time manager although the umbrella organization CH.AN, which includes all Swiss universities of applied science, has 17 employees, of whom 10 work full-time. Only a few alumni have an official board. Staff numbers depend on funding and size of the network. The eleven case studies showed that only three networks use a fee model and that member fees represent a relatively small proportion of an alumni network's funds.

On the basis of the web survey, an attempt was made to trace whether fees financed networks or whether there was basic funding from the university. The type of funding is important for ways of looking at a network and also looking at the way universities can use networks. In line with the case studies in the "overall university network" sample, funding came from universities in two thirds of the networks. It is difficult from the web survey to trace the exact types of funding within the universities and there seem to be several mixed forms, but clearly, university funding dominates (more than half) followed by membership fees (about a third). This concurs with the basic university funding of the networks. Basic university funding has consequences for membership. In some cases, all graduates become members automatically or all graduates are expected to become members. As far as it could be found, network numbers varied greatly; the smallest network comprising of 1,300 members and the largest of 95,000. This of course depends on the size of the university and how long the university and the network have been in existence. The inventory of the faculty or education programme networks indicates that they may be significantly less formally structured and financed as well as being likely to be part of the overall university alumni

network. In nearly all of the studies, in networks where detailed information on organizational structure was found, there was a subdivision in alumni groups or chapters, faculty and education networks.

In relation to university funding, a wide variety of organizational units were found which were responsible for alumni policies and contacts:

- Alumni offices and bureaus;
- General university communication, marketing and external relation offices;
- Student and career services;
- General university and faculty administration units

5.4.2 NETWORK ACTIVITIES

5.4.2.1 GENERAL ACTIVITIES

The case studies showed a significant similarity among the activities of the networks even when there was a notable difference in size and intensity of the activities. Based on the in-depth case studies, the network activities in the web survey were divided into six categories. The overview (Fig. 5.1) of the “overall alumni networks” confirms that the general activities of the analysed alumni networks are very similar. Nearly all networks have a webpage and a large majority offers a newsletter, has possibilities for social networking or exchange platforms and provides some form of education or courses for the alumni or a members’ magazine. The same similarities exist between faculty networks.

Figure 5.1: Percentage of the general alumni networks that perform a certain network activity (column chart). Source: David & Coenen, 2012, BRAND website survey. Note. Sample size: 47 general alumni networks.

Questions about the networks' information and communication activities were focused with regard to the regions. One of the questions asked was whether networks inform alumni (including those living abroad) about regional news, events, economy structure, companies and their job offers.

5.4.2.2 RETENTION ACTIVITIES

In this research study the specific interest lied in the activities of alumni networks in relation to retention and (re)-attraction. Not all retention or (re)-attraction activities carried out by alumni networks are carried out with the prime purpose of retention or (re)-attraction. Even so, they may still fulfil the possibility of graduates staying, or to consider staying, in the study region or for alumni to return, or to consider returning, to the study region. Alumni networks do have an influence on retention even if it is not intentional. Fig. 5.2 shows that many alumni networks organize activities, which, although not intended as retention strategies, can be used as retention activities especially when the activities show the students or graduates career possibilities in the university region. From the web survey it is difficult to determine if activities such as career or information days or field trips for students concern only career opportunities in the university home region or also bring students in contact with career possibilities outside the university region. However, organizing these activities offers up opportunities for improved graduate-university region linking.

Figure 5.2: Percentage of the general alumni networks that perform certain categories of (potential) retention related activities (column chart). Source: David & Coenen, 2012, BRAND website survey. Note. Sample size: 47 general alumni networks.

5.4.2.3 (RE)-ATTRACTION ACTIVITIES

What holds for retention activities is also true for (re)-attraction activities. Not all alumni networks (re)-attraction activities are intentional but they increase the likelihood of alumni returning, or of considering a return, to the study region. Alumni networks do have an influence on (re)-attraction even if it is not their primary purpose. Fig. 5.3 shows that although many activities organized by alumni networks were not originally intended as (re)-attraction activities, they could in fact be used as such.

Affording a “warm place” feeling is much more important in (re)-attraction activities than in activities designed to foster retention. In the case of retention, it might just be a job offer at the university, which convinces a graduate to stay in the region. With (re)-attraction the “warm feeling” of the alumni for the particular study region is also addressed. Job offers are also a very effective pull factor for alumni. Keeping in touch through homecoming events, summer schools and student teacher exchanges can also cultivate the feeling of a possible

future return but are not such concrete pull factors. However, they can be used to form a basis that concrete (re)-attraction activities can be built on.

Figure 5.3: Percentage of the general alumni networks that perform certain (potential) re-attraction related activities (column chart). Source: David & Coenen, 2012, BRAND website survey. Note. Sample size: 47 general alumni networks.

5.4.3 GOALS

As stated above, it is possible for alumni networks to contribute to the retention of graduates and to (re)-attraction activities, even if these were not primary intentions. To discover to what extent retention and (re)-attraction activities were intentionally organized the web survey analysed mission statements and alumni network goals and tasks as formulated in the (web page) published information. In Fig. 5.4 the goals of the alumni networks were classified into four categories. From the survey it is clear that the networks have much broader goals than just keeping in touch with their alumni; they also require their contacts to serve a purpose. The acquisition of new students by alumni is an important goal. Alumni are potentially important promoters or ambassadors for universities and university home regions. Every contact made has the potential to lead resources to the universities. In the western European universities context, direct funding is less an issue than in the Anglo Saxon universities, although making contacts with industry could result in direct funding. Potentially recruiting university staff from alumni seems to be an important motivation for keeping alumni networks.

Maintaining contact can also mean promotion of the region by providing information on regional activities. The regional function means that through the networks' regional information and communication activities, alumni (including those abroad) are informed about regional news, events, economy structure, companies and job offers.

Figure 5.4: Percentage of the alumni networks that have the following general goals.

Source: David & Coenen, 2012, BRAND website survey. Note. Sample size: 47 general alumni networks.

The specific goal of gaining resources for the universities region was also examined. If alumni networks initiated exchanges, homecoming events or internships, they were seen to be bringing in knowledge from outside the region and it was said that they were contributing to a knowledge spillover effect. Remaining in close contact with graduates and alumni contributes to human capital and workforce in the university region and is seen by many alumni networks as a task. Remaining in contact can also mean promoting the region and providing information at regional activities.

Figure 5.5: Percentage of the alumni networks that have the following regional resource goals.

Source: David & Coenen, 2012, BRAND website survey. Note. Sample size: 47 general alumni networks.

Although the number of the sample divided over the five countries is too small, a closer look was taken at the elements of alumni network goals and these were compared between the different countries. Although the sample is too small, Figure 5.6 indicates that finding new students and staff is important for all universities, but there are differences in the importance of fundraising and region promotion. Fig. 5.7 shows that in terms of gaining resources for the region, the resource of human capital and knowledge spillover is found in all network goals but there is a big difference in the contribution to regional attractive in the written goals.

Figure 5.6: Percentage of the alumni networks that have the following categories of goals compared between the countries. Source: David & Coenen, 2012, BRAND website survey. Note. Sample size: 47 general alumni networks.

Figure 5.7: Percentage of the alumni networks that have the following categories of resource goals concerning regional resources compared between the countries. Source: David & Coenen, 2012, BRAND website survey, Note. Sample size: 47 general alumni networks.

5.5 CONCLUSION

The analyses of the present form and function of studied alumni networks brings it to the question; do the studied alumni networks fulfil the formulated conditions?

The answer to the first question, what is the relation between brain flows and alumni, shows that there is a close relation between brain flows and alumni. It was argued that alumni are more open to (re)-migration to their domestic regions or the regions of their study because of the “warm feeling” they might have about and the personal networks they share with the region. Especially non-core regions might benefit from such a bond. The second question asked for the conditions under which of alumni networks could contribute to the retention and (re)-attraction of alumni in a particular region. We suggest, that the first condition for an alumni network to contribute is to be a social network. Fulfilling the social network function implies that the network supports the social network exchange instead selling alumni services and even more important creates an exchanging, lively groups dynamic within the network. This groups exchange in the network should not be limited to a centralized exchange between the alumni network managers and the members, but should open the possibilities and platforms for the members to also exchange among each other. A further condition is that the alumni networks use their communication channels not only for university purposes, but also use them for the purpose of the region. And as a third condition the regional function means for the alumni network activities that these should focus e.g. on communication with alumni on regional job opportunities and on a welcoming culture for

graduates who stay and alumni that (re)-migrate. This needs specific network activities that bring the region and its opportunities under constant attention of alumni.

On the basis of the in-depth case studies and the sample of the web-based analysed alumni networks in the studied countries and regions, it can be concluded the following on the three-formulated conditions.

Condition one; are the analysed alumni networks social networks?

As mentioned above the pre-condition is that alumni networks are social networks based on social engagement that preserves the “warm feeling” that alumni have about their home or study region. A network build purely on providing services for the alumni would not fulfil such a social function. It is hard to judge from the web-based survey whether alumni networks really contribute to social engagement and maintain a “warm place” feeling. The in-depth case studies show that there are many different levels of personal engagement of alumni members in the network. The management and organizing capacity within the alumni networks, such as the number of employees and their full-time equivalence, is often low within the studied networks and the analysed alumni networks are often led by one part-time manager. This might also mean that there is limited time for the alumni network manager to coordinate and moderate the alumni network as a social network, although this gives no real indication that the members’ exchange is high or low and if the social network function is strong or weak.

Condition two; do the analysed alumni networks have the intention to use the alumni communication channels for the region?

The accomplished research shows that the alumni network goals of promoting the region or contributing to the development of the region comes in second place after the goals for the university itself. Regarding the results of the web-based survey as well as the in-depth case studies, there are just a few alumni networks, which co-operate with the region or regional partners. Mainly these networks are umbrella organisations or specific faculty alumni networks, which try to bind their best graduates to the regional labour market or to the university itself.

Condition three; do the analysed alumni networks actively pursue through activities in the network the retention or (re)-attraction of alumni?

The research shows that in so far there are activities of studied alumni networks in relation to retention and (re)-attraction, such as career information events, summer schools, home coming events and regional focus groups, many of the named activities are not carried out with the prime purpose of retention or (re)-attraction, but can be regarded as unintentional side-effects.

The present analysed alumni networks fulfil the conditions to support retention and (re)-attraction activities only partially. As lined out, our examples show that the alumni activities are mainly social networks exchange activities. The survey did find some examples of alumni networks, which use their communication channels and communication platform for activities that go beyond the social network function and the communication about the university activities, for instance regional job-related issues and information on developments in the region. Considering retention and (re)-attraction activities, there are some examples of alumni networks, which run relevant activities. But although the potential effects of these activities on retention and (re)-attraction are unintentional and not the main goal of these activities nonetheless it means for the studied regions that there is an untapped potential of the present alumni networks to play a larger role in the retention and (re)-attraction of highly skilled alumni. But looking at the present conditions in the studied alumni networks, they should be more professionalized in the sense of organizational structure (number of employees, board and full-time equivalence). Furthermore, it would need closer co-operation within the university and a collaboration of alumni networks with the university career centres, press offices and career counselling. In addition, the alumni networks themselves, if they take their potential retention and (re)-migration function serious, should open up to other regional stakeholders such as companies, chambers of commerce etc. And the alumni network activities should than take up retention and (re)-attraction as intentional effects of their activities.

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Further material the chapter refers to:

David, A., Rehfeld, D., Coenen, F., Kopper, J. Kullgren, I. (2013): Using Alumni Networks for Regions - BRAND. Border Region Alumni Network Development. Gelsenkirchen: Institute for

Work and Technology. Project Brochure.

David, A. (2013): Fachkräftesituation in Ostwestfalen-Lippe. Gelsenkirchen: Institute for Work and Technology. BUTTON – Towards tailored Policy Measures to Attract and Retain Highly Educated Workers. Pushing the Right Button. Project Deliverable.

Presentation by David, A., Coenen, F. (2013): The Usage of Existing Social Networks for Regional for Regional Concerns? The Case of Alumni Networks as Untapped Potential, 3rd ERSa International Workshop, 14th October 2013, Hochschule Niederrhein, Mönchengladbach.

David, A., Coenen, F. (2012): Alumni Networks - An Untapped Potential to Attract and Gain Brain? Interim Result of the BRAND Project, presented at the Regional Study Association European Conference 2012, 13th – 16th May 2012, Delft University of Technology, Delft.

PREFACE CHAPTER 6

That return migration can positively impact the regional development and regional knowledge base was already shown by concepts such as “New Nomads” (David et al., 2012), “New Argonauts” (Saxenian, 2007), or “Expatriates” (Israel, 2006). These groups are said to be beneficial in many ways. For instance, they bring in external knowledge to their domestic region in case of returning workers. Moreover, being still tied to the receiving region, return migrants often bring in activities by networking between their domestic and receiving regions and exchanging knowledge and information. In case of returning migrants who start a business, which is based on the mix of knowledge acquired abroad and the knowledge of their domestic region, they seem to be even more successful than old-established businesses. In that line chapter 5 explores the idea that incentives for the retention and (re)-attraction of highly skilled workers are immensely important. The idea of “warm city/place marking”, which is explained in chapter 5, shows that retention and (re)-attraction of brains is easier than new acquisition. This is due to the social (interpersonal) connections, which make the region of birth, study or work more familiar than regions without such ties to their expats. Thus, chapter 5 addresses the second and third pillar of the human capital agenda (section 2.4). Moreover, it presents a special kind of actor networks supporting the effort of highly skilled worker retention and (re)-attraction, namely (university or higher education) alumni networks. Alumni networks seem to be very strong, in line with the idea of setting incentives for the highly skilled to stay or return to their domestic region. They are social networks, which are practically from the first semester in touch with the students and future highly skilled graduates. Being part of the regional knowledge base, universities seem also to be a good instrument to provide highly skilled alumni with information on the region itself and its career possibilities.

Thus, chapter 5 can be considered as an intermediate step in the mobilisation of local regional potential and the attraction of external highly skilled workers, which is the centre of chapter 6. Chapter 6 refers to the four pillar of the human capital model, which is the attraction of external highly skilled workers. Section 2.3.3 of this thesis discusses the several factors needed to take into account, to become the “right place” for talented people. Therefore, migration theories are regarded in chapter 6 to understand the motives of migrants and to draw conclusions on how these can influence their destination country/region. As its core, chapter 6 considers the migration motives of highly skilled graduates, in order make regions understand what young highly skilled workers are inspired

by to migrate and how to set better incentives to gain them and bring them sustainably to the region.

CHAPTER 6: OPTING FOR MIGRATION: IS IT JUST AN ECONOMIC NECESSITY? – A COMPARISON BETWEEN GERMAN AND POLISH HIGHLY SKILLED GRADUATES^{*}

6.1 INTRODUCTION

6.1.1 PROBLEM DESCRIPTION

Humans have always been mobile and moved abroad searching for new opportunities and better lifestyles (Castles et al., 2014). In Europe especially, both human mobility and migration have a long tradition. Before the two World Wars, Europe was considered a continent of emigration rather than immigration. In the 1950s, a change in migration flows occurred. Europe was chosen by a large number of immigrants from former colonial states and became an immigration continent. Moreover, western European countries in particular, suffered a lack of workforce due to the fast growing economy after World War II. This fast development in the fields of economy, welfare, lifestyle, political and social security etc. (Gans et al., 2013) motivated further people to emigrate to and within Europe leading to a long-term chain migration. Since then, migrants have belonged to European life and its street scene (Yildiz, 2013). In the past few years, migration in Europe has increased again and has become an even stronger persistent factor of the European economy (OECD, 2013; OECD, 2014). Effects of the aforementioned financial and economic crises, internationalisation, as well as the promotion of free movement within the EU, have led to new migration patterns, pluralisation and globalisation of migration (Castles & Miller, 2009). The new migration patterns differ in several features from those previously, mostly in the time and the place dimension. Whereas in Europe between 1970 and 1990 people tended to be permanent or long-term migrants moving bilaterally between a domestic and receiving country, the later and current situation shows a tendency to temporary and circular migration (Nowicka, 2007). It seems as if permanent migration rebounds (OECD, 2014). In addition, it is observed that since the late 1990s, new forms of migration patterns have solidified. David et al. (2012) refer to these as "New Nomads" inspired by the concept of Saxenian's "New Argonauts" (2007). Usually this involves mostly highly skilled migrants. "New Nomads" stand out by choosing

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multiple destination countries, moving from one region to another within a certain period of time. They live transnationally (Pries, 2013) including undertaking return migration to their domestic region and emigrating anew (Klagge & Klein-Hitpaß, 2010). This underlines how, in addition to a transformed time and space dimension, there is also a change in the sort of people who are migrating (OECD, 2014). Although “new” migrants are better educated and more mobile than the previous generation, this does not mean that every case has a success story to offer. Even when there is a demand for educated people in several European countries, which is known as skills shortage, many migrants still do not have the adequate entrance requirements for the labour markets of the receiving countries. Moreover, they fight challenges of inclusion such as the recognition of their qualifications and/or language skills (OECD, 2014). In turn, even highly skilled migrants have to deal with uncertainties, which are increased by globalisation effects. This makes their migration choices harder rather than easier. As there is an increasing demand for highly skilled workers, it is of prime importance to know which motives drive highly skilled people to migrate. In knowing this, countries and regions can set incentives to influence migration choice and increase their attractiveness.

6.1.2 RELEVANT SCHOLARSHIP AND HYPOTHESES

The long tradition of migration has been captured in several studies. Among them are studies considering migration as an overall phenomenon (Castles et al., 2014; Bade, 2003; King, 1978), studies on the influence of return migration (Klagge & Klein-Hitpaß, 2010; Saxenian, 2007), studies on migration networks and chain migration (Haug, 2008; Faist, 2007; Pries, 2001), studies on the choice of migration (Haisch & Klöpper 2014; Haug, 2008) and/or migration processes (Massey et al., 1998; Lee, 1966). Further pillars of migration research are studies of highly skilled workers (David & Coenen, 2014; Salt, 2009) and their migration motives (Verwiebe et al., 2010). The research interest in this group has been mainly dealt with within the context of the brain drain/brain gain discussion (David & Coenen, 2014; Stockhorst, 2011). The concept behind this so-called brain flows discussion follows the presumption that highly skilled workers are drivers of regional innovation by influencing the regional knowledge base through individual skills and higher degrees (David & Coenen, 2014; David et al., 2012; Faggian & McCann 2009; Florida, 2008). They tend to have important impacts on knowledge creation and diffusion (OECD, 2008).

By following this theme, this chapter contributes to the acknowledgement of migration motives of young, highly skilled people. In this case, the chapter focuses on university graduates. The survey presented here follows the logic of studying prospective migration processes and their motives. Therefore, it is of a hypothetical nature, contrary to many other

surveys, which regard migration processes and their motives retrospectively. This survey aligns with other studies such as Vorwiebe et al. (2010), which also consider a planned migration process instead of one accomplished. This survey concentrates on university graduates from two cities, both located in Europe and characterized by migration: Rzeszów (Carpathian, Poland) and Bielefeld (East Westphalia, Germany). Initially, the study was motivated by the fact that migration between Poland and Germany has not decreased in the last decades, as once supposed. Even though Poland has been an EU member state since 2004, Polish people are still migrating in large numbers and make up the biggest group of all immigrants in Germany (OECD, 2014).

Following the argumentation above, the survey was driven by the following questions:

1. Have migration motives changed over the last decades regarding highly skilled graduates from Poland and Germany? The question was inspired by an assumption based on several migration theories (see chapter 2), which argue that migration is predominantly driven by economics. In this context, several studies refer to low-skill migration (Wagner et al., 2013). Due to current migrants' higher qualification levels, phenomena such as the Bologna Reform and the opening of borders and free movement of workers, the authors presumed a change in migration motives with movement away from solidly economically driven migration.
2. Do highly skilled migrants opt for new destination countries when searching for a job or do they follow a kind of path dependence in their choice of destination? The assumption was that historical migration roots/paths such as between Poland and Germany, changed in the course of globalisation and free movement within the EU and that new paths arose and influenced migration targets.
3. Last but not least, the question occurred, in the context of a job search, do highly skilled workers use informal networks within their own country and EU-wide? This question was asked against the background of the assumption that, in contrast to the past, (migration) social networks may no longer play an important role in job searching within a country and abroad, (Granovetter, 1995). This stemmed from the belief that global flows and the lower restrictions of movement make job searching easier within the EU and that highly skilled graduates are more independent and less reliant on networks.

6.2 THEORETICAL FRAMEWORK

6.2.1 MIGRATION – A REGULAR FLUENT PHENOMENON

It is differentiated between three levels of migration theories: macro-level, meso-level and micro-level (Mester, 2000). In the focus of many economic, geographical as well as sociological and anthropological migration theories the question of migration motives is raised on all these levels. Many scientists feel out the “why” of human migration. They also pose the question of why some population groups are more motivated to migrate than others. It is clear that migration is seldom an individual decision. In most cases, migration follows a chain process and is embedded in a broader social frame. Moreover, only in rare cases does migration mean a complete giving-up of domestic roots and full integration into the receiving country’s society. This is even more strongly determined by faster mobility possibilities, new technology and faster communication. Today migration goes hand in hand with transnational lifestyles and identities (Schmitz, 2013; Schmiz, 2011). Being regarded as a social and active action, migration is never stable. It follows manifold dynamics and mechanisms (Castles et al., 2014). Migration changes in terms of destinations, distances, duration, social circumstances and further factors. Difficulties can be exacerbated by complex global developments. Furthermore, access to education and information, to social capital and financial resources increases people’s aspirations to migrate (Castles et al., 2014). In comparison to former times, current migrants are freer in their choices. They do not have to depend on the second-hand experiences of close friends and family members, who were the pioneers of migration, but can also, inform those using e.g. further social networks.

As previously stated, migration is fluent. In other words, it shows some regularity, which cannot be completely examined and answered by one theoretical strand. There are theories which deal with different aspects of migration based on different assumptions. One theory may try to explain migration through economic factors only (the traditional view on migration), while another may place it under conditions of poverty and historical disequilibria of countries (Castles et al., 2014). Others look at migration from a social perspective which treats migrants as economic drivers and innovators. In order to approach the “why” question and to pursue the main aim of this survey, in which the migration motives of highly skilled graduates are traced, a reference to traditional migration theories is made in the following. Given the large number of migration theories, the present chapter refers to the main theories being in line with the accomplished survey.

6.2.2 MIGRATION – AN ACTIVE SOCIAL PERFORMANCE

The first migration theories were already being discussed in the late 1880s. For instance, Ravenstein (1889) considered migration as economically driven. Today, the known migration theories can be summarized into different categories. The first category of migration theories reflects migration as a rather passive, rational and calculated choice and process of an individual. The individual is mainly described as economically motivated, weighing up the pros and cons of migration on the basis of a clear financial benefit. Most of the economically driven theories refer to macro and meso-levels of migration research. They try to explain migration using external factors such as regional disequilibria in relation to economy, labour, wages, governments, poverty etc. (Castles et al., 2014). Following this argumentation, it was Lee (1966), who argued that migration decisions are determined by “plus” and “minus” factors in the domestic and the receiving countries (Castles et al., 2014). Through this, Lee developed the push-pull model of migration, which is still of importance. With regard to migration of highly skilled workers, the push-pull model is explained by Hunger (2003) as follows: the push-pull approaches of migration research are a first path to analyse the complex phenomenon of highly qualified migration. Push and pull factors mainly are analysed from a macro-theoretical point of view taking into consideration structural factors. Kalter (2000) takes up the position that the “push-pull paradigm” is not an independent theoretical model. In his view, it is rather a conviction that in the place of origin “repulsive” and in the destination place “attractive” conditions dominate. Moreover, the “push-pull model” was often criticised for its broad list of pushing and pulling factors in one country such as wages, labour markets, climate, political and social situation etc. Today, research shows that these are factors named on the macro, and in best case the meso-level. There are certainly a high number of personal reasons, which constitute a migration decision.

The functionalistic and neoclassical theories consider migration as a development process, by which the overflow of human capital (mainly) in the rural sector provides urban industrial areas with workforce (Lewis, 1954). Similar to the “push-pull model”, it is the difference between the low-wage, labour-surplus regions, which encourage workers to move to high-wage, labour-scarce regions (Castles et al., 2014). At micro-level, neoclassical theories regard migrants as rational actors, who make decisions on the basis of a cost-benefit calculation. At macro-level, these theories view migration as a process in optimising the allocation of migration factors (Castles et al. 2014: 30). In 1962 Sjaastad saw migration as an investment in increasing regional human capital, which he regarded as individual knowledge and skills. People invest in migration as in e.g. education. The better migrants’ individual

skills are, the more migration benefits. Bauer and Zimmermann cite that the “[d]ifferences in such expected “returns on investments” can partly explain why the young and the higher-skilled tend to migrate more” (1998: 99 in e.g. Castles et al., 2014). The main criticism of these theories is that migrants are regarded as independent entities without social networks which had provided them with further motivation to make a migration decision. Furthermore, factors such as age, gender, knowledge, perceptions and attitudes to the outside world are not taken into close consideration. Thus, the exogenous factors play a bigger role than the endogenous.

Since the 1970s, historical-structural theories, including that developed by Massey et al. (1998), characterise migration by the many manifestations of capitalist penetration and the inequality of trade between developed and underdeveloped countries. Castles et al. (2014) state that the main difference between neoclassical and historical-structural migration theories is, that while the first regard migration as a voluntary process, the latter describe migration as a large-scale recruitment of workforce. In other words, the historical-structural theories argue that people are forced to migrate by outward traditional disequilibrium. The initial point of these theories sees an unequal distribution among countries and restrictions in the entrance of people to different sources such as education, labour markets etc. (Castles et al., 2014). Following this argumentation, the globalisation theory, developed in the 1990s, also considers migration as broader interconnection between societies, including all possible cross-border flows such as financial, human resources, knowledge etc. The effects of globalisation are heterogeneous. On the one hand, globalisation means the approach of various regions and cultures and their inclusion. On the other hand, globalisation means a greater exclusion of certain social groups by the restructuring of economies, which in some regions results in a lack of working possibilities thereby fostering migration. These theories provide a view of migrants as victims of globalisation and migration (Castles et al., 2014). All these theories, which mostly consider the macro and meso-level of migration, seem to be too narrow to understand migration motivation. They concentrate too much on political, environmental and predominantly, economic structures and too little on humans as migration actors.

A further category defines migration choice as a much broader action which takes place in social frames built up by families, friends, and colleagues and other significant actors such as pioneer migrants. In addition, it regards migrants not as victims of a system or injustice, but rather as social actors taking an active part in the decision-making towards a migration performance. This includes the idea that migration is a choice not taken by an individual in isolation but by an individual integrated into a social structure and at the same time building

new social structures or even social capital. In following this idea, the household approach, the migration network theory, transnationalism (Pries, 2013) and the diaspora theories (Charim & Auer Borea, 2012) can be listed. The household theory for instance, provides insight into how migrants actively try to use a migration process to overcome structural changes and social exclusion in their domestic countries. In many cases, a family chooses to support one of its members in migration to increase the income and status of the whole family in the domestic country by e.g. remittances. This often helps to overcome crises in the homeland (Massey et al., 1987). The migration network theory pushes social networks into the spotlight and explains how migrants build social ties (Granovetter, 1973) using them later for further migration processes, which can be seen as a path dependence (Pries, 2001a). Such networks even create social, financial and human capital for both the domestic and receiving country by helping further recruitment of (in our case) a highly skilled workforce. The effects of expanding globalisation, which go hand in hand with increasingly fast flows of finances, knowledge, movement, technology etc. and based on the migration network theory, transnationalism (Pries, 2013) and diaspora (Charim & Auer Borea, 2012) theories have occurred. In contrast to migration networks, transnational networks are often long-distance connections improved by new and faster technology development. Furthermore, transnational networks are not only social ties between the domestic and receiving country, but may emerge between several receiving countries. “New Nomads” for instance, are highly skilled and move between several receiving countries in their work context creating social ties. Transnational networks are often economically oriented. Knowledge and financial flows can be well-organised in such networks. Transnational migrants often develop a multilayer identity by operating in several countries at the same time and being a node in a transnational network connecting various actors. Diaspora can be outlined in a similar way. In the past diaspora was used in a new context of migration (Charim & Auer Borea, 2012) and was closely related to migrants who involuntarily and under force, or as refugees, left their domestic countries. Today it participates even more in the identity formation of migrants (Castles et al., 2014). All these theories take into consideration the meso-level of migration and bring a close understanding of how social frames and contexts should be necessarily a part of the consideration of a migration process.

These and further migration theories contribute significantly to the “why” of migration. They provide insights at both macro and meso-levels by explaining the political, governmental, global and social circumstances of migration. The different theories lead to different views and ideas on migration. Not all can be bound to one overall theory. A main point of this chapter is to contribute to the micro-level of migration by interviewing highly skilled

graduates. The results of the survey presented here will later be set into a broader context of migration processes while taking into consideration macro and meso-levels.

6.3 METHOD

6.3.1 INTRODUCTION TO THE SURVEY

Labour migration involves two main categories of migrants:

1. The first category mainly comprises low-skilled workers (wageworkers, workers and job seekers), i.e. the most vulnerable people with regard to poverty and those who have the most difficulties in finding jobs. This refers particularly to people who have completed vocational training and are employed in low-qualified and low-paid work with benefits rarely provided, or unwillingly provided, by the local labour force. They compete for work with the residents of the respective country or with new migrants from their home country or other countries of emigration. With a view to migration flows in Europe from industrialisation up until the 1990s, it was mainly low-qualified migrants who decided to emigrate because of the economic situation in their home countries as well as structural compulsions.
2. The second group of migrant workers comprises well-qualified or highly skilled people (mostly university graduates), including people with entrepreneurial spirit and high self-esteem. This group also includes frustrated and disappointed highly qualified workers who move abroad because of non-existing job or career opportunities at home. Often their movement is effected by a hope of more challenging or better paid employment. They are characterised in many cases by having a great interest in professional development (Barwińska-Małajowicz, 2011). The “[...] increasing levels of education and occupational specialisation generate migration of people who seek to match their particular skills and preferences to particular jobs.” (Castles et al., 2014: 50).

Why the interest in the migration of highly skilled between Poland and Germany? In recent years, the migration of (highly) skilled-workers has become a matter of intense discussion. Highly skilled workers aged 25-29 have been over represented since 2004 and subsequent years in migration processes between Poland and Germany (Kaczmarczyk, 2008). Currently, an increasing number of students opt for studies abroad and search for an entry into professional careers in their destination country. The issue of highly skilled migration is becoming more popular due to the current economic and financial crisis. This is reflected in high unemployment rates and growing youth unemployment in several parts of Europe

(Spain, France, Italy, Poland, Romania etc.). Secondly, highly skilled migration is at the fore of discussions about skills shortages in Europe. Despite high unemployment rates, some European labour markets are characterised by a simultaneous shortage of skilled workforce and highly skilled workers. Both phenomena evoked a paradigm shift in the assessment of human labour, which has been determined by shortages in human resources (HR) and in workplace relocation in low-wage countries. Today, human capital comes more to the fore and again is given high priority in discussions regarding regional innovation systems and their knowledge base. Many regions are in international competition concerning “the smartest brains”. Therefore, the exchange of a (highly-) qualified workforce is becoming more important for economic development. Hunger (2003) argues that knowledge becomes an engine of growth for economies and so demand for mobile and well-skilled workforces rises at international level. The management of cultural diversity can be an innovation potential for modern immigration societies. Furthermore, authors such as Faggian and McCann (2009) point out the need for external knowledge for regional knowledge bases and ensuing innovation systems. It is not only regionally generated and anchored knowledge which plays an important part in innovation systems, but also new external knowledge. Knowledge exchange between regions and systems can evoke innovations. In this process, mobile highly skilled workers are considered as a possible source (pipeline) (Bathel et al., 2004) able to transport knowledge between regions and lead to an inter-regional knowledge exchange. In this context, authors like Klagge and Klein-Hitpaß (2010) and Saxenian (2007) pointed out in several studies on return migration how knowledge of the origin region alongside newly gained knowledge in the destination region can merge into innovative ideas thus leading to a positive boost of regional economy after their return. Competition for specific knowledge, which is generated or transported by highly skilled workers, has been known in the literature for some time as the so-called “brain gain”, “brain drain” or “brain circulation” concepts. Because of this, countries or regions promote the soft (culture and education) and hard (good infrastructure, jobs and workplaces) factors of location and attractiveness which are of benefit to well-qualified people, highly skilled and skilled workers with the intention of persuading them to take part in inter-regional and international migration. In this way, they are using many measures and instruments to attract human capital. In this context, the findings of the study presented here and accomplished at micro-level, also contribute to regional attraction policy in that they present the possible motives of graduates and their real interest in migration.

6.3.2 RESEARCH DESIGN

The survey presented here deals with possible motives for migration, which favour labour driven migration. The views presented are those of a group of highly skilled university graduates. The survey's empirical material is based on a standardised qualitative questionnaire distributed to Polish and German students shortly before their graduation as well as to graduates from public universities in two partner cities, (Rzeszów, Poland and Bielefeld, Germany). The aim of the questionnaire was to find out how, based on the graduates' prospects, personal motives led to labour driven migration. The survey was conducted with university graduates, as well as students in their final semester in various disciplines, at the University of Bielefeld, the Bielefeld University of Applied Sciences, the University of Rzeszów and the Rzeszów Technical University of Applied Sciences. A total of 439 participants from Bielefeld (Germany) and 402 from Rzeszów (Poland) took part in the survey. The groups of respondents were addressed with identical questionnaires, which primarily dealt with possible migration motives based on previous literature analysis. Thus, the majority of possible answers were given. In another part of the survey, the preferred destination countries of potential emigrants (in the case of possible migration) were asked for. A further important requirement was to obtain insights into the question of which form of recruitment graduates wishing to migrate would choose. Would they prefer to use informal national networks or EU wide networks? This question was to examine the idea of whether social networks are still of importance to those planning migration and whether they are linked to job searches.

6.4 RESULTS

The main question of the survey addressed possible circumstances as well as the motivation for international labour migration. The group of graduates and final semester students answered this question. Every response option was evaluated in the categories "yes" or "no". The distribution of Bielefeld graduate responds shows the following picture: the achievement of a higher salary outside of Germany was named as one of the most irrelevant reasons for labour migration among the available response options (even though this reason was significant for more than the half). As motivators for labour related international emigration the following answers were chosen very often:

The perspective of the acquisition or better command of the target country's language (74%), the possibility of better professional development abroad (73%), the possibility of a common movement abroad with family (72%), a lack of alternative income source options at home

(71%) (cf. figure 6.1). The majority of Rzeszów interviewees (72%), when answering the same question, stated that they would emigrate if conditions allowed them learn the destination country's language. This leads to the hypothesis that young, educated people strive for further and new intellectual development and are willing to advance their learning as well as deepening their knowledge of foreign languages. It is striking that for less than half of the interviewees (47%), a lack of alternative possibilities for taking care of their own subsistence was named as a motivational circumstance or factor. This distribution of responses can serve as a base material for carrying out more in-depth research in the analysed field. Moreover, the distribution of answers reveals the importance of a higher salary in the target country than in the home country (60% of interviewees). Other important factors are: the opportunity to move abroad with the family (63%), the perspective of better professional development abroad than in the home country (62%) and equal rights for native citizens and immigrants (61%) (cf. figure 6.1)

Figure 6.1: Circumstances that influence decisions about labour-related emigration in Bielefeld (GER). Source: David & Barwińska-Małajowicz, 2010. Sample size: 439 graduates.

Figure 6.2: Circumstances that influence decisions about labour-related emigration in Rzeszów (PL). Source: David & Barwińska-Małajowicz, 2010. Sample size: 402 graduates.

A - I see no other way to earn money, B - I would earn more money abroad, C - I could speak/learn a foreign language D - My family is moving abroad as well, E - I would have equal rights, as citizens of the country, F - I would have better career development chances and career opportunities than in the home country

Figure 6.3: Stated direction of labour emigration from Bielefeld (GER). Source: David & Barwińska Małajowicz, 2010. Sample size: 439 graduates.

The survey also included the question: In which countries would you search for work? Here, the distribution of answers shows that the greater number of interviewed Bielefeld graduates would first look for employment in their home country (16%), followed by Great Britain (14%), the United States of America (13%), the Netherlands (5%) as well as France, Switzerland and Australia (each 4%). Characteristic for this survey group were also responses without specifying a precise emigration place or destination, e.g. "Europe" (6%), "everywhere" (3%) (cf. figure 6.3). The majority of the interviewed graduation groups from Rzeszów planned in a similar way by searching in their homeland of Poland first (15%). The following countries were also named as emigration destinations: Germany (13%), USA (10%), Great Britain and Ireland (each 8%) and France and Norway (each 7%) (cf. figure 6.4). Among other countries the Netherlands, Spain, Finland and Belgium were named most often. It is noteworthy that, despite the financial crisis, each tenth interviewee would be willing to search for work in the USA. It can be assumed that this refers to the long-lasting tradition of labour emigration from the Carpathian area, where Rzeszów is located (Iglicka, 2008) to the United States of

America and the associated origin of further migration networks coming from the Subcarpathian Voivodeship.

Figure 6.4: Stated direction of labour emigration from Rzeszów (PL). Source: David & Barwińska Małajowicz, 2010. Sample size: 402 graduates.

GER–Germany, UK–Great Britain, NL–the Netherlands, F–France, CH–Switzerland, AUS–Australia, AMZ–Central America, EUR–Europe, IR–Ireland, N–Norway, USA–United States of America

The last important question in this context was whether the study participants would use informal social networks to help them find a job. The following question was asked: Would you use national or Europe-wide informal networks to find a job? Over 60% of the total interviewees underlined the importance of using both national and EU wide informal networks possibilities when searching for jobs. This implies that social informal networks still play an important role in searching for jobs at home or abroad.

Figure 6.5: Use national or European wide informal networks to find a job. Source: David & Barwińska-Małałowicz, 2010. Sample size: 841 graduates.

6.5 DISCUSSION

The results of the present survey provide insights into the cause and motive research of high skills migration in both partner cities Bielefeld (Germany) and Rzeszów (Poland). These will be discussed in the following:

Taking into consideration the first question *Have migration motives changed, especially in the case of highly skilled workers, and does migration remain largely driven by economics?*, the survey showed a differentiated picture.

Pallaske's (2001b, 2001c) study of labour migration among low-skilled workers found that a lack of perspective in migrants' home countries was the main motive for leaving. However, in this study, it was found that a lack of perspective was not a reason for highly skilled workers to want to emigrate. The results do not match with the respondents from Bielefeld, which is perhaps understandable due to Germany's solid economic situation, nor surprisingly, did they match with the Polish graduates from Rzeszów. At first glance, this outcome could possess a key differentiator of the former, purely economically motivated migration patterns of low-skilled workers (Pallaske, 2001c). Kaczmarczyk (2008) attempts to explain the phenomenon by arguing that, although many Poles still see few perspectives in their home country, they do not see this as a radical fact. Compared to the past, they now see temporary labour migration, which lasts several weeks or months, as a fast solution and do not take permanent emigration into account anymore. However, the survey also illustrates that although the perspective of employment abroad does not initially reflect an increased motivation towards migration among Polish graduates, higher salaries abroad in comparison to Poland continue to be highly motivating. This is also stressed by Kaczmarczyk (2007),

who sees it as the main motivation for a change from permanent to temporary migration. He names salaries and the cost of living differences between the home and the destination country, which are advantageous for migrants who earn money abroad and send it home. Their families stay in the home country and the emigrant returns home after a short period of being abroad. Kaczmarczyk (2007) cites the ease of transport and communication channels and open borders within Europe, the move towards commuting migration (circulating migration) and temporary work extensions, as the Polish trend of unemployment export. The responses of the graduates of both countries clearly show that the demands for migration, and therefore on the destination country and region, have changed. A stay in a foreign country does not seem to serve the purposes of a single economic acquisition anymore; moreover, the opportunity to acquire another language is becoming more important. This could possibly be another differentiator to previous migration patterns. It also confirms the global development and economically motivated competition, which nowadays requires an international orientation of a highly skilled workforce. This is reflected by being competent and fluent in many languages. But is migration really no longer being seen as just an economic necessity? Taking a closer look at the motives, which are mainly a chance for professional development in the sense of lifelong learning, it could be assumed that today's highly skilled workers are not economically driven in their migration choice. This closer examination has allowed the authors to form the opinion that the migration of highly skilled workers is still a matter of economics. The identified answer does not exactly point to economic motivation, but motives such as the acquisition of foreign languages, obtaining citizens' rights in a foreign country and having better career opportunities imply a motivation driven by economics. Acquisition of new skills and the internationalization and transnationalisation of personality are often concomitant with hopes for an improved individual economic standard. In a global world, where the highly skilled are seen as drivers of knowledge creation and innovation and as representatives of international spirit and openness, the knowledge of many cultures and foreign languages offer myriad international opportunities for young, skilled people to earn "good" money and attain high positions in the labour market. In summarising, it seems as if the "new" motives for migration are not new at all. Rather, they are economically driven motives placed under a new spotlight.

With regard to the second question *Do highly skilled migrants choose new emigration destinations first or do they still use historical pathways to find jobs?*, the following picture emerged:

The survey shows that graduates from Bielefeld and Rzeszów tend to choose their domestic country first in their search for jobs. A survey undertaken by the Institute for Work and

Technology (IAT) on “MINT” graduates in North-Rhine Westphalia (NRW) (Leisering & Rolff, 2012) pointed out that their place of study or place of birth held the highest attraction for graduates and that this also applied to future job searches and ideas for shaping their lives. The survey results, and of further studies, refers to the fact that highly skilled workers are not as mobile as had been previously assumed. This reduces countries’ and regions’ recruitment opportunities of (highly)-skilled workforces. In taking further answers from the Bielefeld graduates into consideration, it is clear that they favour the UK and USA as prime emigration destinations when looking for jobs. Both countries are English-speaking and as almost all graduates in Germany possess a good command of English, they feel more secure choosing a destination country with a language they already know. In addition, the USA has a long German emigration tradition being perceived by Germans as the most innovative country (e.g. Silicon Valley). Working in the USA is highly regarded and with its research and technology-driven communities, is seen as the prime place to learn and to develop an innovative and entrepreneurial spirit. Looking at the answers given by Polish graduates from Rzeszów, Germany and the USA are named as the most favourable countries for emigration and finding jobs. We know from the migration literature that the Carpathian Voivodeship has a long history of migration to the USA which originates from before the Polish Transformation. Only people from a few Polish regions, such as Masuria and Silesia, were accepted in Germany becoming known as re-settlers. Therefore, the only way for people from other Polish regions to escape the regime was to choose non-European destinations. The survey presents possible indicators of old migration networks from Rzeszów to the USA. An explanation for Germany being listed as the second most favoured destination for emigrants might be found in the new migration patterns. The chapter discusses how circular and short-term migration appears to be a better option for several of the highly skilled migrants to earn money. Germany is seen to have a stable economy and shares a border with Poland leading to the assumption that migrants willingly choose Germany as a destination for migration. It is the short distance between the two countries, which encourages the circular migration of highly skilled migrants.

Answering the questions step-by-step leads us to the last one on the usage of informal networks within migrants’ home countries, or within Europe, in terms of searching for jobs.

Both Bielefeld and Rzeszów graduates stated that informal (migration) social networks are still important in searching for jobs. The broad literature on (migration) networks (David & Coenen 2014; Pries, 2001) shows that formal, and especially informal, networks still are of immense importance. In the case of labour migration they can function as a door opener in the receiving countries. With regard to highly skilled workers, networks are not only family

and friends-related. In many cases it is business networks which provide individuals with job offers in destination countries.

6.6 CONCLUSION

To be competitive in the global economic process Europe needs to tackle several challenges simultaneously. On the one hand, there is the high level of youth unemployment resulting in missing perspectives for an entire generation and on the other hand, there is the search for an appropriately (highly)-skilled workforce. These challenges need to be addressed not only because of the financial and economic crises but also because of phenomena such as demographic change. It is human capital, anchored in university graduates, that represents the knowledge base, and thus the competitiveness, of a region and a country. This knowledge, held by university graduates, is what regional economies need to look for. Due to freedom of workers' movement and the opening of borders, flexible and highly skilled workers exist who are ready to take their chances in those places which offer them the most to enhance their future careers. This chapter deals with questions about the motivation of graduates in the cities of Bielefeld (Germany) and Rzeszów (Poland) in relation to international labour migration. The results of the study indicate that migration motives could have changed within recent years, and that there are differences between low-skilled and highly skilled workers. Today's labour migration of graduates still seems to be motivated by socio-economic reasons, but also asks for professional and personal advancement in terms of lifelong learning. The influences of globalisation are becoming more obvious through the orientation and pursuit of international standards (the learning of foreign languages indicates such a development). The German-Polish comparison also points out that the mismatch between salaries in east and west is still a push-factor for Polish labour migration. Nevertheless, it can be stated that young, educated people also search for new careers abroad and are not only driven by economic factors. The present study also raises several questions that require further research. It would make sense to compare current migration motives, which have been increased by the crisis, with the migration motives of graduates in the past. Also, further differences between the motivation of low-skilled and highly skilled workforces could be analysed. From a regional perspective, the results should be examined in depth because regions are seeking suitable workforces. If more in-depth knowledge of the migration motives of highly skilled labour migrants was available, current regional information could be tailored to the attracted target groups. This is important because knowledge of the individual motives of highly skilled workers would allow countries and regions to put incentives in place to attract the workers they want and need, e.g. faster recognition of

qualifications, good job opportunities and an open international environment brought about by a positive and welcoming culture.

As the study shows, the fact that networks still play an important role in job searching and the migration process, could also be used by countries and regions as an attraction factor. Regional migration-related networks such as diaspora, alumni networks (networks for highly skilled graduates), company networks etc. could be instrumentalised for the recruitment of new skilled workforces from abroad. In following this theme, the study contributes with first insights into a broad and future-oriented topic. It completes with its micro-level in contrast to the aforementioned macro and meso-level theories and by doing so, the present survey is a step further towards a better understanding of migration.

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The investigations were carried out in co-operation with A. Barwińska-Małajowicz in the academic year 2008/2009 and were continued in 2009/2010. Respondents included students nearing the end of their university studies and public universities graduates in the partner cities of Rzeszów (Poland) and Bielefeld (Germany). A query served as a source of information in which the survey types: closed, half-open, open and conjunctive were used. The questionnaire was divided in nine chapters and included 42 questions.

Further material the chapter refers to:

Presentation by David, A., Barwińska-Małajowicz, A. (2013): Motive internationaler Arbeitsmigration von jungen Hochqualifizierten in Polen und Deutschland: Auf der Suche nach besseren Berufschancen oder eine sozio-ökonomische Notwendigkeit zur Emigration?, 6th Summer Conference in Regional Studies, Gesellschaft für Regionalforschung, 28th June 2013, Institut für Arbeitsmedizin und Berufsforschung; Technische Universität Dortmund.

PREFACE CHAPTER 7

In chapter 6 the reader gained insights into the migration motives of highly skilled graduates in two German and Polish cities, in order to set up better attraction incentives for these target group in future. The results in chapter 7 indicate that the migration motives of highly skilled graduates are still mainly driven by socio-economic reasons. But several differences in highly skilled migration motives are also identified. Today's highly skilled graduates seem also to be interested in personal advancement in their professions in terms of LLL. This means that highly skilled young people not only search for better earning potential abroad, but for self-development and challenging career opportunities. This goes hand-in-hand with the phenomena described in section 2.3.3, which specify that regional attraction is much more than popular architecture in metropolitan areas or well-developed high culture (leisure) activities. It is more about framework conditions such as job opportunities, working cultures, knowledge bases etc. Likewise, chapter 6 discusses the role of actor networks and migration networks in planning and accomplishing a migration process. Here, transnational migration networks or diaspora are taken into account as co-creators and co-producers of strategies for the attraction of external highly skilled workers.

How important regional framework conditions are for the creation and implementation of a human capital agenda is shown in chapter 7, which addresses the regional governance structure (see human capital model) and the second pillar of retention of highly skilled workers in the region. Using the example of engineers, chapter 7 investigates the shortages of and demand for engineers in the transport and mobility sector. In doing so, it provides information on companies' demands and future development in the field of human capital. In addition, chapter 7 emphasises the importance of regional actor co-operation, such as university-industry relations, or cluster initiatives, as supportive of actor networks for highly skilled worker recruitment (in this case engineers). It emphasises that actor networks, such as those named, are more flexible and rapid to respond to companies' demands and global challenges. The chapter again illustrates the bottom-up human capital strategies that can be set up, when top-down policies are not available on time and in place.

CHAPTER 7: REGIONAL FRAMEWORK CONDITIONS FOR FUTURE CAREERS RELATED TO TRANSPORT AND MOBILITY^{*}

7.1 INTRODUCTION

7.1.1 PROBLEM DESCRIPTION

The world is becoming increasingly mobile. Urban sprawl to outer cities and density of inner cities generate steadily rising commuting needs. As a consequence road traffic significantly increased, posing serious problems particularly for larger cities and urban agglomerations. Rising greenhouse gas and noise emissions, congestion and air pollution are just a few examples. In response to these challenges, new (alternative) transport and mobility solutions gained in importance in order to ensure quality of life in cities' and citizens wellbeing. The electrification of transport is put forward as promising approach to tackle these challenges. And although the market potential is considered to be enormous, much needs to be done to accelerate the uptake of new transport and mobility solutions: An appropriate regional infrastructure for hybrid and electric vehicles must be ensured (e.g. charging stations). Concepts need to be developed which address the daily use of electric vehicles, including intelligent vehicle use and intermodal transport concepts. Related solutions with their distinct technical approach go hand in hand with social change in terms of altered mobility behaviour. Being aware of the complexity such shifts pose, electric mobility necessitates the integration of distinct technologies and fields of knowledge across sectors (e.g. automotive, ICT and green energy).

Moreover, electric mobility marks a decisive turning point for employees in the automotive sector, and engineers in particular. The emergence of new qualifications as well as changes in qualification profiles, e.g. from metal skills to mechatronics and a move from electrical skills to electronics become apparent. These changes, in combination with the ever increasing complexity of production processes, e.g. in the field of assembly processes,

^{*} The current chapter is based on the article: David, A., Terstriep, J. (2015): Regional Framework Conditions for Future Careers Related to Transport and Mobility. *In: Journal of Strategy and Management*, Special Issue: Green and Sustainable Innovations in Smart Cities: Business Models and Ecosystems, 8(3), 211-230.

require not only new forms of work organisation and process skills, but also cross-sectorial and more specific knowledge of highly skilled workers. At first glance, the demand for highly skilled workers seems to relate to the production of batteries, electric motors, power electronics and fuel cells. However, taking a closer look at the cross-sectorial nature of electric mobility it reveals a demand along the entire value chain, from production to recycling. Next, areas such as research and development, project management and further service-oriented fields of work are concerned (Dispan, 2013). Regions with a long automotive tradition regard the current skills shortage as an obstacle to new technologies and processes, which in turn limits companies' innovation capacities and the further development of new transport and mobility concepts. Following these lines of thought, one of the main challenges for innovative business models will be a strategic orientation which includes investments in employees' future careers and qualifications to sustain competitiveness through innovation.

This chapter examines the demand for qualification shifts and their motives in the fields of transport and mobility. In other words, what engineering skills do companies in the electric mobility sector currently lack? In addition, it is explored what the major recruitment procedures are, including their geographic scope. Arguing that collaboration in regional networks such as clusters, facilitate enlarging regional stocks of highly skilled workers, this study explores their impact on engineers' recruitment. These research questions are empirically addressed by analysing data collected through a company survey with the support of the FP7 project "ELMO^s – Electromobility Solutions for Cities and Regions". This survey complements existing studies on secondary education (cf. Dispan, 2013), and extends these with insights on tertiary education in the future transport and mobility sector.

7.2 CONCEPTUAL UNDERPINNING

7.2.1 SHIFTS IN DEMANDS FOR EMPLOYEE COMPETENCES

From a global perspective, there is an increasing demand for a highly skilled and qualified workforce in many sectors across Europe. This is due to the growing requirements of new technologies, which strongly rely on knowledge generation, exploitation and exchange (Malecki, 2010). This development can be attributed to the move from industrial-based to knowledge-based economies. Hereby, knowledge is said to be the key source of innovative ideas (David et al., 2012; Malecki, 2010; Strambach, 2008; Stehr, 1994). The knowledge-based economy is obviously marked by the term knowledge, which is more than the gathering of information (David & Foray, 2003; Brint, 2001; Bell, 1976; Drucker, 1969).

Knowledge, as defined by David and Foray (2003), empowers its possessors with the capacity for intellectual or physical action. Whereas information shapes the structured and formatted data that remain passive and inert until used by those with the knowledge needed to interpret and process them. Knowledge has been identified as the key driving force for innovative actions (Butzin, 2000; Cooke, 1996) and highly skilled workforce, as carrier of those (Faggian & McCann, 2009; Growe, 2009; Trippl & Maier, 2007; Asheim & Coenen, 2006; Brint, 2001). Especially in times of the industrial-based society - as the “traditional” industries were often run by low-skilled labour - employee competences were seen as decoupled from knowledge and any qualification levels. With the shift to the knowledge-based economy, a shift in the perception of human capital emerged and changed the view on specific qualifications and degrees.

Several factors are regarded as key drivers in the development towards the knowledge-based economy: Economies in developed countries have mainly been driven by new technologies based on knowledge, which in turn facilitated the emergence of new knowledge-based sectors (Powell & Snellman, 2004). In addition, new information and communication technologies strongly influenced the societal and economic development (Lehner, 2005). Moreover, increased global competition forced companies to open up and change innovation, production and service processes. Through the opening of the world's markets companies lost their unique selling position at domestic sales markets and were forced to enter into global competition. In this vein, Powell and Snellman (2004: 213) argue, that several technical innovations require workers with complementary skills and knowledge of new technologies - a fact leading to the increase in demand for highly skilled workers. Additionally, the old way of knowledge generation (mode 1), which was closely connected to scientists, has been expanded to mode 2 (Etzkowitz & Leydesdorff, 2000; Gibbons et al., 1994). Mode 2 of knowledge generation means that several actors and not solely universities co-operate in terms of innovation (Leydesdorff, 2006). Consequently, the role of new groups of innovators such as the public and the individual gained in importance.

Another essential aspect is the strong division of labour within and across companies' boundaries, for which specific skills and knowledge are required. Foremost knowledge-based sectors - such as electric mobility - rely on highly skilled workers, which response to the companies' demands with different types of knowledge (Faggian & McCann, 2009; Trippl & Maier, 2007). Although human resources are “[...] a primary repository of both codified and tacit knowledge”, its strategic potential is grounded in embedding this knowledge “[...] in firms' routines, human skills, and relationships” (Hatch & Dyer, 2004: 1158). Further typologies of knowledge are provided in the literature, e.g. “know-how”, “know-what”, “know-

why” and “know-who” (Stockhorst, 2011; Lundvall, 2004). These are important for the technical development and innovation in certain production areas. Alongside, it is distinguished between “analytical”, “synthetic” and “symbolic” knowledge, which in accordance to sectors’ specialisation (e.g. industrial settings), however, make up the sectorial knowledge base (Asheim & Gertler, 2005). Following this line of argumentation, the success of regional innovation activity does not solely depend on the availability of knowledge, but on its exploration and exploitation (Al-Laham, 2011; Grant & Baden-Fuller, 2004; Nonaka & Takeuchi, 1997; Lundvall & Borrás, 1998). In these efforts, varieties of knowledge and the dynamic interplay and transformation of tacit and codified knowledge play a crucial role (Asheim & Gertler, 2005). For this reason a dense interaction of individuals with different knowledge bases is indispensable. The authors continue that these varieties of knowledge strongly shape a specific knowledge base of companies (Asheim & Gertler, 2005: 295), which can be then seen as a competitive advantage. The broader a knowledge base is (in the sense of knowledge varieties), the better companies can absorb new incoming external knowledge (David et al., 2012; Caragliu & Nijkamp, 2008). The continuous inflow of external knowledge is emphasised as an essential precondition for regions’ and companies’ competitiveness and economic growth (Malmberg & Powell, 2005). Likewise, the purposively management of knowledge flows across companies’ boundaries is of crucial importance (Chesbrough & Bogers, 2014).

Thus, highly and well-skilled workers are regarded as the carriers of knowledge or knowledge holders (Grove, 2009; Tripl & Maier, 2007). In addition to knowledge generation, they also have the capacities to absorb, transfer and exploit external knowledge. So-called knowledge spillover – i.e. knowledge transfer through interactions – occurs across sectors and regions as well as internationally, and is facilitated by workers’ mobility (Boshuizen, 2009; Beaudry & Schiffauerova, 2009; Saxenian, 2007; Audretsch & Feldman, 2004). Following Bathel et al. (2004) highly skilled workers facilitate local buzz (i.e. the circulation of knowledge within a network, cluster or organisation) and global pipelines (i.e. knowledge interactions with the ‘external’ world). The increasing importance of (highly) skilled workers, suggests the following hypothesis:

H1. Firms’ future competitiveness is closely linked to their capacity to assure a stock of engineers with adequate qualifications and competences.

7.2.2 REQUIRED COMPETENCES IN THE FUTURE TRANSPORT AND MOBILITY SECTOR

The electrification of mobility cannot be analysed by simply looking at cars and their production. It implies a broader understanding of all interconnected sectors and fields of knowledge. The proportion of electric vehicles continues to increase. Presently, the automotive industry predicts that in 2025 electrically chargeable vehicles will make up 2% to 8% of the European market, depending on how quickly the various technological, infrastructural and socio-economic challenges can be addressed (Terstriep et al., 2014). It also depends on the workforces involved in this undertaking. As Dispan (2013) describes in his study, there is a shift in the demands for the workforce related to future mobility concepts. This shift is attributed to profound changes along the entire value chain of production, which includes diverse knowledge patterns and the pairing of knowledge from several fields of activity. The aforementioned shifts from metal towards mechatronics and the move from electrical to electronics, are of great importance. These changes are caused by the electrification of vehicles power trains. This results, in major modifications in the value creation that are not limited to new engine variants, but likewise, affect innovation processes also through the entrance of new market actors. Following this logic, the electrification of vehicles also affects necessary competences of workers. For example, once, humans working on combustion engines were confronted with a voltage up to 48 Volt and more recently, they need to handle electric engines of up to 1.000 Volt (Dispan, 2013). The example illustrates why employees today need to be trained in making competent decisions and appropriate assessments in accordance with possible hazards. There are plenty of such examples, being identified along the entire value chain which includes production and service areas of the automotive sector.

Additional factors influencing shifts in demand for skilled workers are: (1) internationalisation, (2) rising service and customer orientation, (3) the need for flexibility (also in the working environment) and (4) new forms of organisation. Internationalisation leads to new coordination of activities of companies within the domestic territory and consultation and co-operation with affiliates abroad. When doing so, workers need to possess intercultural abilities and new language capacities to manage international communication flows. Moreover, to assure high quality globally, controlling and project management gain in importance. According to the extended service orientation, which includes customer focus, there is a trend towards tertiarisation of industrial work. To ensure these processes, new qualifications and training on the job are required with new forms of work organisation. Sustainable working on new mobility solutions requires a strong research and development

input and the ability to integrate the developed knowledge into the markets in terms of innovation and products. According to Dispan (2013), a lack of adequate workforce and skilled workers incentivises to unlock the potential of the electric mobility sector. Skilled workers are even more important when it comes to the usage of new technologies and the application of new procedures. Therefore, long-term human capital development is fundamental and should be part of each company's business model. Hence, this article presents the following hypotheses:

H2. The further development of new transport and mobility solutions relies on the specific knowledge and competences of highly skilled workers, i.e. engineers.

H3. Engineers' skills shortage hinders innovation in knowledge-based sectors related to transport and mobility.

7.2.3 THE ROLE OF CLUSTER CO-OPERATION IN HUMAN CAPITAL DEVELOPMENT

Cross-organisational collaboration is a central success factor for companies' innovativeness (Chesbrough & Bogers, 2014; Dyer & Singh, 1998). According to the relational view of the firm (Duschek, 2004; Dyer & Singh, 1998), knowledge generated through trustworthy relationships is viewed as strategic assets and competitive advantage. This is particularly the case for knowledge-based products and services (Grant & Baden-Fuller, 2004) as provided by the electric mobility constituent sectors. However, collaboration in networks and clusters necessitates governance structures to facilitate knowledge exchange and interactions.

As explored in section 2.1, the demand for highly skilled workers has mainly occurred with the shift towards the knowledge-based economy. This development in combination with broader individual knowledge affected not only the economic and societal world, but also governance structures of several regions. These tend to be more fragmented and specialised (Smith, 1997) due to the growth of individual authority and political involvement (known under the term government with society). The result is a decentralisation of many political and economical systems and regulations, and the increase of further regional steering entities. The crucial role of regional networks is an example for regional decentralisation of decision-making processes.

The broad literature on regional networks such as the Triple Helix, as kind of innovation networks (Etzkowitz & Leydesdorff, 2000) or issue networks, as kind of policy networks (Oermen, 2012) points to the importance of additional governmental instruments for regions and their economies. In that context, a specific role is given to regional clusters as facilitators

of knowledge exchange and innovation (Terstriep & Lüthje, 2014; Porter, 2000). For instance, their specific impact on e.g. regional innovation lies among others in the geographical concentration “[...] because tacit knowledge is exchanged more easily through locally embedded social networks” (Terstriep & Lüthje, 2014: 2). Tacit knowledge, for example, is the kind of knowledge, which cannot be translated easily by codification (Polanyi, 1966) and relies on proximity (Boschma, 2005). Moreover, cross-organisational co-operation within clusters facilitates knowledge exchange and spillover effects, from which the cluster members can profit. But also in terms of human capital development clusters can play a pivotal role, while the effects of cluster and human capital development are bidirectional (Tremblay, 2006). It seems as if proximity and the industrial atmosphere contribute to employees’ skills development and inter-firm learning effects (Cotic-Svetina et al., 2008). In turn, an adequate human capital stock within a cluster can make firms more competitive and in best case innovative. In this vein, Tremblay (2006) emphasises, that “[t]here is agreement on the fact that knowledge and human capital play a role in cluster development” and vice versa. Drawing on this line of argumentation it is hypothesised as follows:

H4: When combined with supportive infrastructures, regional networks, such as clusters, positively impact the development of regional human capital.

7.3 METHODOLOGY

7.3.1 RESEARCH DESIGN & DATA COLLECTION

A mixed methods approach (cf. Creswell & Clark, 2011; Teddie & Tashakkori, 2009) integrating quantitative and qualitative methodologies was applied to answer the raised research questions. While the former is based on desk research including analysis of secondary data plus semi-structured interviews with cluster managers, the quantitative data is drawn from a company survey in the two case study regions Alsace/France-Comté (FR) and Stuttgart (DE). The choice of case regions has been made because of their strong automotive industry, their engagement in electric mobility, and localised clusters.

The quantitative survey was based on a questionnaire, which sought to develop insights in the recruitment practice for engineers, by companies working in the field of new transport and mobility solutions as well as collaborative recruitment activities in the regions. It incorporated questions regarding companies’ view on new drive technologies and future mobility concepts, demands for engineers in new mobility and transport solutions, as well as their perception of engineering education and its importance regarding companies’ demands

plus future R&D needs. Responses were measured using a 4-point Likert scale ranging from 1 = 'I fully agree' to 4 = 'I do not agree at all'. Administered by the cluster managers in the two regions, the seven-page questionnaire was sent out to a sample of 1'000 companies active in electric mobility. Data was collected from mid of March until the end of May 2014, including two reminders two and six weeks after the initial mail. In total 79 valid questionnaires were received, representing a response rate of 7.9%. In addition, a sample of 79 seemed adequate to determine significance at the $p = 0,05$ level, in order to emphasize possible existing differences or non differences between the regions with regard to the regional orientation, personal regional contacts in search for engineers and the demanded engineers' skills.

7.4 QUALITATIVE RESULTS: COMPARISON OF THE ALSACE/FRANCHE-COMTÉ AND STUTTGART REGION

7.4.1 FACT AND FIGURES

Both, Alsace/Franche-Comté and Stuttgart region are characterised by their long-standing tradition as automotive regions.

The Stuttgart region is located in the German State of Baden-Württemberg. It is 10,558 km² large with a population of 4,016,012 inhabitants. In comparison, Alsace/Franche-Comté is slightly smaller (8,280 km²) and has a population of 1,857,477 inhabitants. Whereas in Stuttgart region the unemployment rate of 4.1% is below the national average, in Alsace/Franche-Comté's unemployment totals 19.1% (EUROSTAT, 2012). Both regions have a high number of employees with tertiary education attainment (EUROSTAT, 2012). The Stuttgart region leads with a share of 34.2% of employees having tertiary education attainment, Alsace/Franche-Comté follows with 29.0%. With regard to universities and academia, Stuttgart is in a strong position with 23 universities including universities of applied sciences and further academic organisations. In Alsace/Franche-Comté 6 research entities are located (Terstriep et al., 2014). Both regions have a long tradition in car manufacturing and are European hubs for the automotive industry. They host a broad range of market players, from large multinational Original Equipment Manufacturers such as PSA Peugeot-Citroen, Daimler AG and Porsche AG, to small and medium-sized enterprises. Several international suppliers are located in Alsace/Franche-Comté such as Faurecia, Schrader, Delfingen, Lisi, Timken and Mark IV (Terstriep et al., 2014). In Stuttgart region suppliers add up to 400 companies. Unlike Alsace/Franche-Comté and other automotive regions in Europe, many suppliers in the Stuttgart region are still independent companies, e.g. Bosch GmbH,

Behr GmbH & Co. KG, Mann+Hummel GmbH or Eberspächer GmbH & Co. All company headquarters in Stuttgart are listed in the group of 'Top-100-Automotive-Suppliers 2010'. Although rather small, suppliers in Alsace/Franche-Comté are extremely important and regarded as the backbone of the regional economy providing jobs due to their high innovativeness. The focus of their daily business is design and production of vehicles, with a strong focus on drive systems and car components. These activities are completed by skills in the fields of telecommunications, smart sensors and mobility services (Terstriep et al., 2014). Over the past years, the automotive industry in Alsace/Franche-Comté was strongly affected by the economic downturn in Europe; this is reflected in declining numbers of employees. Stuttgart region, on the contrary, was largely spared from the sector's crisis due to the high share of healthy medium-sized companies with their solid equity structure and innovativeness (Terstriep et al., 2014) and last but not least, the regional governance framework.

7.4.2 FRAMEWORK CONDITIONS AND INFLUENCING FACTORS

As already stated, the development of future transport and mobility solutions with the focus on electrification does not solely depend on changes of the production value chain. It mainly relates to companies' co-operation behaviour and governance frameworks in the regions. With regard to the latter, RTDI and cluster policies, action plans and R&D programmes show to be crucially important to facilitate the market uptake of future transport and mobility solutions. Concerning policies companies in the two regions are confronted with quite distinct framework conditions: Whereas companies in Stuttgart region profit from the German federal system with its decentralised governance structure, activities in Alsace/Franche-Comté are based on a central state model. Forasmuch, policies delegated to the federal state, and in particular the Stuttgart region, show to be more flexible than in Alsace/Franche-Comté. The decentralised government structure in Stuttgart allows regional actors to cope with region-specific challenges posed by complex and rapidly changing socio-economic environments, including globalisation, internationalisation, environmental challenges, changing innovation processes and the shift in demands for highly skilled workers (Terstriep et al., 2014).

Following this, RTDI and cluster policies in both regions differ in terms of flexibility and implementation, but also with regard to the actors involved. While for Alsace/Franche-Comté regional innovation policies are principally defined by the French government, in the Stuttgart region RTDI policies are complementary and formulated at different governance levels: They are designed at national and implemented at regional level as well as designed and implemented at regional level, with national government as major funding source for

innovation activities. In Alsace/Franche-Comté it is quite difficult to set up regional actions as they always behave the national central system. The French cluster policy distinguishes between *competitive* clusters and *regional* clusters. The former are thematic world-class clusters set up at national level. Each competitive cluster is characterised by a 5-year strategic plan based on the “Triple Helix” concept, while emphasising collaborations of small and medium-sized enterprises. In contrast, regional clusters aim at collaborative activities of larger and smaller companies. Germany, with the region Stuttgart, can be considered as a forerunner in cluster policies. Since the 1990s a number of supportive cluster programmes have been established at national, federal state and regional level. They focus on both, the bottom-up and top-down approach of cluster formation (Terstriep et al., 2014). National cluster policies are complemented by federal state cluster policies. With the establishment of the State cluster management organisations for e-mobility both types of policies have been anchored regionally. As in RTDI and cluster policies, action plans in Alsace/Franche-Comté underlie the decision-making at national level. The federal state system in Germany led to the implementation of action plans at all governance levels.

7.4.3 RESEARCH ENTITIES AND R&D

As shown in section 7.4.1, the regions Alsace/Franche-Comté and Stuttgart are well-positioned regarding the number of research entities in the field of automotive and mobility research. Next to the universities and universities of applied sciences Stuttgart region is home of well-known research entities such as the Fraunhofer IAO “Mobility Innovation Competence Centre”. Further institutes, such as the ‘Institute of Vehicle Concepts’ work in close co-operation with the automotive-related companies (Terstriep et al., 2014). The institute’s main focus lies on alternative power trains and energy conversion, fuel and energy storage technologies, innovative systems and more. One of the key success factors of the Stuttgart region is the collaboration capacity of the different research entities. Moreover, a solid collaboration between research entities and the regional economy as part of the cluster logic has been established. In comparison, Alsace/Franche-Comté showed a disparate picture: While the number of private sector research entities in Franche-Comté with a share of 86% is rather high (large companies are key actors in RTDI activities), in Alsace public research organisations account for the majority of research units (Terstriep et al., 2014). Opposite to Stuttgart region, public research entities in Alsace and Franche-Comté rarely co-operate with industry. The strong and long lasting co-operation activities in the Stuttgart region are echoed in the approximately 55 R&D projects, which relate to sustainable mobility. Alsace/Franche-Comté leads 70 R&D projects, which are mainly linked to ICT and mobility

and conducted at European scale. With regard to transport and mobility, the Stuttgart region addresses various sub-projects such as e-bikes, multifunctional smart cards, charging points and others such as EV fleets. Overall, these projects contribute to the establishment of an ecosystem for sustainable transport and mobility. The R&D projects in Alsace/Franche-Comté are traditionally connected to the automotive sector and because of this, they concentrate on urban planning, innovative car components, charging infrastructure and so on.

7.4.4 REGIONAL RESEARCH DRIVEN CLUSTERS

Clusters spread across Europe differ in their development stages; form of organisation, composition and in their thematic orientation. They are important in terms of driving new technologies and new combined sectors such as the electric mobility sector. Moreover, research-driven clusters are expected to bring innovative ideas to the fore. In both case regions, the established clusters are understood as an important research component. Stuttgart hosts two automotive related clusters, while Alsace/Franche-Comté facilitates one. Cluster activities in the Stuttgart region started in 2001. Today CARS with its approx. 326 members is the largest automotive cluster in the Stuttgart region, uniting small and large companies, regional research institutes and public organisations. With a share of 80%, SMEs build the “backbone” of the cluster. A strong cluster management leads the cluster and two renowned companies, Daimler and Porsche, build its core. With regard to the cluster’s development stage, CARS is in its maturity phase with a clear focus on strengthening regional co-operation between companies and academia. Moreover, it acts as a facilitator of knowledge exchange and communication. Apart from the dense interlinkage within the region, a further advantage of CARS is its international orientation towards further European automotive clusters. Four years later than CARS, in 2005, the competitive cluster VEHICULE was established in Alsace/Franche-Comté. In 2011 the cluster unified 1,123 members. VEHICULE’s strategy moves towards vehicles and sustainable regional development. Through collaborative projects, VEHICULE’s goals are to strengthen co-operation activities between companies and regional research entities. Between 2009 and 2011, 119 collaborative projects were set up in the region (Terstriep et al., 2014). As in Stuttgart, regional companies are also engaged in the cluster management of VEHICULE - among them PSA Peugeot Citroen.

7. 5 QUANTITATIVE RESULTS

7.5.1 DESCRIPTION OF THE SAMPLE

Compared to the number of distributed questionnaires, responses were low and below average. This is not unusual when carrying out a company survey, which concerns strategic and thus, sensitive issues. To some extent the poor response rate can also be attributed to the increasing number of company surveys which resulted in declining willingness to participate. Recent methodological work (Groves & Peytcheva, 2008; Groves, 2006) has found, however, that decreases in survey response rates do not necessarily lead to increases in the nonresponse bias of survey estimates.

In the Stuttgart region, a total of 32 companies filled in the questionnaire and in Alsace/Franche-Comté, 47 companies responded. Accordingly, this survey cannot claim to be representative. However, it shows tendencies and trends, thereby adding to a bigger picture of the demand for engineers in the transport and mobility sector. With regard to companies' size and their sector relation, in the Stuttgart region SMEs account for the highest share of respondents (36.7%), while in Alsace/Franche-Comté it is large enterprises (44.7%). Whereas in Alsace/Franche-Comté most of the participating companies (63.8%) were from the transport sector, in Stuttgart, all three sectors were well represented: transport (34.5%), energy (24.1%) and ICT (13.8%) although most of the Stuttgart companies (37.9%) were from other industries.

7.5.2 RECRUITMENT NEEDS FOR ENGINEERS IN THE FIELD OF TRANSPORT & MOBILITY

This part of the survey addressed companies' needs for recruiting engineers in the field of transport and mobility. It included questions on companies' recruitment procedures, the geographic scope of recruitment, and the demanded competences of engineers as well as the provision of further qualifications. First it was asked for companies' plans to *recruit one or more engineers within the next three years in the field of transport and mobility or other fields*. The majority of the Stuttgart respondents (92.3%) stated that they would recruit engineers for tasks related to topics other than transport and mobility. Nonetheless, two-third of companies also seek engineers in the field of transport and mobility. Although at a lower level, the share of companies in Alsace/Franche-Comté that indicated to recruit engineers in other fields (70.2%) is well above that of engineers in transport and mobility engineers (59.6%).

Asking for the *functions the recruited engineers will occupy*, the following responses were obtained: In the Stuttgart region the main fields of occupation are R&D (82.8%), engineering and technical studies (72%) followed by project management (62.1%), while business administration (10.3%) as well as operation and maintenance (24.1%) were considered less important. A similar picture emerged for companies in Alsace/Franche-Comté: Project management and engineering and technical studies were mentioned most frequently (63%), followed by R&D (60.9%). The demand for sales engineers (13%) and operation and maintenance engineers (17.4%) remained well below.

In order to gain insights in the educational institutions, which seem to be appropriate to provide firms with engineers, universities and university of applied sciences are the most cited educational institutions approached by companies in Stuttgart region (46.9%) and Alsace/Franche-Comté in search for engineers. In addition, the results reveal that recruitment from universities is more widespread in the Stuttgart region (12.5%) than in Alsace/Franche-Comté (6.5%).

To widen the scope of knowledge on recruitment procedures and practice, companies were asked for the *common channels used to attract new employees*. The results show that in the Stuttgart region personal (social) networks/alumni networks and word-of-mouth recommendation are the major channels for approaching future employees, followed by personal contacts to universities and universities of applied science (Fig. 7.1). With a share of 71% Internet platforms rank third in Stuttgart region, whereas in Alsace/Franche-Comté, this is the most frequent recruitment channel (52.5%). Roughly half of the French respondents use newspaper advertisements, and 39.1% utilise their contacts to regional universities and schools of engineering. These findings confirm the results from the qualitative analysis that the co-operation culture in Stuttgart region is more pronounced than within the Alsace/Franche-Comté cluster. In that line also the χ^2 test shows (Fig. 7.1), that there are differences between Stuttgart region and Alsace/Franche-Comté regarding the use of personal (social) networks/alumni networks, contacts to universities and universities of applied sciences and job fairs as channels of engineers' recruitment. According to the χ^2 test, Stuttgart region shows a higher degree of personal regional contacts, which can be understand as direct recruitment channels for engineers.

Figure 7.1: Channels used in engineer recruitment (n = 77). Chi² test: significance * 0.05, ** 0.01, *** < 0.01. Source: David & Terstriep, 2014.

Asked for the place of origin of employees hired in the past 24 months, 83.9% of the Stuttgart respondents hired engineers that come from the region and neighbouring regions (54.8%). The Alsace/Franche-Comté company representatives (68.1%) indicated that their employees were recruited nationally and from regional distant geographic areas. These results indicate a higher recognition of the regions' potential for human resources in Stuttgart in comparison to Alsace/Franche-Comté, which also is emphasized by the chi² test. In terms of regional scope of recruitment the chi² test indicates significant regional differences between Stuttgart region and Alsace/Franche-Comté. These findings confirm the crucial role of the region in recruitment for Stuttgart.

Figure 7.2: Field of occupation of engineers (% of votes, multiple answer possible). Chi² test: significance * 0.05, ** 0.01, *** < 0.01. Source: David & Terstriep, 2014.

7.5.3 SHORTCOMINGS AND DEMANDED SKILLS OF ENGINEERS

The questions above mainly focused on the recruitment of engineers. Endeavouring to gain insights into engineers' current qualification levels and whether these match companies' needs, in the following shortcomings of and demands for engineers were queried. For Alsace/Franche-Comté respondents identified poor management skills as major shortcoming (44.7%), followed by poor ability in writing, summarising and communicating information (36.2%). In the Stuttgart region, companies regarded poor project culture (37.5%) and poor knowledge of regulations (31.3%) as the main qualification deficits of their current engineers. The chi² test shows no significant differences between the regions Stuttgart and Alsace/Franche-Comté except for poor management skills, a result that correlates with previous studies such as Dispan (2013).

Figure 7.3: Skills shortage. Chi² test: significance * 0.05, ** 0.01, *** < 0.01. Source: David & Terstiep, 2014.

With regard to strategies to cope with qualification deficits and certain skill requirements participating companies were asked whether they *consider for the recruitment needs the option of in-company training (apprenticeship) and the option of vocational training/advanced training in the next 3 years*. Respondents in both regions regard in-company training and vocational training/advanced training as important and a way to solve their demands for skills. Also their willingness to invest in future engineers' qualifications is high.

Asked for the thematic skills to be covered by engineers today, in order to deepen the knowledge of companies' thematic demands with regard to engineers' qualification, the respondents were asked, *what the key skills needed today are*. With a share of 73.3% the ability to design technical specifications shows to be crucially important for companies in Stuttgart region (73.3%), followed by technical and economic knowledge concerning the various sub-sectors of transport (50%) and the balance between good understanding of business and market mechanisms and a strong science and technology background (60%).

Figure 7.4: Key skills demanded. χ^2 test: significance * 0.05, ** 0.01, *** < 0.01. Source: David & Terstriep, 2014.

Just as in Stuttgart, the ability to design technical specifications (60.9%) is of high relevance for companies in Alsace/Franche-Comté. Besides, a strong entrepreneurial spirit (45.7%), basic skills in electric, mechanical and informatics engineering and international culture (both 47.8%) are regarded as key capabilities. These results coincide with the trends described in section 7.2 of this chapter, which indicates that there is a demand for highly skilled workforces not only in the field of production, but also in R&D. In the light of progressive globalisation of markets, international culture is becoming more important and is closely connected to the service orientation of companies. The χ^2 test shows here no significant differences between the regions Stuttgart and Alsace/Franche-Comté in terms of key demanded skills, apart from technical & economic knowledge of the various transport sub-sectors, which is highly significant. This result can be explained by the broader regional scope of activities with regards to new transport and mobility in Stuttgart region as described in section 7.4.3. On contrary, Alsace/Franche-Comté still concentrates on the core business of design and production of vehicles.

With regard to R&D partnerships, companies in both regions (Stuttgart 77.3%, Alsace/Franche-Comté 86,4%) are interested in collaborating with engineering students within their final study projects (internship). The share of companies seeking co-operation with students in the framework of their PhD thesis or similar, is in Stuttgart region twice as high as in Alsace/Franche-Comté. This marked industry-university collaborations, indicates that companies envisage to recruit employees at a very early career stage. Instead of

working with students, companies in Alsace/Franche-Comté rather aspire partnerships with research laboratories (68.2%).

7.6 DISCUSSION AND CONCLUSION

To obtain insights into the demand for skills and the shortage of skilled labour (in this case, engineers) in firms related to future transport and mobility sector two traditional automotive regions, Stuttgart (GER) and Alsace/Franche-Comté (FR) were analysed. With regard to the formulated hypotheses the findings can be summarised as follows:

H1. Firms' future competitiveness is closely linked to their capacity to assure a stock of engineers with adequate qualifications and competences.

With the quantitative results in section 7.5.2 we find evidence to confirm H1. Firms in both regions intend to recruit one or more engineers in the field of transport and mobility within the next three years. Moreover, the firms in both regions stated that universities and universities of applied sciences are the main educational targets when recruiting engineers. This could relate to the belief that universities are still the main training institutions for higher education, which are linked to highly skilled workers. This indicates a positive connection between firms' competitiveness and qualified engineers.

H2. The further development of new transport and mobility solutions relies on the specific knowledge and competences of highly skilled workers, i.e. engineers.

As outlined in section 7.5.3, in support of H2 the quantitative analysis revealed that companies in both regions rely on the specific knowledge and competences of highly skilled workers as is reflected in the identified qualification deficits. These findings correspond with the trends described in section 7.2 of this chapter, which suggest that there is a demand for specific knowledge not solely in the field of production, but rather in the field of research and development, international culture and service orientation. Moreover, the χ^2 test showed, that there is a difference between the regions in key demanded skills. The results indicate that technical & economic knowledge of the various transport sub-sectors are of higher importance in Stuttgart region. This can be accounted to the broader activities in Stuttgart, which address various sub-projects on e.g. EV fleets, e-bikes, charging points etc., while Alsace/Franche-Comté still is focused on the core business of vehicle design and manufacturing.

H3. Engineers' skills shortage hinders innovation in knowledge-based sectors related to transport and mobility.

The fact that the current qualifications of engineers only partially meet companies' demands supports H3. In particular respondents claimed skills shortage of engineers in the field of project culture, the capacity to write, summarize and communicate information and in management capacities. In order to overcome these shortages companies in both regions consider in-company training and vocational training/advanced training as important and a way to solve their demands for skills.

H4. When combined with supportive infrastructures, regional networks, such as clusters, positively impact the development of regional human capital.

Qualitative as well as quantitative findings support H4. The qualitative comparison of both regions in section 7.4 showed that there are fundamental differences in the supportive infrastructure. While the Stuttgart region is organised decentralise, the region Alsace/Franche-Comté underlies the French central political framework logic. In concrete terms, this influences regional flexibility in collaborations and co-operation of i.e. regional clusters. While decentralisation is a benefit for the Stuttgart region in terms of fast responses to socio-economic changes such as the increasing need for engineers' recruitment, centralisation in Alsace/Franche-Comté leave relative little scope to react flexible to challenges and firms' requirements. It becomes even more obvious by the quantitative results of section 7.5.2, which indicate that in the Stuttgart region the majority of firms use personal and professional regional networks, when recruiting new engineers, while in Alsace/Franche-Comté it is (anonymous) Internet platforms. The geographic scope of recruitment also supports a positive relation between clusters and the development of human capital. Whereas companies in Stuttgart region with its strong cluster and high degree of collaboration focus their recruitment activities on the region, in Alsace/Franche-Comté firms try to gain new engineers national-wide. Both quantitative results could be emphasized by the χ^2 test, which in both cases shows a difference between the regions in terms of their regional orientation – which is significant for Stuttgart region.

The results presented in this chapter indicate that there is a demand for engineers in the electric mobility sector and automotive industry in general. These demands are particularly marked in R&D, technical studies and project management. This concurs with other known studies (see Dispan, 2013), which argue that there is a demand for highly skilled workforces

not only in the field of production in the automotive related sectors, but also in service related activities. With regard to the outlined deficits of engineers, respondents claimed that there is a lack of qualification in the field of project culture, in the capacity to write, summarise and communicate information and in management skills. This again indicates that at current stage, companies' requirements comprise a mix of technical knowledge with service-oriented and organisational skills. This can be attributed to the on-going internationalisation and globalisation. In response to these circumstances, engineers are asked to link their expert know-how with intercultural competences and skills. By doing so they are asked to translate innovation into products and processes which, in itself indicates a good sound knowledge of markets and trends. Research is an important foundation for these actions. If the skills needed by the companies are considered, the ability to design technical specifications shows to be central. There is a huge need to hire engineers who can maintain a balance between a good understanding of business and markets and possess a strong knowledge base in terms of scientific and technological background. Provided supportive regional infrastructures, as is the case in Stuttgart region, cluster have the potential to positively impact the development of regional human capital as a result of dense industry-academia collaboration. Moreover, a multilevel governance structure proves to be of immense importance, as it allows anchoring decision-making in the region and therewith enhances flexibility.

In addition, companies need to seek further knowledge and skills exchange at inter-sectorial and inter-regional level. In this vein, increasing engineers' mobility and therewith knowledge spillovers offers a way forward. Incentives such as good and interesting jobs or a regional welcoming culture could help companies to find the employees they need. Not only are regional co-operations important in achieving this but also inter-regional and inter-national networks, which could be set up by cluster initiatives. Common cross-border activities in the field of human capital such as summer schools and academies make it possible to attract the right employees. As already stated, a long-term human capital strategy should be part of every business model with the aim of attracting qualified employees early in their careers. In order to fulfil their own expectations, companies should act pro-actively by offering their employees advanced, and in-company, training designed properly solve the current problems.

Based on this, the presented study can only give restricted insights in the above-named issues, as it is limited to two clusters in two regions. Thus, further research on the relationship between engineers' recruitment and the role of regional networks as well as the impact of engineers on knowledge-based sectors, such as electric mobility, is necessary.

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Further material the chapter refers to:

Presentation by David A. (2015): Future Careers related to Transport and Mobility, Green and Sustainable Innovations in Smart Cities: Business Models and Ecosystems, GSISC Workshop, 6th March 2015, Nice.

Presentation by David, A. (2014): Comparaison des résultats de l'enquête MOBILITECH-ELMOs avec le Bade-Wurtemberg, Transports du futur et mobilité durable COLLOQUE, 13th October 2014, UNIVERSITÉ DE TECHNOLOGIE DE BELFORT-MONTBÉLIARD, Musée Peugeot, Sochaux.

PREFACE CHAPTER 8

The survey reported in chapter 7 shows that there is a demand for highly skilled workers, in this specific case for engineers, in the transport and mobility sector with regard to its future development. To overcome this so-called skills shortage, firms, which rely on the specific knowledge of engineers, initiate co-operations in the form of a “Triple Helix”, in order to face the challenge. In addition, chapter 7 outlined that well-established cluster structures could mainly be used in terms of the recruitment of engineers in the very early stages of their education. To do so, specific framework conditions can foster regional cluster and “Triple Helix” co-operations and provide policy actions to react quickly to an approaching problem.

In some sense, chapter 8 deepens the view set out in chapter 7 and argues that such framework conditions very often are rooted in regional culture and path dependence as part of the regional social capital. Using the examples of seven European regions, it shows how culture is manifested in specific regional frames, which afford the space for actor network building and strong co-operation to address regional structural changes and challenges. These frames vary regionally and can be activated when needed. They are based on same values, beliefs and traditions, which allows them to be stable in times of transformation. Chapter 8 uses the example of the German region East Westphalia-Lippe (EWL) to show how such frames can be activated to regional concerns, such as the rise of regional attraction. Especially non-core regions, such as EWL, can benefit from this approach. And again, the regional attraction can then positively influence highly skilled worker recruitment. Moreover, a strong labour and business frame (as it is called in chapter 8) is able to retain and mobilise untapped potential in labour market (re)-entry.

CHAPTER 8: THE CULTURAL ASPECTS OF STRATEGIES USED TO ACCOMPLISH STRUCTURAL CHANGE^{*}

8.1 INTRODUCTION

The field of economic geography has been trying, for many years, to explain that differences between regions are due to the influence of specific industries. Culture does not appear to have any influence back in these studies. This is not surprising when considering that social theory, up until the late 1980s and in several variants up until the present time, has been dominated by an acceptance of global and effective modernisation processes which, in turn, have led to a levelling out of local cultural characteristics. The turning point in scientific discourse, as illustrated in Piore and Sabel's (1985) study, was the end of mass production, which brought about a fundamental change in both sectoral and regional production structures, which is described in chapter 1 as the transition to the knowledge-based economy. Since then, clues have repeatedly emerged in regional economic debate indicating that, alongside economic structure, specific regional factors will influence a region's abilities to innovate and to shape structural change.

In this context, particular attention should be given to papers on industrial districts (Asheim, 2000 and 1996; Amin, 1999; Garofoli, 1991; Piore & Sabel, 1984), innovative milieus (Crevoisier 2001; Maillat, 1998; Aydalot & Keeble 1988), discussions on clusters and high-tech companies and knowledge-intensive or knowledge-based industries (Cooke, 2002; Keeble & Wilkinson, 2000; Rehfeld, 1999; Saxenian, 1994) as well as regional innovation systems (Tödtling & Trippel, 2005; Cooke et al., 2000 and 2004; Autio, 1998). This approach to cultural aspects can be found in other research strands related to structural change and in discussions on cultures of founding (Sternberg, 2006), regional development pathways (Martin & Sunley 2010 and 2006; Martin, 2010), varieties of capitalism (Hall & Soskice, 2001; Hollingsworth & Boyer 1997) and regional governance (Benz et al., 2000). Overall, this

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approach concedes acceptance that the differences found within regional strategies and competences such as governance skills, are based on socio-cultural factors. There is particular emphasis on formal and informal actor networks and their socio-cultural fundamentals as well as their abilities in shaping regions being a part of the regional social capital. In that way, regional actor networks base on same values, same culture and same understandings. Insofar as the emphasis on cultural aspects is concerned, the relationship to the concept of social capital (Putnam, 2000; Bourdieu, 1983) dominates. In theory, there are very close connections between social capital, networks and regional governance (chapter 2.5.2).

There are three reasons why these approaches are a long way from providing an understanding of the part culture plays in accomplishing structural change. Firstly, culture continues to be seen as a residual category. Culture is brought in when economic factors at start-up fail to provide a comprehensive explanation for regional variations in economic development. It is logical that culture should be analysed as either an advancing or inhibitive factor in economic development (see majority of contributions in Harrison & Huntington, 2000). Secondly, a further static concept of culture exists in the sense of an ensemble of common traditions and values, shared beliefs and language and the same customs and conventions. The fluent and heterogeneous aspects of culture arising from tension between regional (including subcultures) cultures and global culture are not systematically taken into account. This leads on to the third reason of there being scant attention paid to disciplinary boundaries. Sociological theories of space are able to contribute to the general understanding of processes of cultural change because in sociology *space* is not seen as static or as given, but as the result of a process between regional regimes and regional paradigms. Within this framework, the concepts of social capital and symbolic capital (Putnam, 2000; Bourdieu, 1983 and the concept of spacing Löw, 2001) are highly relevant to the questions set in this chapter. “Spacing” refers to the way in which regional actors shape places through meanings and symbols and ultimately, through mutual actions, which can then be beneficiary for individuals and groups and are regarded as social capital. In this context, anthropological study results such as those from the interaction between local and global cultures (Breidenbach & Zukrigl, 1998), Bhabha’s (2000) “third space” concept or Appadurais’ (1996) interpretation of the local as potential, can all be taken up and processed.

The key aim of this chapter is to develop a closer, theoretically founded and empirically attained understanding of the role of culture with structural change as its main focus. However, in order to avoid the previously criticised hasty functionalization, general considerations regarding culture must be made. Firstly, a framework is presented which

shows the different and variable aspects of culture thereby making it empirically tangible. Then, in a comparative perspective, it is shown how in effect, different cultural frames do exist but also that specific frames are relevant to each region. In the third step, the findings from one particular region are analysed in depth. Because the main focus of this chapter is on structural change and in the broader context of this thesis on regional human capital development, the chapter concentrates on one region where frames related to business/economics and labour play central roles. To conclude, the chapter reflects on the limits of the argument presented here and offers the emergent research questions in detail.

8.2 REGIONAL CULTURE AND CULTURAL FRAMES

In conventional understanding, culture refers to the moral concepts of groups in a specific temporal and spatial context and in general cognition, culture incorporates values, norms and expressive symbols (DiMaggio, 1994). This chapter pertains to collectively gather, solid experience. Such experience can be entirely “second-hand” in that it is gifted through generations with the help of histories, narratives and tradition. Bhabha (2000) goes further and argues that particular cultures can be revitalised when confronted with today’s increasingly globalised cultures thereby growing in importance for their supporters. Often latent or even bygone customs and routines come to the fore and are stronger than ever being found not just in narratives, but also becoming integrated into everyday life. Individual identity is strengthened by the demarcation of self from others. In this context, Bhabha talks about “the third space”, a process whereby a specific culture is cognisant of being confronted with another. At the same time, this “third space” is also the space where cultures intermingle. For instance, the lives of many of today’s (post) migrants in transnational spaces (Pries, 2001a) have been made easier by living among multiple cultures. Transnational spaces are functional spaces of both a virtual and real nature. Functions range from banal exchanges of everyday experience to the sharing of high quality knowledge. This is highly significant for regional economies and knowledge bases, especially if a region has a good absorptive capacity. “The third space” is an interaction space located between two or more worlds and cultures making it possible to utilise the advantages of multiple cultures and even to create beneficial links. In this sense, Bhabha’s “third space” can also be understood as a space for innovative ideas which develops from the exchanges and experience of individuals moving in and across several cultures. More light will be thrown on the latter concept at the end of this chapter. In individual regions, culture is neither static nor homogeneous (Hall, 2002; Bhabha, 2000,). The understanding of culture is dependent on the inclusion of differentiation possibilities as well as how dynamics emerge from confrontations between different cultures. The consequence of such an understanding of culture is that culture is

conceptually difficult to grasp. This is a general problem for socio-scientific theory especially when it comes to processes of change such as structural change (Sarasin, 2009), which is itself dynamic and not particularly static. If the reality for analysis is fluid and “hazy” then it is certainly not useful to characterise culture and cultural differences with attributes considered to be rational, irrational, male or female (as in Trompenaars & Prud’homme, 2004; Trompenaars, 1993; see also Hofstede, 1991). With regard to the analyses of regional cultures in this chapter, the following aspects should be taken into account:

- different cultural frames which do, or do not, act together as a cultural backdrop (hereinafter referred to as “setting”)
- awareness of the dynamics of culture
- the question of the general and specific relevance of different cultural frames

To substantiate this, this chapter uses Goffman’s (1974) “frame analysis”. Goffman’s frames are seen as schematic and interpretive frameworks for the construal of stereotypes which actors rely on to help them evaluate, or to enhance their evaluation of, situations and events or the consequences thereof. Goffman’s frame analysis is widely used in the media, especially in communication science and assists media in capturing and constructing social phenomena. Furthermore, the frame analysis helps to interpret and understand the varying behaviours, and their cultural foundations, of actors in particular social situations. Frames are both emotional and normative.

Five frames are used in the following to analyse cultural settings in a specific regional context. Details of this approach are shown in Cooke and Rehfeld (2011). The first two frames: the *ethnic frame* and the *landscape frame*, relate to socio-cultural and geographical backgrounds. Another two frames relate directly to economic aspects and therefore should be analysed as *labour and business frames*. Last but not least, there is the *political frame*. It is part of the investigation because it relates to the opportunities of collective action, which can be significant for regions. To begin, the aforementioned frames will be briefly discussed and illustrated using the example of seven regions. The labour and business frames, central to the structural change, are then considered at a specific region level (East Westphalia-Lippe).

8.3 REGIONAL FRAMES – A COMPARISON

Not all the frames described are relevant in every region and it was not always possible to examine the frames as deeply as desired due to regions having different pathways.

Therefore, statements in this section should be taken as heuristic. Their function is to make the analytical frameworks tangible and to demonstrate their possibilities as well as their limits. The main interest rather lies in all the various frame forms as well as the relationship between frames and the resulting significance for structural change.

Basel: There is a characteristic heterogeneity within the frames here, which expresses itself more as juxtaposition than a synergy. The ethnic frame with invariable roots is the most likely descriptor because of the strongly based Alemannic culture including Basel's differentiation from Zurich with the somewhat audible differences in language and the both audible and visible differences in carnival traditions. Language however, does not only unite, it can also exclude. English is the accepted business language in the clustered community of international corporate headquarters and is also becoming accepted as the everyday language. This juxtaposition of old and new is also expressed in the landscape frame. Basel is characterised by its historic centre, but also has internationally recognised symbols for the future development of the city, in particular a high density of modern architecture (Herzog & de Meuron; Santiago Calatrava, Mario Botta, Richard Meier, Renzo Piano), as well as modern pharmaceutical industry centres. It is famous for Art Basel, an art trade fair and the Rhine is also a significant attraction. The "old and new" and "local and global" elements are found in the landscape frame alongside a third element: a strong base situated in a cross-border region (Switzerland, Germany and France) which is characterised by heavy commuter flows and interrelated labour markets. Discussion about the high proportion of German professors in the universities and the highly controversial, and almost successful, 2014 immigration restriction initiative flares up repeatedly and generates much tension. The political frame reflects these various elements. Switzerland is characterised by its distinctive cantonal self-government. The city and the canton of Basel work together; Metro-Basel is responsible for marketing functions and the Euro-district manages cross-border interworking. Numerous informal, and often small-scale, networks exist at a lower level. The business and the labour frames are also characterised by the tensions discussed. Basel is defined, on the one hand, by a medium-sized corporate culture with a strong tradition of social and cultural stability and, on the other hand, by an increasingly global culture which is more committed to the Anglo-Saxon shareholder model than the continental stakeholder model. It also has a dominating mission statement for the future as a Life Science Region (here firms are allocated such as: Novartis, Roche, Lonza and Syngenta).

To summarise *Basel:* tensions can always be found in the frames discussed here. Basel represents a metropolitan cultural structure and although there will always be tensions and

contradictions, those related to structural change can be productive. The city and the canton of Basel are, without doubt, attractive and economically successful locations.

East Westphalia-Lippe is, in many ways, Basel's antithesis. Only the key factors are mentioned here as it will be covered in more detail later in this chapter. East Westphalia-Lippe is a mostly rural and medium-sized town region with few common roots. Politically it is an artefact of post-World War II reorganisation. That the region is very successful in its strategies for dealing with structural change can be explained by its distinct and identity-building business frame and related labour frame.

In relation to the ensembles of frames, of the regions examined, the *Southeast Netherlands region/Brabant*, with Eindhoven at its core, can be placed between Basel and East Westphalia-Lippe. Unlike Basel, Brabant relates more to the ethnic frame. Migrants to Brabant have, over the years, and facilitated by the founders of Philips as business leaders, played a formative role in the region. A tradition of the easy-going, "good life" ("gemoedelijkheid") is characteristic of the ethnic frame. In relation to the landscape frame, Brabant is similar to East Westphalia-Lippe in that it is mostly rural with some medium-sized towns. However, it has a stronger global remuneration because of established and by migration influenced international companies which have, over approximately twenty years, pursued cross-border co-operation. The political frame in Brabant is however, less pronounced. The Dutch provinces carry less influence than the Swiss cantons and currently their position, as seen in the Chambers of Commerce, has been weakened by a tendency towards centralisation. Nevertheless, the region has had repeated success in taking a clear profile in the context of Dutch structural policy, initially as "Peaks in the Delta" - a technology region and subsequently with a more developed profile within the top sector policy. The reason for this success is the same as in East Westphalia-Lippe's business frame: a successful, though often precarious, balance between locally-based family businesses and a global company culture. Both maintain a shared orientation, focused to the Philips' sites, towards the concept of "open innovation" as a basis for the further development of technology regions thereby providing a framework for joint strategies.

The remaining four regions examined here have significantly greater difficulties than the three discussed to date. Of the four, *Wales* features the clearest ethnic and landscape frames. Where Wales' ethnic frame is concerned, its Celtic tradition, combined with a distinct Welsh national identity, speaks for itself and is expressed in the conservation of the Welsh language. The green and protected landscape is fashioned by an Atlantic coastline and receives a fair amount of rain. The political frame has been strengthened by Britain's

decentralisation policy which has also facilitated the marketing of diverse organisations leading to the deployment of structural policy. A joint strategic positioning on structural change is complicated by a lack of common balance within the business and labour frame. Local traditions, which stem from the coalmines and steelworks with their strongly cohesive work culture, are juxtaposed with the involvement in the Anglo-Saxon shareholder culture and in recent years, a return to local production. These are factors also visible in the divergent development between core areas around Cardiff and heavily industrialised North Wales with its coal and steel industries.

The same heterogeneity and lack of interaction between frames is found in three other regions studied: *Győr*, *Brandenburg* and *Styria*. These regions have historical roots which go back a long way. Despite its location between Greater Berlin and the extremely heterogeneous rural eastern regions, Brandenburg, which encompasses Potsdam, forms the heart of Prussian tradition and, embedded in a metropolitan landscape context, is the most likely comparison with Basel. Two characteristics found in Győr's political frame are similar to those in other regions. The first concerns a border area which has, over the past centuries, been repeatedly involved in ever-changing political structures and which mentally separates itself from the current involvement with Hungary. Secondly, this is a border region that is traditionally multi-lingual and, because of its closeness to the border, has an advantage in attracting outside investment. Although Styria has not undergone any similar political upheaval, it has experienced profound upheavals in the structure of its coal and steel industries which were traditional in this region as far back as the Middle Ages.

Profound upheaval at various levels and poorly integrated and coherent frames are common characteristics of these three regions. The economic structure is heterogeneous in that, despite different cultures, old industrial structures, traditional and regionally based companies, emerging industries' companies such as information and communication technologies and subsidiaries of international companies operate side by side. As yet, a common business and labour frame has not evolved.

8.4 A DEEPER VIEW: EAST WESTPHALIA-LIPPE

8.4.1 FACTS AND FIGURES

East Westphalia-Lippe (EWL) is one of five administrative districts in North Rhine-Westphalia (NRW), Germany. It consists of seven sub-regions, measures 6.5 million square metres and has a population of approx. 2 million people. Its pattern of settlement is typified by a few

medium-sized towns, the two major cities of Bielefeld and Paderborn with approx. 325,000 and 145,000 inhabitants respectively as well as a larger number of small towns embedded in the region's vast rural landscape. A degree of urbanisation has taken place over the past few years, but generally, EWL has remained rural. A high number of medium-sized, historically important cities such as Minden, Gütersloh, Herford and Detmold are special features of the region.

EWL does not have a homogeneous landscape, nor is it a historically constituted or structured region. It has a history shaped by a special mentality of its people. During the 17th century, the region was embroiled in the Thirty Years' War between Protestants and Catholics. At the end of the War, a peace treaty was signed in the neighbourhood region of Münster and Osnabrück and it was only at this time that different regional areas were documented on maps. The county of Ravensberg, a territory of the Roman and later the Prussian Empire, lay in the north (Bielefeld, Bünde, Halle, Herford and Minden) of the region. Due to its strong community spirit, Ravensberg was strongly influenced by Luther's revivalism and local people still talk about a certain cast of mind determined by "Ravensberg Pietism". Internationally renowned social institutions such as the Bethel Foundation have evolved from this public spiritedness. A strong sense of self-confidence and identity spread into the surrounding areas due to the widespread Protestantism. The strongly Catholic Diocese of Paderborn, in the southern part of EWL was a contrast. Paderborn had belonged to Prussia since the beginning of the nineteenth century necessitating it to be self-supporting, a situation which lasted for more than two centuries. During that time, there was a lack of inter-regional cultural exchange, something which, even today, some people see as the reason for what is known as the "Westphalian mentality".

8.4.2 REGIONAL IDENTITY – THE TENSION BETWEEN EXTERNAL AND INTERNAL IMAGES

With regard to the region's current identity, the historical, political and religious boundaries remain in force. After World War II, EWL became an administrative district. Its exact boundaries within NRW are more a result of political negotiation than its socio-cultural roots. The Lippe District was undecided for some time about being known as part of NRW or Lower Saxony, until it eventually joined NRW. The administrative district was set up in 1947. Administratively, the district government of Detmold, which sits between the state and the municipalities, is responsible for a range of issues such as regulating land-use planning and environmental matters. Co-operation between regional actors was further enhanced in the late 1990s by the founding of the "Bertelsmann Foundation's Initiative for Employment EWL e.V." The initiative was entrusted with developing specific concepts for the regional labour

market which focused on (re)-integration and mobilisation of human capital to the labour market. In addition, similar functions were undertaken by “EWL Marketing GmbH” in its role as regional Business Development Agency. EWL Marketing GmbH was founded as a public-private partnership and is still working on behalf of the following cities and districts: Gütersloh, Herford, Höxter, Lippe, Minden-Lübbecke, Paderborn and Bielefeld. It sees itself as combining and augmenting the strengths of different regional actors as well as other thematic initiatives.

The next significant activity to be revealed by the region was REGIONALE 2000, a State Government tool which, with its focus on co-operation and transparency, aimed at promotion of regional identity. Between 1997 and 2000, the State of NRW funded 54 projects in EWL with the slogan Expo-Initiative: “Bringing the World Fair here”. That project was of special importance for EWL. Thus, East Westphalia-Lippe’s external image continues to be that of a “non-core” region within the state of NRW. Public perception of EWL is rather diffuse and distorted with an article in the *Süddeutsche Zeitung* (no. 127, 2012, 7) referring to it as being “somewhere between Dortmund and Hannover [...] many farms and little towns”. The area still has an image problem and is relatively unknown throughout the rest of Germany. A study by the “Westphalia-Lippe Landscape Association” (LWL) in 2012 showed that, in comparison to the Ruhr Area or the Rhineland, on the rare occasions NRW and EWL are represented in school textbooks, it is usually in a negative way.

Despite its strong economic structure, people in NRW continue to associate EWL with attributes such as: rural, spacious, green and think of it in the context of agricultural industry rather than technology. The *Süddeutsche Zeitung* (no. 127, 2012, 7) recently wrote: “The name of this region is East Westphalia. It is so far away from anything that enemy bombers in World War Two felt it to be of no importance”. They added: “If the World really was flat, it would stop at Bielefeld.” EWL has long been seen as Germany’s “health and spa region” and the image of its convalescence clinics and rehab-centres partly reinforces public perception. Because of its landscape, EWL is often seen as an “escape to the country”. 6.4 million overnight stays in 2010 have made it one of the most attractive tourist areas in NRW.

But, there is another side to EWL. Despite its diffuse image, EWL has much potential. A survey on brand awareness and business location image, carried out in 2009 by the “Emnid Market Research Institute”, had positive results with almost 80% of respondents saying that they had heard of EWL (*Süddeutsche Zeitung*, no. 160, 2011.22). 503 of those interviewed were decision-makers from the fields of economics, science, politics and administration. In addition, in 2012 *Manager Magazine* conducted a study called “Image Profile 2012” and

interviewed 4.000 executives, directors and senior managers. The study confirmed a high ranking for EWL's economy and companies based there. In 2008 the regional business magazine *Brand Eins* dedicated their issue "A New Land – East Westphalia-Lippe – You Don't Need to Talk all the Time" to the region thereby uncovering much that was new. *Brand Eins* summed up the region's success and its low level of prominence under the motto: "Calmly, quietly successful". An chapter published by *The Economist* in April 2012 titled: "What Germany Offers the World" refers to "hidden champions" achieving global success due to their East Westphalia-Lippe location. The secret of success of companies such as Dr. Oetker, Miele, Beckhoff etc., is attributed to their regional subsidiaries providing stability during the current economic crisis and at other difficult times. "Beckhoff and its peers have global ambitions but their business culture has deep provincial roots" (*The Economist*, no. 04/2012). This seldom acknowledged culture which appears so traditional and provincial to outsiders, and in which the majority of medium-sized companies and family businesses were founded in EWL, encompasses sustainability, trust, innovation and co-operation. With the help of the aforementioned initiatives, regional willingness to co-operate was in evidence at the end of the 1990s and the beginning of the 2000s. Joint projects to deal with skills shortages and promotion of the region's images were ascribed to participants in the region co-operative working. Despite its traditional image, the formation of regional sector initiatives in the late 1990s showed that economically the region has been setting out for new shores for some time. Joined together as a symbol of regional economic power, the initiatives serve as a communication instrument both internally and externally. Today's 11 sector initiatives declare their success to be firmly anchored in regional companies (*The Economist*, no. 04/2012) and are internationally recognized as shown by the "EWL Maschinenbau e.V." network and the leading-edge cluster "it's owl e.V." (Intelligente Technische Systeme OstWestfalenLippe).

8.4.3 NEW IDENTITY CREATION AS PART OF REGIONAL SOCIAL CAPITAL (TRUST VALUE)

From a current perspective, it seems as though EWL has changed little externally. "In places like Bielefeld the future looks like an extension of the past" (*The Economist*, no. 04/2012). Unlike other regions which have created new images by following global trends and changing only on the outside, EWL has managed to utilise the tried and tested to improve quality of life and to create an identity as a strong economic and employment location. The regionally collective project "Zukunftsmeile Fürstenallee" is a business and science initiative for product and production innovation being undertaken with the aim of promoting EWL as a region of technology. The future of the region and its employees rests on an improved interchange

between science, business and companies. Other reasons for this pioneering project include the promotion of co-operation between SMEs and large companies as well as the crossing of boundaries between EWL's, historically divided, sub-regions so that the region presents a united front. "Although they (companies) often compete, they have a common interface: a location problem." (Herbert Weber, OWL GmbH, Süddeutsche Zeitung, No. 160, 2011.22). In the past few years, the region has developed new advertising and marketing concepts to raise awareness of its attractiveness as a place to live. Their slogan "EWL – at the top of North Rhine Westphalia and in the heart of Germany" proclaims the extent of the region's economic importance in NRW and the relevance of its central location in Germany. OstWestfalenLippe GmbH advertises for staff on its website using the slogan: "We Give Talents a Home" thereby giving prominence to a culture instrumental in acknowledgement and recognition. The creation of such new external perception of the region can be accounted to the regional "trust" value as part of the regional social capital. This again is reduced to the old EWL culture, which is family based at the one hand, but globally active on the other hand and rooted in deep regional co-operations, which in case of challenges and changes bundle their competencies.

To sum up: despite weak ethnic and landscape frames and undistinguished political competencies, EWL's efficient network-governance structures make it one of the most successful regions in Germany today. In view of the aforementioned activities and general awareness of networking and co-operation, the region can be considered as equipped for global competition. This is remarkable for a region where, traditionally, companies have followed a lone wolf mentality in entrepreneurship. None of the interview partners in our sample were able to provide a satisfactory explanation for the shift from "lone wolf to networker". If an interviewer attempted to address the issue of cultural change, the simplest answer to come in return was: "The time is ripe for networking".

8.4.4 EWL'S STRONG LABOUR AND BUSINESS FRAMES

The main reasons for cultural change in this region can be identified as strong labour and business frames. Both are attributable to the region's large number of family businesses and competent regional networking. In law, a family business is a company owned and operated by one family with members being at least second generation of that family. EWL is one of the top five German regions with the highest density of family businesses. Three of the others are large metropolitan areas: Munich, Hamburg and the Rhine-Ruhr area. In these regions family businesses do business alongside global listed companies whereas in EWL (and the area around Stuttgart) the industry culture is dominated by family businesses.

Obviously, not all companies in EWL are family businesses but they are important to the regional economy and labour frames. Most have a clear idea of how a family business should conduct itself and many, including the smaller family businesses, try to adhere to a code of conduct. An interview with August Oetker, one of the prominent family business owners in EWL, falls into this context. The company, better known as “Dr. Oetker” is interesting because of Oetker’s statement on the financial crisis. In a local newspaper interview published in January 2009, Oetker said that the strengths of family businesses are visible in times of economic crisis and that family businesses with their values of trust and morality, as well as endogenous capital, are models of success. Although these companies may not expand rapidly, are financially restricted and unable to access finance via the stock exchange, in times of crisis they exceed the performance of public limited companies. August Oetker went on to say that public companies’ short-term actions are not only a problem for economic performance, they also make it impossible to build a good corporate culture (rooted in a strong and beneficial social capital). Continuity in top management and a good working atmosphere are the keys to success (Neue Westfälische, no.14.01.2009). A good working atmosphere/culture is crucial for the recruitment and retention of (highly) skilled labour from other regions in Germany and from abroad. Another important aspect of family businesses is that they often act anticyclically. The “Miele” company in EWL is an example of a strongly traditional family business which even today refuses to introduce shorter working hours, just as it did during the 1929 Great Depression. Instead it uses the time as respite, to develop new products and to recruit demanded employees. It is an interesting approach and again, is typical of the region. Salaries in the region’s family businesses may be lower than in the larger concerns but jobs are more secure and working conditions better. In times of crisis, employees’ recruitment is a good and sensible strategy which wins over existing staff by evidencing a sound, stable business culture. The family-run business culture is strongly linked to organisation, production and innovation processes. The three main aspects can be summarised as:

1. *A high level of functional integration and a strong focus on product quality.* When it comes to production and innovation, EWL’s family businesses are highly integrated. The motive for this degree of functional integration appears to be a strong interest in quality control because high-quality products and processes are fundamental to most EWL family businesses. (“When we talk about quality, we mean business”). Technology and innovation are approached in the same way. Companies are aware of their competitive position on a technology-driven basis and strive to retain their most important technological skills within the company.

2. *Pragmatic method of organisation development* (form follows function).
The organisational structure of family businesses in EWL is generally very informal. Internal structures typically consist of short pathways, direct communication and flat hierarchies. A common feature consists of: first try it out, then test it, then do it. If it works, the organisational structure is passed on. Limited funds are another common feature of the region and settings are traditionally low-cost. This might be one of the reasons why so many local companies specialise in durable, high-quality products.
3. *A growing interest in regional networking*. Respondent interviews and case studies revealed a wide variety of indicators and statements which showed that the companies had achieved a stronger regional dimension in the previous 5 to 10 years. When regional out-sourcing experiments were discontinued, companies started paying more attention to regional level. None of the respondents could explain why this change took place.

Just as employees have a sense of responsibility to their companies, so are these particular types of companies in EWL accredited with responsibility toward both the region and their employees. According to one interviewee, a personal responsibility incorporating direct, intensive communication between employers and staff removes the need for bureaucratic decision processes thereby enabling resolutions to be reached faster. Such a culture makes it easier to cope with failure and to clarify how to move forward. Last but not least, people working for family businesses are able to put a face to their employers, although the face is not always that of a family member. A family business exists not only in economic terms but also impacts on everyday life. Owners stay rooted in shared histories when taking part in everyday events such as eating with staff in the company canteen. An owner of a large family business is reported to have said that he preferred local food and lived a very modest life. Luxury and intense lifestyles compare badly with the image of family businesses in EWL. If this concept of family businesses is interpreted using business and labour frames, one can see that family businesses are not solely legal concerns as there are many companies which, by definition, are not family businesses but claim to have a sense of family enterprise and to practice correspondingly. For example, one public company in the region said that it functions and practices more like a family business than a public company. An interviewee from the ICT industry said that he liked the idea of starting up a multi-generational family business and saw his business as a family for two reasons: firstly, his brother, sister and his brother-in-law already work there. Secondly, he regarded the company as family saying that: "Joining this company is like getting married." His other statements confirmed what he had previously said in that traditional family businesses view their employees as people and

guide them in creating participative, open work-related relationships where everyone helps one another in resolving conflicts in an open manner.

In conclusion, EWL has weak ethnic and landscape frames but is defined by its political frame which, in effect, is its potential. However, the strong business frame is the basis of today's strong labour frame and provides a cultural background for the optimisation of the political frame's potential.

8.5 CULTURAL ASPECTS AND STRATEGIES FOR COPING WITH STRUCTURAL CHANGE - SUMMARY AND CONCLUSIONS OF IMPRESSIONS AND QUESTIONS

What has emerged from these considerations of the role of culture and the question of structural change management? Does culture actually have a role? If so, is it possible to work out the specific aspects of successful structural change management? In answering these questions, one must keep in mind the key factors of successful strategies for dealing with structural change. If one follows the regional economic discussion, there are three important aspects to be found in these concluding considerations: Firstly, it is assumed that regional development, rather than beginning at zero, operates within a framework of pathways/path dependence. Secondly, mutual strategic action (regional governance) skills play an essential role in the management of path dependence should they change. Thirdly, there must be effective use of available resources as well as of resources that can be mobilised.

Meanwhile, path dependence has become a key category in the structural change debate. Martin (2006) sees an inability in path dependent processes to escape respective histories and goes on to say that path dependence has a location-dependent character. It produces geography, which, in turn, produces pathway dependence. Therefore, path dependence is a social construct, which refers to the significance of persistence and permits the possibility of change whereby cultural and material factors work in unison. On the one hand, technological and institutional convergence mechanisms, synchronisation of individual and organisational decisions and various forms of increasing economies of scale enable the emergence of path dependence and lock-in effects in regional economic development. On the other hand, location specific histories, multiple variations of knowledge development and institutional conditions generate diversity and heterogeneity in the economic landscape thereby providing a permanent impulse for the unlocking of dependency and path reconstruction (Martin, 2006).

The frames discussed here provide opportunities for differentiated analysis of change processes. Although the ethnic and landscape frames are largely stable during its course, the importance of structural change varies. A recognisable, historically developed frame, not just presented as a folkloric museum piece, can help to reinforce a region's visibility and distinctiveness within an increasing global cultural levelling. It can also, as cultural and social capital, strengthen the collective regional capacity to act. Out of the regions discussed in this chapter, Basel is a particular example. It is relevant that local produce and authenticity develop into growing niches in contrast to standardised mass production. In this respect, out of the regions studied, Wales stands out as an example. It can generally be assumed that traditional ethnic frames perceive themselves as increasingly challenged by global cultural trends, an aspect referred to in connection with the economic frame. The landscape frame, which at the beginning of industrialisation, was important due to natural resources such as raw materials, transportation and centrality, is seen differently today. Against a background of growing knowledge-based production, a qualified workforce is an essential resource for the successful management of structural change. In the face of demographic change and the predicted workforce shortage, the landscape frame again achieves importance through its opportunities for a better quality of life ("soft location factor").

In the regions investigated, the political frame has been shaped by considerable, albeit varied, upheavals beginning with fundamental system changes in Europe followed by a general trend towards decentralisation and regionalisation. Above all, in Brabant, East Westphalia-Lippe, Styria and Wales, it opened up a frame for regionally developed structural policy strategies. The strengthened position of border regions should not be underestimated. As part of the European unification process, the borders of Basel, Győr and Brabant have become increasingly fluid. It could, for example, be shown that in East Westphalia-Lippe opportunities derived from an altered political frame represent a potential which, though not necessarily effective if a shared economic or ethnic frame is already in place, could become particularly successful. The economic frame is central to structural change and its associated strategies and it is here that tensions are most distinct. As seen in East Westphalia-Lippe, an operational guide is available. There are similarities in Brabant although Brabant is aware of the tensions stemming from the growing global spread of central companies. Whereas these two regions, East Westphalia-Lippe and Brabant, have a relatively continuous path development, extensive schisms can be found in the other regions. In Styria and Wales there are splits between old and new industries and in Wales, Brandenburg and Győr, there are breaks between traditional, regionally-based economic frame elements and new, global involvement.

The relationship between a coherent frame, social capital, networks and regional capacity is strongest in East Westphalia-Lippe where it can be seen that a region's economic success is a shared thematic focus in its networking ability as well as in the perceptions of the actors. Based on social capital, regional actor networks promote trust as an important component of network building (Putnam, 1993). However, not all regions seem to be awarded the same social capital and decisive amount of trust. Peripheral regions point to a higher level of trust and associated network building than agglomerations or metropolitan areas. The level of trust needed for effective co-operation is characterised in peripheral regions by a particular proximity and culture as well as the need for mutual action. In EWL the family business culture assumes a certain degree of stability, continuity and values thereby creating a matrix of trust and regional connectedness. However, it comes at a price. Developing networks and regional co-operation costs a lot of strength. Regional connectedness can be so effective that a region becomes enmeshed within its own structures and is prevented from being able to act at a global level. There are dangers of a lock-in effect and actors being unable to see beyond their own positions leading to inflexible problem solving and lack of new knowledge acquisition for innovative actions.

Nevertheless, no region stands in isolation. All regions are, in various ways, engaged in perpetual global exchanges and are therefore, able to avoid being the sole subjects of focus. In this context, Appadurai's (2005) "5 scapes" could be employed as spaces for exchanging information and ideas to achieve simultaneous regionalisation and internationalisation. The *ethnoscape* describes inter-regional migration flows as well as tourist flows and how human mobility fosters knowledge transfer, especially of specialist knowledge held by (highly) skilled workers. With the help of new technologies, communication pathways and international financial system activities, the *technoscape* and *finanscape* are fluid spaces wherein networks and knowledge creation can be furthered. The last two "scapes": *mediascape* and *ideoscape* are particularly important to the formation and distribution of all regions' (including EWL) national and international image. If regions are in danger of focusing too strongly on their own interests, they need a stronger base in the individual "scapes". This could be achieved, for example, by selecting external stakeholders such as board members of different regional bodies, companies, etc. Regional universities, which act as international network exchange nodes, offer exchanges through summer schools as well as collaborating with their alumni to introduce new knowledge to the region, thereby retaining their involvement. Today, international (transnational) networks are part of all global companies and are maintained through economic relations as well as sustaining links with former employees. Organising international trade fairs and conferences in the region serves as a

way to exchange new ideas. Finally, the human capital strategy of every region must take (labour) migration into account and put strategies in place, which address return migration as well as new migrants who, through their international migration networks, become channels or pipelines of learning and knowledge exchange and sharing.

By comparison, in East Westphalia-Lippe and Basel there are two different, distinct structural policy development models. In East Westphalia-Lippe there is a marked regional strategy competence based on co-operation within a single frame. Basel has a metropolitan model criss-crossed by tension and conflicts, which unlike other regions discussed in this chapter, has led to the development of a productive force. Again, this has implications for (highly) skilled human resources as the key resource in structural change.

Overall, metropolitan regions seem to be more attractive to (highly) skilled workers and the global trend of rural-urban migration confirms this. There are however, no general statements which can define regional attraction (see also section 2.3.3). Although hard factors such as a region's infrastructure and positive city image, for example from its architecture, will determine the choice of where to live and work, regional attraction is also strongly influenced by soft factors such as a good quality of life, secure jobs, personal development opportunities, good salaries, social security, low-priced living costs and affordable property, job opportunities for partners and organised childcare. In addition, it should be noted that what (highly) skilled workers need from regions and cities varies and is often dependent on the life cycle of target groups. It is therefore, not surprising that graduates whose primary focus is their career, tend to gravitate to cities or metropolitan areas. Also, it is understandable that (highly) skilled workers with well-advanced careers and a family want to move out of the big cities and be able to watch their children growing up in a green environment. National regions, which often have achieved the best results in terms of attraction, act as an example and reference measure when general evaluations are made of how attractive a region should be. In the German region of EWL, Munich or Frankfurt rate highly in attraction whereas the Brabant region sees Randstad as an attractive place. From the point of view of Graz, Vienna would be its reference region. From a Welsh perspective, Cardiff would look to London, or more probably to Edinburgh, as a model region and so on. As previously described, what most regions lack in attractiveness, is an essential urbanity, a flourishing climate and global architectural symbols. Basel was one of the first to manage its dissatisfaction with decorative features and emulated the "Bilbao effect" by amassing architectural trophies (Calatrava, Zaha Hadid, Norman Foster, Frank Gehry, Cesar Pelli) which facilitated an orientation towards globalised Toronto (Frank Gehry, Will Alsop, Daniel

Libeskind), Berlin (Frank Gehry, Foster, Libeskind, Richard Rogers, David Chipperfield) and Peking (Herzog & de Meuron, Rem Koolhaas, Foster, Skidmore, Owings & Merrill).

To summarise: there are significantly different ways to examine frames in regions and their influence on regional economic performance. The fact is that culture matters and it cannot be disregarded that one frame is more decisive than another. Therefore, it is better to consider individual frames as potentials which, under given circumstances, can be either mobilised or left unused. How the frames are utilised depends on factors such as available time, management or market opportunities as well as a heavy reliance on a region's circumstances.

ACKNOWLEDGEMENTS

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Further material the chapter refers to:

David, A. (2010): Vom Einzelkämpfer zum Netzwerker: Gestaltung regionaler Außenwahrnehmung; Ergebnisse der CURE-Vertiefungsstudien. Internet-Dokument. Gelsenkirchen: Institut Arbeit und Technik. Forschung Aktuell, Nr. 02/2010.

David, A. (2009): Gestaltung regionaler Bilder - Shaping Regional Images: Kurzbericht "CURE - Corporate Culture & Regional Embeddedness", 6th Framework Programme. Gelsenkirchen: Institut Arbeit und Technik.

N. Clifton, Regional Report Wales, CURE Deliverable 26 (Cardiff 2009).

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S. Gärtner/D. Rehfeld, Regional Report East Westphalia Lippe, CURE Deliverable 24 (Gelsenkirchen 2009).

KWI Institute for Advanced Studies in the Humanities, Regional Report Brandenburg Southwest, CURE Deliverable 27 (Essen 2009).

M. Losoncz/M.Szombathelyi, Regional Report Győr Region, CURE Deliverable 25 (Győr 2009).

E. Nussmüller/L. Lengauer/F. Tödtling, Regional Report Styria, CURE Deliverable 30 (Wien 2009).

P. Prud'homme van Reine/B. Dankbaar, Regional Report Southeast Netherland, CURE Deliverable 28 (Nijmegen 2009).

8.6 SUMMARY OF THE THESIS' CORE

The previous chapters 3-8 are the core of the thesis. Each chapter deals with specific strategies for mobilisation, retention and (re)-attraction of highly skilled workers as part of a long-term regional human capital agenda. Moreover, some chapters take several regional preconditions such as culture into closer consideration. In terms of the development and implementation of these “bottom-up” strategies actor networks are described as supporting instruments. They are regarded as appropriate instruments closing the gap as long as top down policies are missing. But even then, actor networks as argued, can be advantageous as they are of a by far flexible nature then further regional organisations or institutions. Moreover, actor networks base on common values, understanding and are rooted in the same regional culture – attributes which are regarded as social capital.

CHAPTER 9: CONCLUSIONS

9.1 INTRODUCTION TO THE CONCLUSIONS

The topic of this dissertation is the problem experienced by many European regions, that they lack (adequate) regional human capital, which is also regarded as a major societal challenge by national and EU political and social actors. The problematic issue of a lack of (adequate) regional human capital as relevant to regional socio-economic development is underlined by several academic studies. An overview of interdisciplinary research in the field of innovation and knowledge, presented in this thesis, indicates that highly skilled workers are the main knowledge carrier needed for regional economic development; at the same time they form the backbone of regional societies (compare for instance Stockhorst, 2011; Fikkers, 2005), and therefore they build the target group of employees that regions and their companies want to attract.

Europe is facing other social challenges related to the problem of (adequate) regional human capital. One is the aging European population. Likewise, current events show that migration flows are growing within Europe and to Europe from overseas, which is causing new encounters. There are also labour market disequilibria and high unemployment rates in several European countries and regions, which are rendered even more severe by the economic and financial crises. The current picture shows that on the one hand there is a skills shortage in several European regions, especially related to knowledge-based sectors, while on the other hand, there is much untapped potential, which is not being used to its full extent.

These socio-economic challenges point even more strongly to the demand for highly skilled workers and their specific knowledge, which will accelerate in future times. There is still a backlog on national and regional agendas, including policies and strategies based on existing mechanisms to assure a sustainable human capital stock.

This problem description was taken as the initial starting point of the thesis. Given this societal problem, this dissertation attempts to provide insights into and understand the mechanisms and conditions underlying regional human capital strategies, in order to develop and implement them. An insight into the mechanisms related to human capital and understanding them is relevant in the context of strategy development and its implementation, because identifying these mechanisms and understanding them allows regions to take action. The mechanisms can be quite different (causal) relations in society.

For instance, the relation between personal preferences and migration motives, the relation between the demand and supply of engineers, the relation between internal knowledge types and external knowledge flows, or the relation between the mobilisation and motivation of untapped labour potential.

Measures address a specific mechanism, such as addressing particular personal preferences, the curricula in education systems or the (re)-inclusion options of target groups into VET and the labour market.

If a particular human capital related mechanism is not relevant in a certain region, for instance if there is no higher education and no supply of engineers, there is no basis or possibility to develop strategies. Following this line of argument, the development and implementation of human capital strategies are regional choices, depending on the presence and/or absence of human capital related mechanisms. In this thesis, for instance, the following human capital related mechanisms were taken into closer consideration: migration and return migration behaviour (brain flow), including motives for migration according to push and pull factors, new migration patterns and their related knowledge flows, the living and working conditions and choices of highly skilled workers, identifying regional untapped labour potential and its motivation to further education, incentives of and possibilities for highly skilled graduates to remain in the region after their study, the openness of alumni to (re)-attraction. The results of the research are summarized and presented in section 9.2.

This thesis focuses is not on who should make these regional choices – government or societal actors, or both in some form of governance arrangement – rather, a special research focus is laid on the role of actor networks in the processes of human capital strategy formulation. Our interest does not lie in who should be in charge of human capital strategy agendas or in government-society relations. The reason for the consideration of actor networks involvement in human capital strategies lies in their position in agenda setting and regional problem definition, as described in section 2.5.1. Although the demand for highly workers reached a peak in several regions, for a long time highly skilled workers were not on the national and regional policy agenda. While several regions experienced a brain drain, it took time to identify a common regional problem definition and get the issue on the political agenda. As a reaction to the skills shortage, several non-government actors in these regions became active in the identification of possible human capital mechanisms and strategy formulation before government became involved. Consideration of the role of actor networks in these processes is also important, because (1) actor networks are regional resources based on social capital. Regional actor networks are founded on the common regional

culture; values, trust and traditions. The result is that actor networks are well informed about regional demands and the ways to approach a problem. They know the regional strengths and weaknesses – they follow the regional path dependence. (2) A further positive influence of actor networks on the formulation of human capital strategies was recognised in this thesis in their potential as co-creators and co-producers of regional government policies. (1) This follows from the observation that actor networks often act at the interface between the identification of human capital mechanisms (alumni networks have an overview of the willingness and openness of alumni to (re)-attraction and possible incentives to achieve such (re)-attraction) and strategy development. In that way, they are faster to assess the existence of a mechanism, which can later be addressed by regional strategies. (2) Actor networks already co-operate with other regional actors, including regional government, in problem definition. Actor networks can contribute to problem solving by creating side-effects of their priority actions. This means, that even if an issue is not the first priority of an actors' network, because of its bridging and bonding ability, it can become part of the action using strong and weak ties and being itself a bridge within a wider networking context.

The thesis shows that a number of different actor networks – such as alumni networks, migration networks, policy networks like the higher education system networks, and issue networks like regional economic networks – appear to be appropriate resources for the bottom-up development and implementation of human capital strategies. This is due to nature of flexibility in actor networks and their ability to respond rapidly to a problem or issue, compared with government or governmental strategies (compare for instance Butzin, 2000; Cooke, 1996). These network abilities are rooted inter alia in the flat hierarchies and horizontal communication of actor networks.

9.1.1 RESEARCH QUESTIONS

To attempt to gain insights into and to understand the mechanisms underlying human capital strategies and to fully unfold these strategies, the following research question was formulated:

What kinds of strategies take regions (including non-core regions) into consideration to assure an appropriate regional human capital stock for a sustainable regional economy and how do actor networks support this purpose?

This general research question was expanded with the sub-questions of chapters 3-8. These questions are not precisely identical with the questions posed in chapters 3-8, but are assimilated into the overall question and the structure of this thesis.

- Chapter 3: What kind of regional supportive concepts and actor networks facilitate brain exchange to promote knowledge spillover effects based on various migration patterns?
- Chapter 4: What is the contribution of social capital in the form of learning networks to the (re)-inclusion of the untapped labour potential of vulnerable and marginalized groups?
- Chapter 5: How do (university) alumni networks function as retention and (re)-attraction instruments for highly skilled workers?
- Chapter 6: To what extent do migration networks influence the migration decision of highly skilled graduates, and have migration motives changed over time?
- Chapter 7: How do R&D policies, research infrastructure and regional economic networks impact on the development and recruitment of highly skilled workers?
- Chapter 8: How do cultural aspects and regional path dependence as part of social capital accomplish structural change in labour markets?

9.1.2 APPROACH

A multi-disciplinary and a mixed-method approach was chosen to investigate the key research question and the sub-questions. The decision to adopt a multi-disciplinary approach was governed by the notion that the importance of human capital and especially of highly skilled workers needs integral and holistic consideration. As highly skilled workers are depicted as the carriers of knowledge and have an impact on societal and economic regional development, an interdisciplinary view appeared necessary, because the topic of human capital seems to have far-reaching anthropological consequences.

In order to highlight the topic from different academic angles, several scientific disciplines have been incorporated, such as spatial (planning) science, social science, communication science, economics, and cultural science. The research focused on innovation and knowledge approaches, actor networks, firm and cluster theories, migration theories, and regional attraction models. The mixed-method approach of the empirical chapters includes qualitative and quantitative data based on previously accomplished surveys.

9.2 RESULTS AND CONCLUSIONS

The results of the literature review lead to the assumption that there is a great demand for varieties of knowledge possessed by highly skilled workers. This demand mainly relates to specific knowledge-based sectors and firms.

As discussed in this thesis, the literature also argues that this demand increased during the shift to the knowledge-based economy, causing a structural change, which requires more knowledge and specific skills. This knowledge is important for regions if they are to remain innovative and competitive within a globalised and internationalised world.

In addition, another research strand focuses the social impact of highly skilled workers on regions and takes their far-reaching anthropological consequences into account. It is claimed that highly skilled workers have a role as the backbone of regional societies and they influence the creation of regional social capital.

Moreover, several studies argue that first and foremost the so-called non-core regions (defined as border and peripheral regions) have greater difficulty in retaining and (re)-attracting highly skilled workers, as there are fewer mechanisms open to these regions, which can be addressed by developed strategies.

To solve the regional problem of the lack of an (adequate) stock of regional human capital, the research studies used in this thesis suggest focusing on migration, inclusion and new qualification.

In addition, the literature analysed revealed that actor networks around related issues such as alumni, migration, education and learning, knowledge transfer, and innovation can set specific preconditions for actors to act as co-creators and co-producers of solution-solving strategies.

9.2.1 CONCLUSIONS FROM THE CHAPTERS

The core of the thesis includes chapters 3-8, which present insights into possible regional human capital strategies addressing the mechanism identified. These chapters also consider the development and/or implementation of strategies by regional actor networks, which again in this thesis are regarded in the role of co-creators and co-producers of such strategies.

SPILLOVER EFFECTS

The initial question based on chapter 3 asks:

What kind of regional supportive concepts and actor networks facilitate brain exchange to promote knowledge spillover effects based on various migration patterns?

Several concepts are known from the literature, which turn out to have a positive impact on the facilitation of brain exchange while at the same time promoting migration-related knowledge spillover effects. For instance, Klagge and Klein-Hitpaß (2010), Saxenian (2007), and Israel (2006) focus on the positive aspect of return migration in the form of brain exchange on regions. To make full use of the migrant knowledge spillover effects, Cassarino (2004) points to the importance of regional inclusion as a concept that has a positive influence on a successful migration process. He argues that the more “successful” a migration process is, the more benefits it can bring to both the domestic and the receiving region. The regional absorptive capacity described by Cohen and Levinthal (1990) suggests that the brighter a regional knowledge base is, the better and faster it can identify and absorb external knowledge to manifest it regionally.

The results of chapter 3 suggest that a better insight into the mechanisms of various migration patterns allows regions to create and use tailor-made concepts to facilitate brain exchange and knowledge spillover effects. In line with the literature, these concepts are recognised as inclusion and regional absorptive capacity. Inclusion aims to give the individual the feeling of being part of the regional society and in doing so, works with trust issues, which allow them to identify their specific skills and knowledge more quickly. These again can spill over into the region, given a well-developed knowledge base. A well-developed regional knowledge base, which works to support knowledge spillover effects, includes already allocated highly skilled workers and students, universities and advanced research organizations as well as knowledge-based sectors and firms. This collectively existing knowledge can better identify new knowledge and match it with the knowledge deficits of the region. This insight into migration-related knowledge flows is the starting point on which strategies can be developed.

Furthermore, chapter 3 discovered that the new forms of migration networks such as alumni networks, transnational migration networks, or new diaspora, could offer greater support to brain exchange. These actor networks, when addressing brain flow mechanisms, can influence the inclusion of migrants with the attitude of a “welcoming culture” (door open

function, job search function etc.). In addition, the named new migration networks are able to promote migration-related knowledge spillovers in two main ways: as knowledge generating and knowledge exchanging platforms, because these networks often provide a local buzz and act as global pipelines connecting the region through the actors involved to global flows and vice versa.

SOCIAL CAPITAL AND (RE)-INCLUSION OF UNTAPPED POTENTIAL

The initial question based on chapter 4 asks:

What is the contribution of social capital in the form of learning networks to the (re)-inclusion of the untapped labour potential of vulnerable and marginalized groups?

The literature on social capital describes it as beneficial at two levels (compare for instance Putnam, 2000; Coleman, 1988): the individual level and the group level. Social capital in the form of networks is a regional resource and a precondition for several regional actions based on common values, trust issues, traditions and culture. Thus, human capital co-operating in networks and its collective knowledge base influence the regional social capital and vice versa. Social capital, especially in the form of learning networks is a regional resource that can contribute (O'Reilly, 2005) to the (re)-inclusion of regional labour untapped potential, if these target groups exist in the region and are open to further education. In that context Yildis (2013) argues that the so-called vulnerable and marginalized groups such as (post) migrants and also early school leavers, people with disabilities etc. have not yet been taken fully into consideration. But these groups are untapped labour potential and carry knowledge, which can be useful for the regional social and economic development and their (re)-inclusion into VET and labour markets, which is a human capital strategy.

Generally speaking, chapter 4 claims that a holistic regional human capital strategy (see human capital model in section 2.4) should be taken into consideration by regions. "VAM"-vulnerable and marginalized groups ((post) migrants, early school dropouts, people with disabilities) - are regarded as regional untapped labour potential, which can be further educated, especially when strategies for highly skilled worker retention and (re)-migration are not sufficiently effective. This strategy particularly concerns the non-core regions, which are described as border and peripheral regions and often are less attractive to highly skilled workers.

The results of chapter 4 show that the (re)-inclusion of VAM groups into VET and even the labour market can be preceded regionally by the improvement of learning networks as part of

the regional social capital. Especially helpful in this context, it appears that learning networks based on services such as Web 2.0 and 3.0 offer a kind of innovative form of learning. This is because these forms of learning are independent of place and time and therefore particularly address groups of people who often need more flexibility, such as VAM groups. The viewpoint of chapter 4 is that these learning networks foster co-operation and trust between learners and teachers and contribute to collective learning situations, thus increasing the group-related and individual social capital. This collectively gained knowledge and further development of VAM groups can positively impact regional social capital and regional development in general.

ALUMNI NETWORKS AS RETENTION AND (RE)-ATTRACTION INSTRUMENTS

The initial question based on chapter 5 asks:

How do (university) alumni networks function as retention and (re)-attraction instruments for highly skilled workers?

Summarizing the findings of studies on alumni networks, which are higher education networks (such as university alumni networks), these are recognized as gaining in importance over the last several years (see for example Sá, 2010; Benneworth & Hospers, 2007, Wolfe, 2005). Alumni networks are regarded as universities' (service) contacts. In the first instance the idea of alumni networks is based on alumni commitment to their alma mater by donating and/or associating. In return, alumni networks offer former students information on the universities' activities and help them to keep in touch. Moreover, they act as social networks based on mutual exchange and the organization of various events for the target groups. In doing so, alumni networks keep up contact with highly skilled workers, even when they leave the region. But even before that, alumni networks try to bind students to their alma mater during their study period. Alumni networks, in this thesis, are a good example of networks that may co-create and co-produce human capital strategies, as a side-effect.

Another strand of the literature that takes account of the regional attraction perspective (cf. e.g. Hospers, 2010) argues, that (re)-attracting highly skilled workers who already have ties to a specific region is much easier than attracting people who have never been in touch. Hospers (2010) calls this concept "warm city marketing". Considering the results of the literature review as a whole, it is clear that people who once lived in a specific region are easier to address than strangers to the region.

The results of chapter 5 lead to the following conclusions. Personal regional networks such as alumni networks can be used as retention and (re)-attraction instruments for highly skilled workers, to facilitate their stay in the region and their return to the region. Alumni networks are able to provide a “warm feeling” (loaned from Hospers’ concept of “warm city marketing”) about the home region to the target groups, because personal relations are the direct linkage to a region. In the main, alumni networks take over the role of personal relations, when highly skilled workers toy with the idea of return migration after several years. Then, alumni networks, as part of the alma mater, are the first contact points for the returnees, when friends and colleagues are no longer located in the region.

Further results of chapter 5 are that alumni networks, as part of regional universities, can step into the retention and (re)-attraction function (which is not their primary function), when they use their communication channels not for university purposes only, but also for regional purposes. Moreover, they contribute to the retention and (re)-attraction of highly skilled workers when using the mutual exchange to provide their members with regional job opportunities and a regional welcoming culture. The outcome of chapter 5 is that if alumni networks want to tackle their retention and (re)-attraction function, they should be more professional in the sense of organizational structure and staff, and look for closer co-operation with the university career centres, press offices or career counselling. In doing so, they can expand and accelerate their actions. Close links to regional stakeholders such as firms, chambers of commerce, regional agencies etc., can also increase the alumni networks’ retention and (re)-attraction endeavours.

MIGRATION DECISIONS OF HIGHLY SKILLED GRADUATES

The initial question based on chapter 6 asks:

To what extent do migration networks influence the migration decision of highly skilled graduates and have migration motives changed over time?

The broad literature on migration theories embraces the topic of migration networks. The literature on migration networks reviewed for this thesis uncovered that these, including e.g. transnational networks and new diaspora, still come into action when a human takes the decision to leave the native country in order to migrate (compare for instance Castles et al., 2014; Pries, 2013). For instance, studies of Lee (1966), Castles et al. (2014) provide the information that main migration processes (excluding e.g. war refugees) are still strongly socio-economically motivated.

The results of chapter 6 relate to this body of literature and show that the migration of highly skilled graduates is still mainly motivated by socio-economic reasons, because there are labour market disequilibria and income differences and these refer also to the group of highly skilled workers in Europe. In addition to the literature review, the clear-cut outcome of our own survey research is that highly skilled graduate migration is not driven by income differences alone, as has been attributed to lower skilled migration processes. Further push-pull factors (see Lee, 1966) can be listed. Over time socio-economic migration motives also changed, because today's highly skilled graduates not only search for higher incomes, but also for appropriate career development and extended job opportunities within an international context (e.g. new language acquisition, transnational relations).

Migration networks and personal ties, such as new diaspora networks, alumni networks, and transnational migration networks, play an important role in job searching by highly skilled migrants in the receiving region and in the process of planning and accomplishing a migration, because many highly skilled graduates still rely on the first-hand experience of their predecessor. Therefore, such networks, which involve family, friends or colleagues', should be more focused if they are to be used as attraction instruments and knowledge spillover pipelines.

REGIONAL ECONOMIC NETWORK IMPACT ON THE RECRUITMENT OF HIGHLY SKILLED WORKERS

The initial question based on chapter 7 asks:

How do R&D policies, research infrastructure and regional economic networks impact on the development and recruitment of highly skilled workers?

The literature on regional innovation capacity, like Chesbrough and Bongers (2014), and Dyer and Singh (1998), claim cross-organisational collaborations as the central success for company innovation. In line with that, Etzkowitz and Leydesdorff (2000) also name the "Triple Helix" or issue networks (Oermen, 2012) as a kind of policy network, which can act as additional tools for regions and their economies. With regard to human capital development, Tremblay (2006), for example, points to clusters as regional economic networks that play a pivotal role. This can be explained by the firms' proximity within a cluster and the industrial atmosphere contributing to employee skill development and learning effects. Additionally, Terstriep et al. (2014) argue that a decentral type of regional government structure including political frameworks has a positive impact on the development and establishment of regional R&D policies, research infrastructure, and economic networks, which are the foundation for

faster regional actions to respond to intra and inter-regional demands, such as the development and recruitment of highly skilled workers.

Based on a regional analysis, the findings of chapter 7 show that governance structures organized decentrally can positively support regional R&D policies, research infrastructure and regional economic networks. In doing so, these conditions can be developed more independently. Such a regional “atmosphere” fosters mutual actor co-operation and networks. These again can set their focus of action on regional points of interest such as the development and recruitment of regional human capital. This refers to the fact that decentralization leads to greater flexibility. This flexibility allows faster feedback and the faster development and implementation of regional bottom-up policies. These policies, then, are the umbrella under which strategies of e.g. actor networks and further co-operations can be formulated and realized in an accelerated process.

Chapter 7 especially points to the role of clusters, as regional economic actor networks mainly regarded as policy or issue networks, in the process of further development and recruitment of highly skilled workers. This can be reduced to the fact that clusters usually are built as “Triple Helix” co-operations, where the exchange of information, knowledge, employees, and solutions is better organized among the partners and accords with the needs of regional sectors and firms. The short lines of communication and long-term co-operations within a cluster allow the partners involved to act quickly and more demand-oriented.

IMPORTANCE OF CULTURAL ASPECTS TO STRUCTURAL CHANGE

The initial question based on chapter 8 asks:

How do cultural aspects and regional path dependence as part of social capital accomplish structural change in labour markets?

An overview of the wider research on the influence of cultural aspects and path dependence suggests that culture, which is the foundation of regional social capital, has an impact on regional economy and structural changes (Asheim, 1996; Piore & Sabel, 1985). Especially regional frames grounded in regional culture (Cooke & Rehfeld, 2011; Goffman, 1974) that are regarded as schematic and interpretive frameworks can help actors to understand actions and constellations of a particular situations, to act in more solution-oriented way.

The results of chapter 8 show that cultural aspects such as cultural frames and path dependence prove to be useful when coping with structural changes and labour market

topics such as human capital development and assurance, because mutual strategic action skills, as part of regional governance structures, play an important role in changing regional pathways and mobilising regional potentials.

Moreover, the results of chapter 8 reveal that regional cultures are mirrored in traditions, values, trust issues, which are part of the social capital and influence the quantity and quality of regional co-operations. For instance, when a region is traditionally associated with a strong labour and business framework, it is easier for the regional actors to find adequate co-operation and build networks, in order to work on a specific issue. Regions with strong business and labour frameworks show greater motivation and faster implementation of the development of labour market related strategies when accomplishing a structural change, than regions that are more rooted in an ethical or a landscape framework.

9.3 GENERAL CONCLUSIONS AND THEIR REGIONAL RELEVANCE

9.3.1 GENERAL CONCLUSIONS

The conclusions drawn in the previous section (section 9.2) give answers to the six sub-questions and build towards the general conclusions. The following results also consider the literature review of this thesis and reply to the key research question:

What kinds of strategies take regions (including non-core regions) into consideration to assure an appropriate regional human capital stock for a sustainable regional economy and how do actor networks support this purpose?

The fact that there is a demand for highly skilled workers as carriers of specific types of knowledge triggered by the shift to the knowledge-based economy, was not only exposed by the literature review used for this dissertation (compare for instance Coenen & Flikkers, 2010; Tripl & Maier, 2007), but is also a result of a survey accomplished as part of this research work (chapter 7). In addition, the literature review brought together insights into the importance of highly skilled workers and their knowledge to the regional economy and society (compare for instance Greve et al. 2006; Florida, 2006; Flikkers, 2005). In line with this, it is argued that mainly specific groups such as (post) migrants and return migrants (compare for instance Saxenian, 2012 and 2007; Klagge & Klein-Hitpaß, 2010) can have positive effects on regional performance, because they also are carriers of external knowledge (e.g. Faggian & McCann, 2009; Faist, 2007). Referring to Malmberg & Power (2005), this is even more important for regional innovation capacity than internal knowledge. Against this background, and fostered by the current socio-economic challenges in Europe,

regions are asked to develop and implement human capital strategies, which aim at sustainable regional development. Here, sustainable regional development is regarded in a plurality of ways. Human capital and especially highly skilled workers can increase regional innovation performance by their knowledge, and the regional standard of living and attraction by e.g. financial incentives. They have a positive impact on the regional social capital and network building as one of the region's resources. And so the regional knowledge base increases. A region with a strong stock of human capital can react better and faster to global flows and regional demands.

In that context, a specific role was assigned to actor networks, which by their bridging and bonding ability (Putnam, 2000), as well as by their strong and weak ties (Granovetter, 1973), can support the development and implementation of bottom-up human capital strategies as their co-creators and co-producers (Voorberg et al., 2014).

In line, this thesis offers the following general conclusions:

The main result of this thesis is, that regions can use a variety of human capital strategies to address identified human capital related mechanisms, in order to assure an (adequate) regional human capital stock. Taking into consideration the results of chapters 3-8, such a plural approach should be of a holistic nature addressing a mix of strategies for the mobilisation, retention and (re)-attraction of highly skilled workers, driven by actions including migration, inclusion and new qualification. In order to face such an undertaking, the thesis' results show that specific regional preconditions are important. These preconditions can be regarded as regional frameworks, which function as brackets or an umbrella enclosing any actions fulfilled for this purpose. First, culture has been discussed in this thesis as a framework condition. Culture facilitates regional actor networks (which are a regional resource) with common traditions, values and trust issues on which regional social capital is built. Social capital in this context is important because it positively impacts the ability of regional co-operations and the building of actor networks as a regional resource, which can later address specific regional foci by their bridging and bonding activities. Secondly, a well-developed economic structure as a precondition is of value. It attracts and assures the existence of knowledge-based sectors and firms within a region, which provide highly skilled workers with appropriate and attractive job opportunities and a flexible and diverse working culture. Firms interacting globally are found to be especially attractive to highly skilled workers. Moreover, regional firms can have a positive influence in the context of retaining of highly skilled workers and their further educational development (see vocational training, in-company training). Thirdly, the regional knowledge base is the foundation for the

identification and absorption of external knowledge. External knowledge was identified as important to the regional ability to innovate. The regional knowledge base can be described as the collective regional knowledge comprising regional universities, students, highly skilled human capital, knowledge-driven firms and clusters, as well as knowledge-based sectors. It is argued that the brighter and more diverse a regional knowledge base is, the better external knowledge (in the form of manifold knowledge types) can be identified and matched to regional requirements and knowledge deficits. Fourthly, a decentralised regional governance structure can respond faster and more flexibly to global flows and regional demands. This implies a multi-level government mix of various regional actors of organisations, institutions and networks to identify mechanisms faster, formulate strategies and implement them. When these framework conditions are in balances they exert a positive impact on the attraction of highly skilled workers.

A main result of this dissertation is that actor networks could be identified as regional resources based on social capital, which can support the co-creation and co-production of regional human capital bottom-up strategies. Several types of actor networks were introduced in the course of this dissertation, such as higher education networks, various kinds of migration networks, economic networks, and issue networks as part of the regional policy networks. In comparison to further government organisations, the involvement of actor networks as co-creators and co-producers of human capital strategies can be attributed to such characteristics as their flexible nature, their flat hierarchical structure and organisation, and their focus-oriented findings. Moreover, actor networks can accomplish the development and implementation of such strategies, not only in their primary, but also in their secondary function using their strong and weak ties as bridging and bonding instruments (as so-called side-effects). Regarding regional actor networks as part of the regional social capital, based on common culture, traditions, and as trust issues and values, there is a close co-dependence between the regional network building process and the creation of regional social capital. Moreover, the overall results show that cultural path dependence matters for regional development, because it is also based on the regional culture. Thus this thesis has revealed that social capital and path dependence could be an advantage or a disadvantage for the capacity for regional actor co-operations and network building, as well as action.

Finally, a further outcome is that regional image and regional attraction are not solely dependent on regional symbolic capital such as a popular architecture and metropolitan lifestyle. Regional attraction is strongly connected to socio-economic factors, such as good career development opportunities, housing, social relations, and an environment open to diversity. Strategies addressing such matters as the inclusion and a welcoming culture,

which imply an open and tolerant environment, and the consideration of individual biographies (such as migration processes), seem to be attractive to highly skilled workers.

9.3.2 RELEVANCE TO REGIONAL ACTORS

The research reported here is relevant to regions in several ways. It has attempted to provide insights and to understand the mechanisms underlying human capital strategies. Several regional actors could support such a process, but actor networks, as a regional resource based on social capital, were considered as co-creators and co-producers of such strategies.

The following incentives are suggested for regional policy makers (regional governance including several actors' networks, higher-education institutes, firms and others).

First of all, this thesis provides insights into the topic of highly skilled workers. It has revealed that human skills and potential do not depend solely on qualification levels and/or qualification degrees. A large number of employees have been identified as highly skilled workers because of their current working positions and the related skills. Additionally, untapped labour potential still exists in each region, which is provided by neglected, vulnerable and marginalised groups. The potential of migrants and return migrants has still not yet been fully uncovered. Policy makers and firms should aim at solutions to uncover these potentials. On the one hand, there is a need for the faster recognition of qualifications and degrees from abroad and inclusive approaches regarding individual migration biographies, in order to identify external knowledge, which is useful for regional purposes. During this process, it will be necessary to develop further qualifications for migrant/re-migrant employees to quicker reach the national education level, in order to prepare them for (re)-inclusion into the labour markets. Firms with a high demand for highly skilled workers are asked to devoted more effort to "in-company training" or "vocational and advanced training" to further develop their own stock of employees, or to take vulnerable and marginalised groups into closer consideration. Moreover, tacit knowledge, which is described as hard to translate into new setting, should command more attention from various regional actors, when talking about knowledge migration. Tacit knowledge maybe can be unfold and communicated when cultural setting of receiving countries are similar to cultural settings of the domestic countries. This is a further argument, why it is of importance to consider migration biographies individually.

The research also provided that a mix of regional concepts and regional strategies addressing various groups of highly skilled workers seem to be the best solution to develop a

sustainable regional human capital stock. Before the formulation of a strategic mix, it is important to identify human capital related mechanisms, to be addressed by such strategies. Moreover, it is important to clearly define responsibilities among regional actors in terms of identifying human capital mechanisms and developing and implementing strategies. Especially policy makers are asked to put such a strategy-mix on the regional agenda, in order to increase regional innovative capacity and competitiveness. Special consideration may be given to the role of regional actor networks, which have been identified as a regional resource based on social capital for the co-creation and co-production of human capital strategies. Actor networks such as alumni networks, transnational migration networks, new diaspora, learning networks, and economic and issue networks can, under certain conditions, be used by regions for the retention and (re)-attraction of highly skilled workers. With their bridging and bonding function (compare for instance Putnam, 2000; Coleman 1998) they act as a local buzz factor and a global pipeline at the same time and exchange human capital (e.g. return migrants), social capital (e.g. knowledge, information) and financial capital (e.g. remittances). A determination of regional responsibilities for the development and implementation of human capital strategies by actors allows regions to reach their goals faster and more efficiently, and avoids overlapping strategies.

The research reported in this dissertation argues that specific framework conditions such as a regional culture, a well-developed knowledge base and a good regional economic structure and a decentralised governance structure, facilitate the rise of human capital in terms of better external knowledge absorption, increased numbers of highly skilled workers, the creation of social capital, and actor networks. Based on this, the improvement of the regional knowledge base by the allocation of higher education institutes, the increase of regional R&D activities, the number of students and graduates, as well as a mix of knowledge-based firms, helps regional actors to better identify new inflowing knowledge and match it with the regional needs to broaden the regional knowledge base. Thus, policy makers and universities should make efforts to attract students and knowledge-based companies from outside, in order to gain regional knowledge and provide highly skilled workers with career development possibilities. For better absorption and usage of migration-related knowledge spillover effects, especially firms, in their position as employers, should consider migration processes and biographies more individually, and develop different concepts and strategies relevant to diverse migration patterns.

Finally, regions in general, but especially non-core regions, should not solely concentrate on symbolic capital creation, but rather on the creation of an appropriate economic structure including attractive career possibilities and working environments for highly skilled workers,

which are flexible and which can use their full potential. Here policy-makers are asked to set up incentives that e.g. correlate with the lifecycles of highly skilled workers and provide them with benefits they will not find in other regions (escalator regions).

9.4 CONTRIBUTION TO BODY OF KNOWLEDGE AND AREAS FOR FUTURE RESEARCH

9.4.1 CONTRIBUTION TO CURRENT RESEARCH

The contribution of this dissertation to the body of knowledge is mainly visible in the following aspects:

Many scholars have studied the importance of knowledge and knowledge types on regional innovation performance (see for comparison e.g. Malecki, 2010; Asheim & Coenen, 2006; Butzin, 2000; Polanyi, 1966). There is also a body of literature on highly skilled workers (cf. e.g. Trippel & Maier, 2007) as carriers of knowledge, and migrants as well as return migrants who have a positive impact on regional economies (Saxenian, 2012; Klagge & Klein-Hitpaß, 2010). Nevertheless, no literature has been found that reports integrative studies of the contribution of knowledge of a variety of groups of humans as regional innovators. Among other things, this thesis highlights the untapped labour potential of vulnerable and marginalised groups. Moreover, the knowledge of alumni as part of the flow of return migrants was expanded and the migration motives of highly skilled graduates were analysed at the micro-level and compared to previous migration motives.

In general, human capital was for long time an old-fashioned term, which had rather a negative connotation. The usage of the word “capital” in conjunction with “human(s)” was avoided. The term “capital” was considered as too economics-oriented and it was brought into context with financial assets. Today, human capital is once again being used. This dissertation also describes “human capital” as the worth of humans’ potential, abilities, skills and knowledge and contributes to the consideration of human capital not solely in economic terms, but in line with Coenen & Flikkers (2010), stresses its importance as a backbone of regional societies and its far-reaching anthropological importance.

In the literature many researchers emphasise the importance of a brain gain (compare for instance Faggian & McCann, 2009) especially with regard to non-core regions (compare for example Stockhorst, 2011; Coenen & Flikkers, 2010; Flikkers, 2005), suggesting single strategies to avoid a skills shortage. This dissertation fills the research gap and offers insights into the mechanisms and conditions for the development and implementation of regional human capital agendas to gain brains. It suggests a holistic view of the development

of human capital, including the identification of its mechanisms and a mix of strategies aimed at migration, inclusion and new qualification. Moreover, it provides information on the need for regional framework conditions, such as culture, knowledge base, economic and governance structure, which are considered as the regional foundation for the development of regional human capital and which raise the attraction of highly skilled workers. At the same time, this work argues that regional attraction is not primarily bound to symbolic capital and an open and tolerant environment (Florida, 2002 and 2008) but rather to concepts such as inclusion, which provides a welcoming culture and absorptive capacity and considers individual pathways, in order to make greater use of human knowledge.

There is a broad literature on actor networks and their performance on regional economies (e.g. Terstriep & Lüthje, 2014; Porter, 1998) or on migration and transnational networks (Pries, 2001) as knowledge exchange platforms as well as on issue networks, as a kind of policy network (Oermen, 2012). But no research is to be found on the performance of actor networks in the identification of human capital mechanisms and the development and implementation of human capital strategies. The consideration of multiple actor networks as co-creators and co-producers of a human capital agenda is a contribution of this thesis to regional human capital development. Hereby, actors' networks were studied as a regional resource based on regional social capital. Especially actor networks, which are not primarily created for human capital development, such as alumni networks, are here presented as innovative actors in the development of bottom-up strategies.

9.4.2 FUTURE AREAS OF RESEARCH

The main motivation throughout this dissertation was to provide insights into and to understand the mechanisms underlying a wide variety of regional human capital strategies. Even if this thesis could give answers to its key research questions, there is still space for future research.

To complete the research on the identification of human capital mechanisms and the development and implementation of human capital strategies, the following areas of research could be identified. More evaluation needed on the effectiveness of strategies to address human capital with special attention to highly skilled workers. Research could mainly highlight the failures and success stories to give other regions the chance to modify their own human capital agendas. In line with that, further research into actor networks as co-creators and co-producers of human capital strategies is needed regarding their transformative nature and side-effects. The identification of further actor networks, which were not taken into

consideration in this thesis, could give a fuller picture of regional possibilities of human capital development.

In the context of growing migration flows to Europe from e.g. third states as current events show, this thesis encourages future research on refugees as further untapped labour groups. Many refugees who reach the borders of Europe are highly skilled workers in their native countries. They are often regarded as the best brains in their home countries, but they represent a brain waste in Europe. There still are not enough strategies to fully identify and absorb their knowledge and the law regulations and regional policies are often too time-consuming to react fast and effective.

Further concepts of migration and mobility should be focused on by future research to enhance the inter-European migration of young people, who could respond to the disequilibria in the European labour market and decrease the unemployment rate of young people. For instance, VET mobility programmes are one possibility to steer migration or migration on approval, which can offer a long-term perspective. Here, further research is demanded to find out what are the insecurities of young people when making a migration choice, and why certain groups are often excluded from VET mobility programmes and migration options.

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SUMMARY IN ENGLISH

Actor networks are claimed to offer solutions to regional development. In the past, studies argued the importance of actor networks in regional innovation and firms' performance. Nonetheless, there is less research dealing with actor networks' role in the development of an adequate regional human capital stock. This study investigates whether and how actor networks can be regarded as co-creators and co-producers of regional human capital strategies by using a bottom-up approach.

The lack of an adequate human capital is a common problem of European regions, which is also regarded as a major societal challenge by national and EU political and social actors. Foremost, highly skilled workers as carriers of knowledge are of importance. This is because knowledge is identified to be the key factor of the knowledge-based economy. At the same time highly skilled workers form the backbone of regional societies and therefore they build the target group of employees that regions and their companies want to attract.

Simultaneously, Europe is facing other social challenges related to the problem of (adequate) regional human capital. One is the aging European population. Likewise, current events show that migration flows are growing within Europe and to Europe from overseas, which is causing new encounters. There are also labour market disequilibria and high unemployment rates in several European countries and regions, which are rendered even more severe by the economic and financial crises. The current picture shows that on the one hand there is a skills shortage in several European regions, especially related to knowledge-based sectors, while on the other hand, there is much untapped potential, which is not being used to its full extent. These socio-economic challenges point even more strongly to the demand for highly skilled workers and their specific knowledge, which will accelerate in future times. There is still a backlog on national and regional agendas, including policies and strategies based on existing mechanisms to assure a sustainable human capital stock.

It is thanks to the relevance of the highly skilled workers and their knowledge that regions develop and implement human capital strategies to mobilise their human capital potential and retain and (re)-attract highly skilled workers as a long-term endeavour. In that context the so-called non-core regions, which are defined here as border and peripheral regions, characterised by a lower level of attraction, are finding it even more necessary to develop a sustainable human capital model, including a mix of strategies to address highly skilled workers.

Thus, to solve the problem of the lack of an adequate stock of human capital, in this dissertation, regional resources are taken into more careful consideration, as one of the preconditions for developing and implementing regional human capital strategies. Throughout this thesis, actor networks are discussed as such a resource. This study handles actor networks as regional resources and part of the regional social capital, which can turn out to be advantageous when addressing specific regional issues. The study shows that a number of different actor networks – such as alumni networks, migration networks, policy networks like the higher education system networks, and issue networks like regional economic networks – appear to be a resources for the bottom-up development and implementation of human capital strategies. This is due to nature of flexibility in actor networks and their ability to respond rapidly to a problem or issue, compared with government or governmental strategies. These network abilities are rooted inter alia in the flat hierarchies and horizontal communication of actor networks.

This problem description was taken as the initial starting point of the thesis. Given the societal problem of lacking an adequate regional human capital stock, this dissertation attempts to provide insights into and understand the mechanisms and conditions underlying regional human capital strategies, in order to develop and implement them. An insight into the mechanisms related to human capital and understanding them is relevant in the context of strategy development and its implementation, because identifying these mechanisms and understanding them allows regions to take action. The mechanisms can be quite different (causal) relations in society. For instance, the relation between personal preferences and migration motives, the relation between the demand and supply of engineers, the relation between internal knowledge types and external knowledge flows, or the relation between the mobilization and motivation of untapped labour potential. Measures address a specific mechanism, such as addressing particular personal preferences, the curricula in education systems or the (re)-inclusion options of target groups into vocational education and training and the labour market.

Against this background and in order to attempt to gain insights into and to understand the mechanisms underlying human capital strategies and to fully unfold these strategies, the following research question was formulated, which was expanded and elaborated by further sub-questions in the thesis' chapters:

What kinds of strategies take regions (including non-core regions) into consideration to assure an appropriate regional human capital stock for a sustainable regional economy and how do actor networks support this purpose?

A multi-disciplinary and a mixed-method approach was chosen to investigate the key research question and the sub-questions. The decision to adopt a multi-disciplinary approach was governed by the notion that the importance of human capital and especially of highly skilled workers needs integral and holistic consideration. As highly skilled workers are depicted as the carriers of knowledge and have an impact on societal and economic regional development, an inter-disciplinary view appeared necessary, because the topic of human capital seems to have far-reaching anthropological consequences. The results of this study thus provide insights into the mechanisms underlying human capital strategies.

The main result is, that regions can use a variety of human capital strategies to address identified human capital related mechanisms, in order to assure an (adequate) regional human capital stock. Taking into consideration the results of the chapters, such a plural approach should be of a holistic nature addressing a mix of strategies for the mobilisation, retention and (re)-attraction of highly skilled workers, driven by actions including migration, inclusion and new qualification. In order to face such an undertaking, the studies' results show that specific regional preconditions are important. These preconditions can be regarded as regional frameworks, which function as brackets or an umbrella enclosing any actions fulfilled for this purpose. First, regional culture has been discussed in this thesis as a framework condition. Culture facilitates regional actor networks (which are a regional resource) with common traditions, values and trust issues on which regional social capital is built. Social capital in this context is important because it positively impacts the ability of regional co-operations and the building of actor networks as a regional resource, which can later address specific regional foci by their bridging and bonding activities. Secondly, a well-developed economic structure as a precondition is of value. It attracts and assures the existence of knowledge-based sectors and firms within a region, which provide highly skilled workers with appropriate and attractive job opportunities and a flexible and diverse working culture. Firms interacting globally are found to be especially attractive to highly skilled workers. Moreover, regional firms can have a positive influence in the context of retaining of highly skilled workers and their further educational development (see vocational training, in-company training). Thirdly, the regional knowledge base is the foundation for the identification and absorption of external knowledge. External knowledge was identified as important to the regional ability to innovate. The regional knowledge base can be described as the collective regional knowledge comprising regional universities, students, highly skilled human capital, knowledge-driven firms and clusters, as well as knowledge-based sectors. It is argued that the brighter and more diverse a regional knowledge base is, the better external knowledge (in the form of manifold knowledge types) can be identified and matched to

regional requirements and knowledge deficits. Fourthly, a decentralised regional governance structure can respond faster and more flexibly to global flows and regional demands. This implies a multi-level government mix of various regional actors of organisations, institutions and networks to identify mechanisms faster, formulate strategies and implement them. When these framework conditions are in balances they exert a positive impact on the attraction of highly skilled workers.

A further result of this dissertation is that actor networks could be identified as regional resources forming social capital, which can support the co-creation and co-production of regional human capital bottom-up strategies.

Moreover, actor networks can accomplish the development and implementation of such strategies, not only in their primary, but also in their secondary function using their strong and weak ties as bridging and bonding instruments (as so-called side-effects). Regarding regional actor networks as part of the regional social capital, based on common culture, traditions, and as trust issues and values, there is a close co-dependence between the regional network building process and the creation of regional social capital. Additionally, the overall results show that cultural path dependence matters for regional development, because it is also based on the regional culture. Thus this thesis has revealed that social capital and path dependence could be an advantage or a disadvantage for the capacity for regional actor co-operations and network building, as well as action.

Finally, a further outcome of the study is that regional image and regional attraction are not solely dependent on regional symbolic capital such as a popular architecture and metropolitan lifestyle. Regional attraction is strongly connected to socio-economic factors, such as good career development opportunities, housing, social relations, and an environment open to diversity. Strategies addressing such matters as the inclusion and a welcoming culture, which imply an open and tolerant environment, and the consideration of individual biographies (such as migration processes), seem to be attractive to highly skilled workers.

Based on the overall results, the contribution of this dissertation to the body of knowledge is mainly visible in the following aspects. In general literature emphasise the importance of a brain gain especially with regard to non-core regions, suggesting single strategies to avoid a skills shortage. This dissertation fills the research gap and offers insights into the mechanisms and conditions for the development and implementation of regional human capital agendas to gain brains. It suggests a holistic view of the development of human

capital, including the identification of its mechanisms and a mix of strategies aimed at migration, inclusion and new qualification. Moreover, it provides information on the need for regional framework conditions, such as culture, knowledge base, economic and governance structure, which are considered as the regional foundation for the development of regional human capital and which raise the attraction of highly skilled workers. At the same time, this work argues that regional attraction is not primarily bound to symbolic capital and an open and tolerant environment but rather to concepts such inclusion, which provides a welcoming culture and absorptive capacity and considers individual pathways, in order to make greater use of human knowledge.

Additionally, there is a literature on actor networks and their performance on regional economies or on migration and transnational networks as knowledge exchange platforms as well as on issue networks, as a kind of policy network. But this study gives insights into the performance of actor networks in the identification of human capital mechanisms and the development and implementation of human capital strategies. The consideration of multiple actor networks as co-creators and co-producers of a human capital agenda is a contribution of this thesis to regional human capital development. Hereby, actors' networks were studied as a regional resource based on regional social capital. Especially actor networks, which are not primarily created for human capital development, such as alumni networks, are here presented as innovative actors in the development of bottom-up strategies.

NEDERLANDSE SAMENVATTING

Van actor-netwerken wordt gezegd dat ze zouden kunnen bijdragen aan regionale ontwikkeling. In het verleden benadrukten onderzoeken het belang van actor-netwerken voor regionale innovatie en de prestaties van bedrijven. Toch is er minder onderzoek gedaan naar de rol van actor-netwerken bij de ontwikkeling van een toereikende voorraad menselijk kapitaal in de regio. Deze studie onderzoekt of en in hoeverre we actor-netwerken kunnen zien als coproducten van strategieën op het gebied van menselijk kapitaal in de regio. Hierbij is gekozen voor een benadering van onderaf.

Het gebrek aan voldoende menselijk kapitaal is een bekend probleem in veel Europese regio's en wordt door politieke en maatschappelijke actoren op zowel nationaal als EU-niveau als een belangrijk maatschappelijk vraagstuk gezien. Allereerst zijn hoogopgeleide arbeidskrachten van belang als dragers van kennis. Want kennis is een essentiële factor in onze kenniseconomie. Hoogopgeleide arbeidskrachten zijn tevens de ruggengraat van regionale samenlevingen en zij vormen dan ook de doelgroep van werknemers die regio's en de daarin opererende bedrijven willen aantrekken.

Europa heeft daarbij nog met andere maatschappelijke problemen te maken die verband houden met het gebrek aan (toereikend) menselijk kapitaal in de regio. Eén voorbeeld is de vergrijzende Europese bevolking. En de recente gebeurtenissen laten zien dat migratiestromen binnen Europa en vanuit andere delen van de wereld naar Europa toenemen, wat nieuwe uitdagingen met zich meebrengt. In veel Europese landen en regio's is bovendien het evenwicht op de arbeidsmarkt verstoord en heerst er grote werkloosheid. De economische en financiële crises hebben deze situatie alleen maar verergerd. Op dit moment zien we dat er enerzijds een gebrek is aan vaardigheden in verschillende Europese regio's, met name binnen de kennisintensieve sectoren, terwijl er anderzijds veel onbenut potentieel is, dat niet optimaal wordt ingezet. Deze sociaaleconomische problemen maken de vraag naar hoogopgeleide arbeidskrachten en hun specifieke kennis nog groter, en die vraag zal in de toekomst alleen maar toenemen. In nationale en regionale beleidsagenda's is nog weinig tijd aandacht voor dit vraagstuk, ook als het gaat om beleidsmaatregelen en strategieën die gebaseerd zijn op bestaande mechanismen die een duurzame hoeveelheid menselijk kapitaal moeten garanderen.

Dankzij de relevantie van hoogopgeleide arbeidskrachten en hun kennis ontwikkelen en implementeren regio's strategieën voor menselijk kapitaal om hun potentieel aan menselijk kapitaal te mobiliseren en hoogopgeleide arbeidskrachten vast te houden en (opnieuw) aan te trekken. Dat is een langetermijnsinspanning. In deze context vinden de zogenaamde niet-kernregio's, die hier worden omschreven als grensregio's en perifere regio's met een nog lagere aantrekkingskracht, het nog belangrijker om een duurzaam model voor menselijk kapitaal te ontwikkelen, inclusief een combinatie van strategieën om hoogopgeleide arbeidskrachten aan te trekken.

Om het gebrek aan een toereikende voorraad menselijk kapitaal op te lossen gaat dit proefschrift nader in op de beschikbare regionale hulpbronnen, een basisvoorwaarde voor het ontwikkelen en implementeren van regionale strategieën voor menselijk kapitaal. In dit proefschrift worden actor-netwerken als zo'n hulpbron beschouwd. In deze studie worden actor-netwerken als regionale hulpbron behandeld en deze worden als onderdeel gezien van het sociale kapitaal van de regio, wat een voordeel kan zijn bij de aanpak van specifieke regionale vraagstukken. De studie laat zien dat een aantal verschillende actor-netwerken – zoals alumninetwerken, migratienetwerken, beleidsnetwerken (zoals netwerken binnen het hogeronderwijssysteem) en issue-netwerken (zoals regionale economische netwerken) – een nuttige hulpbron blijken te zijn voor ontwikkeling van onderaf en de implementatie van strategieën voor menselijk kapitaal. Dat komt door de flexibiliteit van actor-netwerken en hun vermogen snel op een probleem of vraagstuk te reageren vergeleken met (strategieën van) de overheid. Dit vermogen vloeit onder meer voort uit de platte hiërarchie en de horizontale communicatielijnen binnen actor-netwerken.

Deze probleemstelling vormde het eerste uitgangspunt van het proefschrift. Gezien het maatschappelijke probleem van het gebrek aan een toereikende hoeveelheid menselijk kapitaal in de regio, wil dit proefschrift inzicht geven in de mechanismen en voorwaarden die ten grondslag liggen aan regionale strategieën voor menselijk kapitaal, om deze strategieën te kunnen ontwikkelen en implementeren. Inzicht in de mechanismen die een rol spelen bij menselijk kapitaal en een beter begrip ervan is relevant binnen de context van strategieontwikkeling en -implementatie, want als is vastgesteld hoe deze mechanismen werken, kunnen de regio's in actie komen. Deze mechanismen kunnen bestaan uit zeer uiteenlopende (causale) relaties in de samenleving, zoals de relatie tussen persoonlijke voorkeuren en migratiemotieven, de relatie tussen de vraag naar en het aanbod van ingenieurs, de relatie tussen interne kennistypen en externe kennisstromen, of de relatie tussen de mobilisatie en motivatie van onbenut arbeidspotentieel. De maatregelen zijn

gericht op een specifiek mechanisme, zoals aandacht voor bepaalde persoonlijke voorkeuren, curricula in het onderwijs of (hernieuwde) toegangsmogelijkheden voor doelgroepen tot het beroepsonderwijs, trainingen en de arbeidsmarkt.

Tegen deze achtergrond en om inzicht te krijgen in de mechanismen die ten grondslag liggen aan strategieën voor menselijk kapitaal en om deze strategieën volledig te kunnen ontplooiën, is de volgende onderzoeksvraag geformuleerd, die aan de hand van deelvragen verder wordt uitgewerkt in de hoofdstukken van het proefschrift:

Welke strategieën overwegen regio's (inclusief niet-kernregio's) om een toereikende voorraad menselijk kapitaal in de regio te garanderen voor een duurzame regionale economie, en hoe dragen actor-netwerken daaraan bij?

Voor het bestuderen van de onderzoeksvraag en de deelvragen is gekozen voor een multidisciplinaire en mixed-method aanpak. De keuze voor een multidisciplinaire benadering werd ingegeven door het besef dat het belang van menselijk kapitaal en in het bijzonder van hoogopgeleide arbeidskrachten een integrale en holistische aanpak vereist. Omdat hoogopgeleide arbeidskrachten worden gezien als dragers van kennis en dus invloed hebben op de maatschappelijke en economische ontwikkeling van de regio, bleek een interdisciplinaire blik noodzakelijk. Het onderwerp menselijk kapitaal lijkt immers verstrekkende antropologische consequenties te hebben. De resultaten van deze studie bieden inzicht in de mechanismen die ten grondslag liggen aan strategieën voor menselijk kapitaal.

De belangrijkste conclusie is dat regio's verschillende strategieën voor menselijk kapitaal kunnen hanteren als ze zich bezighouden met bepaalde mechanismen op het gebied van menselijk kapitaal, om een (toereikende) voorraad menselijk kapitaal in de regio te garanderen. Rekening houdend met de resultaten die in de hoofdstukken worden gepresenteerd, moet een dergelijke meervoudige aanpak holistisch van aard zijn en gericht op een combinatie van strategieën voor de mobilisatie, het vasthouden en (opnieuw) aantrekken van hoogopgeleide arbeidskrachten, gestimuleerd door maatregelen op het gebied van migratie, inclusie en nieuwe kwalificaties. Uit de onderzoeksresultaten blijkt dat specifieke regionale basisvoorwaarden hierbij van belang zijn. Deze basisvoorwaarden kunnen gezien worden als regionale kaders, die functioneren als paraplu en alle voor dit doel genomen maatregelen kunnen omvatten. Allereerst wordt in dit proefschrift de regionale cultuur als kadervoorwaarde genoemd. De cultuur faciliteert regionale actor-netwerken (die een regionale hulpbron vormen) met gemeenschappelijke tradities, gedeelde waarden en

wederzijds vertrouwen waarop het regionale sociale kapitaal steunt. In deze context is sociaal kapitaal van belang vanwege de positieve invloed ervan op mogelijke regionale samenwerkingen en het vormen van actor-netwerken als regionale hulpbron. Deze netwerken kunnen zich later op specifieke regionale aandachtspunten richten met hun verbindende activiteiten. Ten tweede is een goed ontwikkelde economische structuur een belangrijke basisvoorwaarde. Een economische structuur is aantrekkelijk voor kennisintensieve sectoren en ondernemingen in de regio en kan hun aanwezigheid waarborgen. Deze sectoren en bedrijven bieden hoogopgeleide arbeidskrachten passende en aantrekkelijke carrière mogelijkheden en een flexibele, afwisselende arbeidscultuur. Vooral ondernemingen die internationaal actief zijn, blijken aantrekkelijk te zijn voor hoogopgeleide arbeidskrachten. Bovendien kunnen ondernemingen in de regio een positieve invloed uitoefenen als het gaat om het vasthouden van hoogopgeleide arbeidskrachten en hun verdere opleiding en ontwikkeling (denk aan beroepsopleidingen, interne trainingen). Ten derde vormt de regionaal aanwezige kennis de basis voor de identificatie en opname van externe kennis. Externe kennis is van belang voor het innovatievermogen van de regio. De regionaal aanwezige kennis kan worden omschreven als de collectieve regionale kennis. Daaronder vallen regionale universiteiten, studenten, hoogopgeleid menselijk kapitaal, op kennis gebaseerde ondernemingen en clusters, evenals kennisintensieve sectoren. Gesteld kan worden dat hoe uitgebreider en diverser een regionale kennisbasis is, hoe beter externe kennis (in de vorm van velerlei kennistypen) kan worden herkend en gekoppeld aan regionale eisen en kennisachterstanden. Ten vierde kan een gedecentraliseerde regionale governance structuur sneller en flexibeler reageren op mondiale menselijk kapitaal stromen en regionale behoeften. Dit impliceert een overheidsmix op meerdere niveaus van diverse regionale actoren van organisaties, instellingen en netwerken die mechanismen sneller moeten herkennen en strategieën moeten formuleren en implementeren. Wanneer deze kadervoorwaarden in evenwicht zijn, hebben ze een positieve invloed op de aantrekking van hoogopgeleide arbeidskrachten.

Een andere conclusie van dit proefschrift is dat actor-netwerken kunnen worden gezien als regionale hulpbronnen die een sociaal kapitaal vormen, dat de gezamenlijke creatie en productie van menselijk kapitaal in de regio van onderaf kan ondersteunen.

Actor-netwerken kunnen bovendien de ontwikkeling en implementatie van zulke strategieën bewerkstellingen, niet alleen in hun primaire rol, maar ook in hun secundaire rol, waarin ze als overbruggings- en verbindingsinstrumenten gebruikmaken van hun sterke en minder sterke banden (ook wel neveneffecten genoemd). Als we regionale actor-netwerken als onderdeel zien van het sociale kapitaal in de regio, gebaseerd op een gemeenschappelijke

cultuur, tradities, wederzijds vertrouwen en gedeelde waarden, is er een nauwe onderlinge afhankelijkheid tussen het regionale proces van netwerkvorming en de creatie van sociaal kapitaal in de regio. Bovendien blijkt uit de resultaten dat culturele padafhankelijkheid relevant is voor regionale ontwikkeling, omdat deze ook gebaseerd is op de regionale cultuur. Dit proefschrift heeft aangetoond dat sociaal kapitaal en culturele padafhankelijkheid zowel een voor- als nadeel kunnen vormen voor regionale actor-samenwerkingen, netwerkvorming en maatregelen.

Een andere uitkomst van het onderzoek is, ten slotte, dat een regionaal imago en regionale aantrekkingskracht niet alleen afhankelijk zijn van symbolisch kapitaal in de regio, zoals populaire architectuur en een metropolitische levensstijl. Een aantrekkelijke regio hangt sterk samen met sociaaleconomische factoren, zoals goede carrièreperspectieven, huisvesting, sociale relaties en een omgeving die ruimte biedt voor diversiteit. Strategieën die zich richten op zaken als inclusie en een gastvrije cultuur, wat een open en tolerante omgeving impliceert, en waarbij rekening wordt gehouden met individuele levensgeschiedenissen (zoals migratieprocessen), lijken aantrekkelijk te zijn voor hoogopgeleide arbeidskrachten.

Op basis van alle resultaten is de bijdrage van dit proefschrift aan het vakgebied vooral zichtbaar in de volgende aspecten. In de literatuur wordt het belang van een *brain gain* benadrukt, vooral als het gaat om niet-kernregio's, en worden er individuele strategieën voorgesteld om een tekort aan vaardigheden te voorkomen. Met dit proefschrift wordt een leemte in het onderzoek opgevuld. Het biedt inzicht in de mechanismen en voorwaarden voor de ontwikkeling en implementatie van strategieën voor menselijk kapitaal in de regio, om meer hoogopgeleide mensen aan te trekken. Het onderzoek pleit voor een holistische kijk op de ontwikkeling van menselijk kapitaal, waarbij ook wordt gekeken naar de onderliggende mechanismen, en een combinatie van strategieën die gericht zijn op migratie, inclusie en nieuwe kwalificaties.. Bovendien biedt het informatie over de behoefte aan regionale kaders, zoals cultuur, een kennisbasis en een economische en governance structuur. Deze kaders worden gezien als de regionale basis voor de ontwikkeling van menselijk kapitaal in de regio, en ze maken de regio aantrekkelijker voor hoogopgeleide arbeidskrachten. Tegelijkertijd betoogt dit proefschrift dat regionale aantrekkingskracht niet alleen verband houdt met symbolisch kapitaal en een open, tolerante omgeving, maar vooral met zaken als inclusie, een concept waarin een gastvrije cultuur wordt geboden en een opnemend vermogen en waarin individuele routes in overweging worden genomen, om menselijke kennis beter te kunnen benutten.

Daarnaast bestaat er literatuur over actor-netwerken en wat die kunnen bereiken voor regionale economieën. En over migratie en transnationale netwerken als platforms voor kennisuitwisseling, evenals over issue-netwerken als type beleidsnetwerk. Deze studie geeft inzicht in de positieve rol van actor-netwerken bij het herkennen van mechanismen voor menselijk kapitaal en de ontwikkeling en implementatie van strategieën voor menselijk kapitaal. Door meervoudige actor-netwerken te beschouwen als medescheppers en medeproducenten van een agenda voor menselijk kapitaal draagt dit proefschrift bij aan de ontwikkeling van menselijk kapitaal in de regio. Actor-netwerken zijn hierin bestudeerd als een regionale hulpbron, gebaseerd op sociaal kapitaal in de regio. Met name actor-netwerken, die niet primair zijn opgezet voor de ontwikkeling van menselijk kapitaal (zoals alumninetwerken), worden hier gepresenteerd als innovatieve actoren bij de ontwikkeling van strategieën van onderaf.

ABOUT THE AUTHOR

Alexandra David was born on October 17th, 1977 in Katowice, Poland, where she spent the first 10 years of her life and attended the primary school. After moving to Germany, she studied communication science, English and aesthetics at the University Duisburg-Essen. She holds a Magister degree in communication science. Moreover, she accomplished economic studies at the FernUniversity of Hagen. Since 2006 Alexandra David is researcher at the Institute for Work and Technology, Westphalian University in Gelsenkirchen, Germany and works for the research department "Innovation, Space & Culture". In addition to her working experience as a researcher, in 2013 she worked for the mundi consulting AG in Bern, Switzerland. In 2011 Alexandra David started to work on her doctoral research at the CSTM - Department of Governance and Technology for Sustainability at the University of Twente.

Her field of research mainly focuses on human capital and the exploitation of untapped regional human capital potential. Her research on human capital can be summarised under the key attributes of migration, inclusion and qualification. Moreover, her accomplished research projects deal with regional cultures and regional attraction of highly skilled workers, knowledge transfer as part of new migration patterns as well as actors and communities of innovation.

Selected publications:

David, A., Barwińska-Małajowicz, A. (2015): Opting for Migration: Is it just an Economic Necessity? A Comparison between German and Polish Highly skilled Graduates. *In: Journal of Education and Training Studies*, 3(2), 114-125.

David, A., Terstriep, J. (2015): Regional Framework Conditions for Future Careers Related to Transport and Mobility. *In: Journal of Strategy and Management*, Special Issue: Green and Sustainable Innovations in Smart Cities: Business Models and Ecosystems, 8(3), 211-230.

David, A., Barwińska-Małajowicz, A. & Coenen, F. (2012): From Brain Drain to Brain Exchange: How to Use Better Highly Skilled Workers; A Conceptual Approach. *In: Unia Europejska.pl*, 216(5), 25-35.

David, A., Coenen, F. (2014): Alumni Networks – An Untapped Potential to Gain and Retain Highly-Skilled Workers? *In: Higher Education Studies*, 4(5), 1-17.

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ANNEX

INTERVIEW GUIDELINE (CHAPTER 5)

Questionnaire on Alumni Networks and Alumni Network Managers

Background of the survey

This document is regarded as a guide for the questionnaire planned in phase 2 as part of the Sub-project BRAND – Border Regions Alumni Network Development. It is based on the Project Application Form and the inside described tasks under the category 'Methodology'. Additionally it refers to the discussion held at the BRAND Kick-off meeting (7-8 June 2011) in Gelsenkirchen among the project consortium. It summarizes the discussion and gives advice for the planned regional data collection.

PART 1 – General Questions

- Founding year?
- Initiators/Supporters (material/immaterial)?
- Number of members? – Further financial sources?
- Organization and management structure?
- How does the network define the term 'Alumni Network' within its framework?
- Is the Alumni Network part of a department or a faculty, or is it an overall university Alumni Network?
- Number of the occupied employees (half time or full time occupation)?
- Which legal form does the Alumni Network have?
- Are there already internal evaluations about the network?

PART 2 – Membership and Finances

- How is the member structure of network (faculty/gender/graduation/academic degree /intern or extern alumni/age-group)?
- How does the Alumni Network administer the personal data? Own portals? Use of commercial social networks such as Facebook, LinkedIn?
- How does the network handle the property rights? Does it have an effect on the network activities?
- How do the networks acquire new alumni? – Contacting from hearsay?
- How is the degree of acceptance of the Alumni Network among potential members?
- What is needed to become a member of the Alumni Network? Are there any limitations for the enrolment?

- Benefits for universities, students, alumni and external (materiell/immaterial)?
- How is the Alumni Network founded/financed? Fundraising/sponsoring/donating?
- Is there any contribution paid by the members and are the contributions graduated?

PART 3 – Network Activities und Marketing Strategies

- What are the network activities (newsletters, events etc.)?
- How is the network organized (central/decentral)?
- Are there any ranges of services?
- Do the services vary among the members depending on their paid contribution?
- Whom do the network try to address? Who is the audience?
- What instruments are used for addressing the audience?
- What does the operational work look like? Concrete activities?
- Is there any strategic network orientation?
- Are there any instruments to measure the network's success?
- How does the activity radius look like (regional, inter-regional, international)?
- Does the network take use of the university marketing?
- Is there a branding/image strategy with regard to the network (public performances e.g. logo, webpage etc.)
- Is there any communication strategy?
- Is there a plan how to bind alumni to the university and to the network?
- Does the network take part in further Alumni Network associations (national, or even international)?
- How could the network's activity portfolio be completed (what is realistic, what is not)?
- Uncovered alumni demands (Are there any, and is there a realistic way to cover them)?

PART 4 – (Inter-)regional Embeddedness and Co-operation

- Is there a further link between the network and the region apart from the university?
- What regional co-operations are given?
- Are there any co-operations with regional economy, companies etc.?
- Are the network supporters parts of private or public institutions?
- Is the Alumni Network part of any regional projects?
- Are there further existing contacts or nodes to regional key authorities?
- Is internationalization relevant for the network?

INTERVIEW GUIDELINE (CHAPTER 6)

Questionnaire on Highly Skilled Graduates Migration Motives

Background of the survey

This is an interview guideline, which is the basis work of data collection for the comparison of Polish and German highly skilled graduates. The questionnaire, in its original is much broader. Here, only parts, which were taken closer into consideration for the planned article, are presented. The questionnaire, as presented here, has been translated into English. The original languages of the questionnaire are Polish and German.

PART 1 – Motives and Directions

1. What circumstances would influence your decisions about labour-related emigration?

	Circumstances	Yes	No
(1)	I see no other way to earn money	☐	☐
(2)	I would earn more money abroad	☐	☐
(3)	I could speak/learn a foreign language	☐	☐
(4)	My family is moving abroad as well	☐	☐
(5)	I would have equal rights, as citizens of the country	☐	☐
(6)	I would have better career development chances and career opportunities than in the home country	☐	☐

3. What directions/which countries would you prefer for emigration?

4. Have you already been working abroad?

- Yes ☐
No ☐

5. How would you allocate your money earned abroad, if you would take a return migration into consideration?

6. Do you use national or European wide informal networks to find a job?

Yes ☐

No ☐

PART 2 – Jobs and Qualifications

1. In what occupation/with which qualification could you find easily a job in Poland/Germany or abroad? (Please specify at least two types of jobs or qualifications)

In Poland/ In Germany (depends on where the questionnaire was spread):

1.

—

(Please explain your choice)

2.

—

(Please explain your choice)

Abroad:

1.

—

(Please explain your choice)

2.

—

(Please explain your choice)

1. If you could retrain or further train by qualification or courses, which direction/occupation would you choose/prefer (when addressing the Polish labour market)?

2. If you could retrain or further train by qualification or courses, which direction/occupation would you choose/prefer (when addressing the labour markets abroad)?

PART 3 – Further information

1. Your birth year

19____

2. Gender:

(1)	Female
(2)	Male

3. Marital status?

(1)	Single
(2)	Standing Partnership
(3)	Married
(4)	Further (please specify).....

4. Place of residence?

(1)	I leave with my parents
-----	-------------------------

(2)	WI have my own home
(3)	Further (please specify).....

5. Language Skills? Which?

6. In which of these countries were your born/were your parents born?

		You	Mother	Father
(1)	Germany	☐	☐	☐
(2)	Turkey	☐	☐	☐
(3)	Poland	☐	☐	☐
(4)	Russia	☐	☐	☐
(5)	Further (please specify)			

INTERVIEW GUIDELINE (CHAPTER 7)

Questionnaire on Future Careers related to Transport and Mobility

Background of the survey

With the increased demand for future mobility concepts such as electromobility and the associated necessary technical and social changes, a shift in the demand concerning employees' competences in the automotive industry and related sectors occurs. Due to this change and the increasing complexity of production processes, e.g. in the field of assembly processes, the need for new work organizations and process skills emerged. The question arising in this context is whether the existing regional human resources meet the needs of regional companies also regarding long-term developments. The study refers exclusively to tertiary education related to electromobility and among that to the graduates of regional universities and universities of applied sciences. It asks whether a *(mis)match of qualification degrees and companies' requirements in the e-mobility related sectors* exists in the survey regions Alsace/Franche -Comté (FR), Bern (CH), Stuttgart (DE), Vorarlberg (AT), West Transdanubia (HU), Slovenia (SL) is at the heart of the present study.

The survey refers to the ELMOs Project - Electromobility for cities and regions (FP7 / Regions of Knowledge sub-programme) and more precisely to the aim of «Improving Electromobility Knowledge Architecture». Regions' competitiveness is determined by their ability to achieve and maintain high levels of growth and employment. This, in turn, is a question of human capital, research, absorptive capacity and innovation performance. Economic research suggests that upgrading knowledge is one of the most efficient routes to economic growth. Following the projects' basic idea, improving regional «Electromobility Knowledge Architectures» will contribute to achieving this goal, especially by enhancing regional human capital. Exploiting the regions' potential can do this, while matching qualifications with the requirements of companies is an important step ahead.

Why you should participate: Utilising the survey results for your benefit

By matching current qualification profiles with companies actual and future job requirements will help to identify potential gaps. Informing you and other regional stakeholders concerned about the survey results will also raise awareness of existing qualification gaps in the region and paves the way for joint actions to overcome these. On request, you will receive the written comparative report.

PART 1 – Your Views on establishing new «Transport & Mobility»

Recent developments in the field of transport and mobility lead to a number of questions on which we would like to hear your views.

1.1 In the context of energy and environmental issues, mobility is one of tomorrow's major challenges.

Fully Agree o (1) Agree o (2) Disagree o (3) Fully Disagree (4) o

1.2 New, cleaner, safer and smarter transportation technologies will be developed in the future.

Fully Agree o (1) Agree o (2) Disagree o (3) Fully Disagree (4) o

1.3 Electric cars (BEV/HEV) are an obligatory step for the future of cars.

Fully Agree o (1) Agree o (2) Disagree o (3) Fully Disagree (4) o

1.4 The service-based dimension (cars as part of a mobility service, e.g. car-sharing) will develop to the detriment of the ownership dimension (rewording required here to make it clear?).

Fully Agree o (1) Agree o (2) Disagree o (3) Fully Disagree (4) o

1.5 These changes will be accompanied by the emergence of new businesses or significant changes in some existing businesses.

Fully Agree o (1) Agree o (2) Disagree o (3) Fully Disagree (4) o

1.6 In 10 years, vehicles will interact with each other and the infrastructure, which could lead to the partial or total automation of driving.

Fully Agree ☐ (1) Agree ☐ (2) Disagree ☐ (3) Fully Disagree (4) ☐

1.7 Alternative urban transport modes (e.g. public transport, cycling, walking) will contribute to more sustainable, connected, smart and user-friendly cities.

Fully Agree ☐ (1) Agree ☐ (2) Disagree ☐ (3) Fully Disagree (4) ☐

PART 2 – Your recruitment needs of engineers in the field of transport and mobility

2.1 Will you recruit one or several engineers in the next three years?

For an issue related to "transport-mobility": ☐ Yes / ☐ No

For an issue related to another topic: ☐ Yes / ☐ No

2.2 What functions will be occupied by the new engineers? (multiple choice)

☐ Project management

☐ R&D

☐ Engineering / Technical studies

☐ Production (including process management)

☐ Operation and maintenance

☐ Business administration

☐ Sales engineer

☐ Other. Please specify.....

2.4 What are your main target schools of engineers?

- ☐ University
- ☐ University of applied sciences
- ☐ Other. Please specify.....

2.5 What are (generally speaking) the 3 main shortcomings of engineer training courses you watch today, considering the whole population of engineers recently recruited, and regardless of which school they are from? (multiple choice)

- ☐ Poor mastery of technologies and tools
- ☐ Poor knowledge of regulations
- ☐ Poor understanding of the evolution of individual mobility behaviours
- ☐ Poor « project culture »
- ☐ Poor capacity to write, summarize and communicate information
- ☐ Poor management skills
- ☐ Lack of creativity
- ☐ Low adaptability
- ☐ Low motivation and / or intellectual curiosity
- ☐ Other. Please specify.....

2.6 Do you consider for your recruitment needs the option of in-company training (apprenticeship) in the next 3 years?

- ☐ Yes / ☐ Non

If Yes, in which areas? Please specify.....

If No, please explain why.....

2.7 Do you consider for your recruitment needs the option of vocational training/ advanced training in the next 3 years?

- ☐ Yes / ☐ Non

If Yes, in which areas? Please specify.....

If No, please explain why.....

2.8 What are your common channels to attract new employees (multiple choice)?

- ☐ Alumni / Personal (social)networks / Word-of-mouth recommendation
- ☐ Advertisement (newspaper)
- ☐ Using contacts to regional universities / schools of engineers
- ☐ Job fairs
- ☐ Internet platforms
- ☐ Other. Please specify.....

2.9 Where do the employees hired within the last 24 months come from (multiple choice)?

- ☐ Region
- ☐ Neighbouring regions (apart from your own region)
- ☐ National wide (apart from your region)
- ☐ European Union (apart from your country)
- ☐ International (apart from European Union)

PART 3 – Your views about the existing engineer training courses and their relevance to the requirements of private companies

3.1 What is your assessment of the following thematic courses, which could be proposed? (Course names are provisional)

Thematic Course 1: Embedded energy systems in transport

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 2: Engineering of new transport systems

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 3: Innovative materials for sustainable mobility

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 4: Manufacturing and logistics in the transport industry

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 5: Information systems in transport

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 6: Vehicle architecture and mobility focused on end-users

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 7: Mobility in sustainable, connected, smart cities

Highly Relevant ☐ (1) Relevant ☐ (2) Not Relevant ☐ (3) Not Relevant At All (4) ☐

Thematic Course 8: Human-Machine Interfaces (HIM)

Highly Relevant o (1) Relevant o (2) Not Relevant o (3) Not Relevant At All (4) o

3.2 Do you have any other suggestions on training courses?

☐ Yes. Please specify.....

☐ No

3.3 What are the key skills needed among today's engineers? (multiple choice)

- ☐ Technical and economic knowledge of the various sub-sectors of transport: road, rail, air...
- ☐ Ability to design technical specifications
- ☐ Balance between the good understanding of business and market mechanisms and a strong science and technology background
- ☐ Good understanding of the views and positions of the supply chain's stakeholders: manufacturer, subcontractor, dealer, service provider, end-user
- ☐ Strengthening basic skills in electrical, mechanical and informatics engineering
- ☐ A stronger entrepreneurial spirit
- ☐ More assertive managerial skills
- ☐ International culture
- ☐ Other. Please specify.....

PART 4 – Your research and technology needs in the area of transport and mobility

4.1 Can you express your specific needs for your R&D projects in terms of scientific and technical engineering?

☐ Yes

☐ No

4.2 If yes, what partnerships are you interested in for your R&D projects?

- ☐ Student project (as part of educational courses)
- ☐ Engineer final study project (internship)
- ☐ Partnership with a research laboratory
- ☐ Research thesis or similar
- ☐ Other. Please specify.....

4.3 If yes, which topics are your specific needs for your R&D projects related to?

.....
.....

4.4 Do you have any other comments or suggestions?

.....
.....

PART 5 – Further information

5.1: First name / Name

5.2: Organisation

5.3 Size of your organisation

- ☐ Micro Enterprise (< 10 employees)
- ☐ SME (< 250 employees)

- o MSE (< 5000 employees)
- o Large enterprise
- o Other. Please specify.....

5.4 Company's sector:

- o Transport
- o ICT
- o Energy
- o Other industry
- o Other service

5.5 Position / Status within the organisation:

5.6 Postal code

If outside the country, please specify your country:

.....

5.7 Phone:

5.8 Email: