

Expatriates in Health Valley: Developing the Cluster through Network Relations

Master Thesis

Supervisor:

Dr. Arnoud Legendijk

Timmy Visser

s0725986

timmyvisser@hotmail.com

Acknowledgements

This thesis is the result of a research process which took about three quarters of a year. The initial thoughts on this research already started in June, 2011, resulting in an internship with a research project called 'BUTTON', a research project that was coordinated by the Radboud University of Nijmegen and contained several European partners within a larger research framework of Interreg IV C mini programme 'Brain Flow'. The initial plan was to write the thesis during this internship; however, it was only after finishing the internship that the research actually started to take form. I have to thank both my thesis supervisor Arnoud Lagendijk, as well as BUTTON coordinator Frans de Man for this opportunity, which gave me some valuable insights to be used in my future career.

I furthermore have to thank my supervisor Arnoud Lagendijk, not only for introducing me to the research project, but also for his guidance and his input during my research process. Thank you for your patience during the research, and giving me exactly enough to proceed with my research, and still challenge myself into using own ideas. Our mail conversations and meetings kept me motivated all along the process.

Input from two of my friends and colleagues was essential in finishing this thesis, Laurens van der Meer and Tom Koemans helped me during an essential phase of my research. Organizing meetings and distributing my work among their colleagues was of great value.

Special thanks to my parents, who always kept believing I could finish the job, and supported me in every way.

And finally, thank you Madelon, for your patience and motivational speeches, even though you knew I hated them.

Contents

ACKNOWLEDGEMENTS	II
CONTENTS	III
ABSTRACT	V
FIGURES	VI
TABLES	VI
ACRONYMS	VII
1. INTRODUCTION	1
1.1 BACKGROUND	1
1.2 RESEARCH QUESTION	2
1.3 RELEVANCE	3
1.3.1 <i>Scientific relevance</i>	3
1.3.2 <i>Social relevance</i>	4
1.4 STRUCTURE	4
2. EXPATRIATES, CLUSTERS AND NETWORKS	5
2.1 EXPATRIATES	5
2.2 THE CLUSTER IN GLOBAL PRODUCTION NETWORKS	6
2.3 KNOWLEDGE FLOWS AND NETWORK RELATIONS	8
2.3.1 <i>Types of knowledge</i>	8
2.3.2 <i>F2F and 'buzz'</i>	10
2.3.3 <i>Network pipelines</i>	11
2.4 CONCEPTUALIZING THE ROLE OF THE EXPATRIATE	12
3. RESEARCHING HEALTH VALLEY EXPATRIATES	16
3.1 CLUSTER CONCEPT AND NETWORK ORGANIZATION	16
3.2 EXPATRIATES IN HEALTH VALLEY	17
3.3 KNOWLEDGE FLOWS INITIATIVES	18
4. METHODOLOGY AND RESEARCH PROCESS	20
4.1 RESEARCH STRATEGY	20
4.2 RESEARCH METHODS	20
4.2.1 <i>Qualitative in- depth interviews</i>	20
4.2.2 <i>Questionnaire</i>	23
5. FIELD DATA ANALYSIS	26
5.1 BRINGING NEW KNOWLEDGE	26
5.2 INTERNAL GATEKEEPER	27
5.3 BUILDING AND MAINTAINING PIPELINES	28
5.4 COUPLING MECHANISM	31
5.5 FACILITATE TRANSNATIONAL MOBILITY	32
5.6 CREATING ATTRACTIVE CITY	33
5.7 OTHER ROLES FOR EXPATRIATES	34
6. CONCLUSIONS	36
6.1 CONSTRAINTS	36
6.2 RESULTS	36
REFERENCES	40
INTERNET REFERENCES	41
APPENDIX A	42

APPENDIX B	44
APPENDIX C	47
APPENDIX D	49

Abstract

Increasing globalization of economies provides a constant competition for value. The problem of many peripheral regions is to create the right conditions to compete in a battle of attracting financial- and human capital. Creating an economy of scale and scope is one of the main policies of the city of Nijmegen, in order to compete among many other smaller sized cities. Specializing on existing local strength was the motto of Nijmegen, when branding the city Health Valley. This thesis is concerned with presenting a way in which expatriates can help the cluster Health Valley develop, by a triangulation of methods. Where contemporary literature provides us with six conceptual roles of expatriates in attributing to internal, external, formal and informal knowledge flows, a mix of in-depth interviews and a questionnaire ensure the necessary empirical results. The thesis argues that background differences and an interdisciplinary approach can help the internal buzz, while highlighting the importance of external social contacts of expatriates in building external pipelines. Finally, it recognizes the position of the expatriate to increase the reputation of Nijmegen, ensuring future transnational mobility to the region. Above all, this research provides a framework for further research on ways to improve the role of the expatriate in developing clusters.

Figures

Figure 3.1	Health Valley logo.	16
Figure 3.2	Triangle East-Netherlands.	17
Figure 4.1	World map with countries of origin - interview participants.	21
Figure 4.2	World map with countries of origin - survey participants.	25
Figure 4.3	Length of stay in Nijmegen – survey participants.	25
Figure 5.1	Importance of ‘bringing new knowledge’ in percentages of respondents.	26
Figure 5.2	Importance of ‘internal gatekeeper’ in percentages of respondents.	28
Figure 5.3	Presence of expatriates lead to official collaborations?	30
Figure 5.4	Describe professional contacts outside Nijmegen.	30
Figure 5.5	How did you learn of your current external contacts?	31
Figure 5.6	Importance of ‘coupling mechanism’ in percentages of respondents.	32
Figure 5.7	Importance of ‘creating attractive city’ in percentages of respondents.	34

Tables

Table 4.1:	Composition of interviews	22
Table 4.2:	Questionnaire divided in themes	24

Acronyms

CEO	Chief Executive Officer
CLS	Centre for Language Studies
CoP	Community of Practice
F2F	Face-to-Face
GCC	Global Commodity Chain
GPN	Global Production Network
HIV	Human Immunodeficiency Virus
IMM	Institute for Molecules and Materials
NCMLS	Nijmegen Center for Molecular and Life Sciences
MPI	Max Planck Institute for Psycholinguistics
OECD	Organization for Economic Co-operation and Development
PhD	Doctor of Philosophy
TNC	Transnational Corporation
UMC	Universitair Medisch Centrum

1. Introduction

1.1 Background

The 'BUTTON' project is a sub-project of a mini-programme 'Brain Flow' from the INTERREG IVc programme. Its full title: *Towards tailored measures to attract and retain highly educated workers. Pushing the right Button*. The city-region of Arnhem-Nijmegen is also part of this project. Every region within the project was asked to form a Communities of Practice (CoP) including regional stakeholders from local economic and societal organizations. The initial goal of the CoP meeting was to determine which challenges the city region had to deal with, and how the CoP thought of solving these problems.

Although the region is home to a university and a college and 'produces' large quantities of highly educated workers, it lacks the capacity to embed these workers within the local labor market. In other words, the region lacks sufficient highly-skilled jobs. However the region, and the city of Nijmegen in particular, retained many highly-educated workers within their borders due to high living standards and a large cultural sector (Atlas voor Gemeenten, 2009). Although many highly-skilled were employed elsewhere, they remained living in the region.

One way of attracting economic activities and increase the region's labor market is specialization. Specialization is a way to increase the region's competitiveness over other regions, where skilled labor and investment chooses the competitive over the uncompetitive. The degree in which the region is competitive is the capacity of a region to attract economic activities. A way to increase competitiveness is identifying the potential advantage of the region over others (OECD, 2005). The potential of the Arnhem-Nijmegen city region is the presence of many highly educated workers, (Atlas voor Gemeenten, 2009) and specialized sectors like health (Nijmegen), technology (Arnhem/Nijmegen) and fashion (Arnhem). The specialization is identified by the presence of certain clusters in the area, by which we mean a geographic concentration of linked industries. According to Porter (2003: 571): "*Regional economic performance is strongly affected by the strength of clusters and the vitality and plurality of innovation.*"

To develop the 'top sectors' in the city region, the regional stakeholders in the CoP meeting argued, that it is vital to emphasize a more global ambition, aimed at more entrepreneurship and a better business climate with an increasing international reputation. To achieve these ambitions, they argue, it is of utmost importance to create the right conditions for

expatriates¹ to settle in the region. The presence of expatriates should increase global business climate and eventually the regions competitiveness over other regions. Regional policy therefore, should be aimed at attracting and retaining these expatriates by focusing on their needs in terms of housing, leisure, mobility, work and business networks.

However, it is not yet known, how the expatriate affects the economic development of Nijmegen and if and how their presence increase relations with the global market. A study by the city-region of Arnhem-Nijmegen argued that the importance of expats in Nijmegen is a shortage of highly skilled, technically educated employees because of the 'brain drain' of these workers to the Randstad²³ (Research voor Beleid, 2008). However, the research does not speak of the potential of expatriates and the possible effects on the competitiveness of the city and development of the economy. While expatriates do not only fulfill vacancies, they potentially can be of greater benefit to the city of Nijmegen. The study continues by acknowledging that the cities of Arnhem en Nijmegen are not well known to foreign high skilled workers. To me, this sounded as an opportunity to research how the expatriate help the economy of Nijmegen to integrate within the global market, and by doing so, creating new opportunities for the city and region of Nijmegen to develop.

However, to research the impact of expatriates on economic development it is important that they have a certain context, because economic development, or global reputation in that sense, is not easily measured. One major economic opportunity for the city of Nijmegen is the strong presence of health sector related activities, represented by the UMC St. Radboud, St. Maartenclinic and the Canisius Wilhelmina Hospital. Therefore the Nijmegen city area is considered to be one of three knowledge intensive regions in East-Netherlands and is often referred to as Health Valley. In a highly globalizing world, this is the way forward for the city of Nijmegen, concentrating on a specialized health sector by and doing so, creating a competitive city. This is where I think the individual expatriate, or temporary highly skilled migrant can play an important role, not only by ensuring future flows of highly skilled migrants to the city, but also increasing the awareness and global reputation of Nijmegen as Health Valley, through their social and business networks.

1.2 Research Question

The objective of this research is to generate knowledge on the potential roles of expatriates in developing a research cluster through their social and professional network relations.

¹ The exact meaning of the word 'expatriate' or 'expat' is further elaborated on in the theoretical framework.

² Conurbation in western Netherlands, the 'core' of the Netherlands industry.

³ Although earlier I show otherwise, career opportunities is a major incentive of migration. Highly talented employees therefore often seek work elsewhere.

The central question in this research is: *How do expatriates working in Nijmegen health sector, influence Health Valley cluster development through their social and professional network relations?* In order answer these question we will use a case-study approach. Through this approach the outcome of this research is show the influence of expatriates and their network relations on the development of a knowledge cluster. To answer the main question it is divided into four sub-questions:

1. How do knowledge flows influence cluster development?
2. What is the role of expatriates within knowledge flows?
3. How do networks of expats in Health Valley look like?
4. Which role of an expatriate contributes most to the development of Health Valley?

1.3 Relevance

1.3.1 Scientific relevance

The main concepts in this research have been the object of study in many articles and reviews. Concepts like cluster development, network relations and expatriates are subject of many scientific debates. This research however tries to relate the networks of expatriates in particular, with the development of a cluster and the integration of the region within global markets. Although we have found some research on the topic (Millard, 2008; Beaverstock, 2002), they focus either on the impacts of clustering on scientific mobility, instead of the influence of scientific mobility on cluster development, or the impact of transnational elites on the development of global cities. The expatriates interviewed in this research can hardly be described as global elites, and the Health Valley cluster within Nijmegen can't be seen as a major node in global networks, neither Nijmegen as a global city. We also found several publications on the influence of networks on cluster development (Storper & Venables, 2004; Bathelt et al, 2004; Owen-Smith & Powell, 2004) which all contribute to a better understanding of the influence of formal and informal networks on knowledge creation and the innovation process. They introduce new concepts like 'buzz' and 'pipelines' to this study, however these articles do not make clear distinction between the domestic- and the temporary and foreign (expatriate), high skilled worker. We have also found an interesting study on making friendships between transnational professionals (Kennedy, 2004), however this is mainly a social study on relationships instead of a more socio-economic study on the influence of these networks on development.

In this study we try to theoretically relate the buzz/pipeline principle with cluster development. Subsequently, we try to empirically relate the role of the expatriate to the buzz/pipeline concept and to cluster development. In this way we hope to contribute to the economic geographic debate.

1.3.2 Social relevance

Development of the Health Valley cluster is economically important for the city-region Nijmegen. Competition for investment and human capital between regions in the Netherlands and Europe inevitably leads to specialization. In order to be successful and to ensure a durable future for life sciences in Nijmegen, Health Valley needs to create economies of scale and scope by focusing on attracting health related firms and highly skilled workers both from domestic as from foreign markets. If Health Valley succeeds, it would mean a vital source of income and value for the city of Nijmegen, creating a dynamic, young and creative population.

Expatriates can help Health Valley succeed. However, despite emphasizing the importance of attracting more expatriates, it is not well known how exactly they contribute to development. The aim of this research therefore, is to shed some light on this issue towards a better understanding of processes which influences the expatriates contribution. This research tries to be the starting point of further, more practical research on ways in which to increase the expatriates contribution to Health Valley development, towards actual measures that not only increases the number of expatriates, but also their qualitative contribution to the international reputation and economic development of Health Valley and Nijmegen.

1.4 Structure

The theoretical background and further elucidation of important concepts is done in chapter 2. It will discuss the concepts of expatriates, clusters and networks, thereby relating different concepts into a structure in which knowledge flows play an important role in the development of all concepts. In the end of the chapter we will conceptualize six different roles applicable specifically to expatriates within the context of development of clusters. The next chapter, 3, will show the methods used in this research, why these are chosen in relation to the research strategy and the preparation of the interviews. Chapter 4 will reflect on the reason of choosing Health Valley as an object of study, why this is important to Nijmegen and how the cluster relates to expatriates. The final chapter, 5, will discuss the results of the empirical research, and which implications it has on the different conceptual roles of expatriates eventually leading to chapter 6, where we draw our conclusions.

2. Expatriates, Clusters and Networks

2.1 Expatriates

The focus of this research is on the influence of expatriates on cluster development. Why we choose the expatriate as the object of study is explained in this paragraph. We first show the importance of migrants in regional innovations processes, focusing on the dependence of innovation processes on extra local connections. We then present why we focus on expatriates instead of the 'normal' migrant, before explaining ways in which the expatriate is used in several literature studies, and the way we use it in this study.

Research on transnational innovation systems (Coe & Bunnell, 2003) shows the importance of extra local connections in regional innovation systems. They acknowledge the dependence of innovation on international network relations, especially the relations between actors embedded in particular regional innovation systems. They continue by conceptualizing the transnational innovation system by emphasizing the importance of three overlapping domains of transnational innovation networks. First the corporate-institutional domain, where TNC's, partners and institutions exchange information (innovation) through intra- and extra-firm knowledge transfers. Second the social networks, in which knowledge transfers are embodied in migrants, focusing on the international mobility of knowledgeable workers. And thirdly the hegemonic-discursive domain where transfers of dominant knowledge's about innovation are constituted by the increasing global circulation of books, videos, magazines and journals. The domain of social networks is most important in this research since it stresses the valuable contribution of these networks in facilitating the international movement of people and ideas between firms and across the globe, thereby recognizing the role of high skilled international migrants in the innovation process and the transnational links that often remain out of the migratory process.

The role of social networks, and the knowledge embodied within migrants, is subject of this research, however we do focus on a specific type of migrant, the expatriate. According to the Oxford Dictionary of English (2003) the expatriate means: '*a person who lives outside their native country*'. The word comes from the Latin terms *ex* ('out of') and *patria* ('country, fatherland') However this definition does not justify the full meaning of the concept, because the expatriate in this sense can also be considered as a migrant, asylum seeker, foreigner or diaspora. The highly skilled, professional and temporary character of the expatriate is the reason why this research focuses on expatriates instead of ordinary migrants. The impact of highly skilled professionals on economic, regional and cluster development is different than from a more fixed- or less educated migrant. The expatriate brings a new specific, and

valuable knowledge, next to social and cultural capital, while maintaining strong formal and informal relations with the region or nation of origin. The latter and the expectation that the expatriate will, in time, return to the nation of origin or migrate further to other regions of the world, will connect the temporary region of stay with the global market⁴. In terms of cluster development, the connection with the global market together with a substantial supply of skilled labor, are two important determinants for clusters to develop (Bresnahan, 2001).

Although the difference between expatriates and other types of migrants is explained, what remains unexplained are the different roles that different types of expats can occupy. For instance, Beaverstock (2002), talks about transnational elite which are conceptualized by the work of Castells (2000) on the 'space of flows'. The expatriate is a 'flow' in Castells' network society, which transfers transnational practices and networks to the global city. However, the transnational elite are conceptualized in the context of International Financial Centers (IFC's) and corporate knowledge networks, embedding the networks of expatriates in the working sphere, but not in the local, economic and social environment. These transnational elite can hardly be compared to expatriates in a regional cluster that primarily focuses on research and development and which are often researchers within local institutions instead of CEO's and corporate bankers within transnational corporations (TNC's). The role of such researchers which often have stronger ties with local social sphere's is presumably different than that of the transnational elite. Coe and Bunnell (2003) acknowledge this by not only emphasizing the role of the corporate networks but also the social networks in transnational innovation systems. However, as with several literature studies that mentions expatriates in development (Williams *et al.*, 2004; Kennedy, 2004) they do not differentiate between different types of expatriates, for instance the researcher or the manager, or when the expatriate working for a research institution, university instead of a firm. We will only conceptualize on the different positions and roles of expatriates in developing clusters after we will theoretically recognize ways in which the expatriate can possibly contribute to cluster development.

2.2 The Cluster in Global Production Networks

This paragraph aims to present an outline on which the ideas of development through clusters are based. It creates a context in which the believe that clusters can help develop the region's economy is conceptualized through the use of several economic theories.

⁴ The coupling of regional clusters to the Global Production Network is something I will elaborate on further in the next paragraph.

In order for a region to develop it needs to adapt to an increasingly globalizing world. The region not only competes with neighboring regions, it has to compete with regions all over the world. The increasing global distribution of goods and services, caused by the reduction of trade barriers, falling transport costs and growth of transnational corporations (TNC's), forces nations, regions and cities to follow different strategies in order to adapt and complement to global needs. Analyzing processes of economic globalization on different geographic scales, Henderson *et al.* (2002) proposed a framework of 'global production networks' (GPN), which gives better understanding of the changing international distribution of production and consumption than previous theories. GPN draws on many aspects already outlined in work (Gereffi & Korzeniewicz, 1994) on *Global Commodity Chains* (GCC), however, Henderson *et al.* (2002) emphasize the importance of production over commodity, and networks over chains. Emphasizing on 'production', they introduce social processes in the production of goods and services and reproduction of knowledge, characterizing contemporary forms of industry. The use of 'chain' in GCC gives the impression of a linear process of activities rather than vertical, horizontal and diagonal complex of related activities - on an increasingly global scale - that lead to the production of goods, hence the notion of 'networks'. Additionally, production networks do not only integrate in firms but also in national economies and are therefore influenced by socio-political context. This creates an incredibly complex structure where, as the latter is highly territorial, production networks are not. The most valuable contribution of the GPN for this research is that it stresses the importance of place- instead of notions of 'flows' - since it recognizes the influence of territory on production networks, constantly changing these networks through economic, social and political processes on local, regional and national scales. The role of regions has not disappeared, however the position of the region in the bargaining processes has changed. The region needs to adapt its endogenous growth to the strategic needs of actors situated within the global production networks.

The region is important because of its influence on *productivity growth*. Increasing productivity means increasing the standard of living subsequently economic development. Porter (2000, p.19) then quotes:

"The concept of productivity must encompass both the value (prices) that a nation's products command in the marketplace and the efficiency with which standard units are produced."

In order for the region to create, enhance and capture value, it needs to develop an economy of scale and scope. First, economies of scale can be attained by concentrating on a specific kind of knowledge and expertise. The region can use already present advantages and develop these into economies of scale which leads to an agglomeration of firms which provide

employment and wealth for the region. Second, the region should try to create an economy of scope in which firms and institutions cooperate to create an atmosphere of learning and eventually lead to 'spill-over' effects (Coe *et al.*, 2004). The local manifestation of the economies of scale and scope are the introduction of 'clusters'. The region specializes by facilitating labor and capital to areas of expertise, promoting economic development based on the premise that these close linkages produce innovation. However, the endogenous creation of economies of scale and scope does not necessary lead to regional development, since the region-specific economy should couple with the constantly changing strategic needs of the global production networks. Not adapting to these needs means the economies of scale and scope can easily reduce and move to other parts of the globe.

2.3 Knowledge flows and network relations

One reason of the existence of clusters is knowledge transfer between actors or firms. However, there are several types of knowledge and these are transferred in different ways. This paragraph focuses on these knowledge flows and shows how the different interactions influence cluster development and how successful clusters need different types of knowledge through different types of flows.

2.3.1 Types of knowledge

Contemporary literature on economic geography makes a clear distinction between *tacit* and *codified* forms of knowledge. Tacit knowledge is not easily written down, difficult to share and is often transmitted through face-to-face contact (Gertler & Wolf, 2005), and plays a central role in the significance of learning-through-interacting, reinforcing the local over the global in the geography of innovative activity (Gertler, 2003). Codified knowledge on the other hand doesn't benefit from proximity and with current communications technology is easily sent internationally through the use of global pipelines. The distinction however is strongly debated since the process of producing new knowledge uses both tacit and codified forms of knowledge, they complement instead of substitute each other (Gertler & Wolf, 2005).

Gertler and Wolf (2005) continue by emphasizing that different industrial sectors use different types of knowledge and introduce the terms *synthetic* and *analytical* knowledge to explain the divergence. Synthetic knowledge is used by sectors where research is less important than development. This type of knowledge is often used in applied sciences to solve technological or production problems. Solutions often comes from tacit knowledge since learning by doing, using and interacting can create the most efficient solutions.

Analytical knowledge on the other hand, is used in sectors where scientific knowledge and research, which are based on codified science, are highly important. Core activities of industries in these sectors are generating new products and processes in which knowledge inputs are often based on existing studies and understood scientific principles and methods.

Since synthetic knowledge is based on more tacit forms of information and analytical knowledge is more easily codified, you would expect that analytically based industries are more distributed spatially, since codified knowledge doesn't benefit from proximity as much as tacit knowledge does (Asheim & Gertler, 2005). However, in researching knowledge spillovers, Jaffe *et al.* (1993) find that patent applicants cite other patents from the same city more often than they do from non-local sites. Furthermore they show that patent citations are more localized in the first year of the establishment of the patent, distributing more globally over time, hence providing evidence that analytical industries are no less reaping the advantages from spatial proximity as industries based on more synthetic types of knowledge. Asheim and Gertler (2005) acknowledge three different forces that are to explain this paradox. First, they argue that any kind of knowledge is more easily distributed within local social networks of researchers, and that some forms of knowledge are almost never distributed non-locally such as research failures that aren't published, but which can help other scientist saving time and expenses. The concentration of localized communication between researchers is what Storper and Venables (2004) calls 'local buzz' and is further elaborated on in the next paragraph.

Secondly, the importance of highly skilled workers in the innovation process, will trigger a competition for talent where places who offer the most attractive employment opportunities will be preferred over others. These workers are often attracted to places where they can work with well-known firms and institutes and others working in the same occupational categories. Finally, the locations that offer a high quality of life, combined with good employment opportunities are more likely to attract highly skilled workers from different social and ethnic background, since these workers tend to go where one can find the social diversity and tolerance which will lower the threshold of migrating to such place. These conditions makes it more easy for other nationalities to adapt to a new social environment, creating more attracting neighborhoods that further enhance the attractive power of these places (Asheim & Gertler, 2005).

What these arguments show is that innovative activities, whatever the type of knowledge may be, tend to spatially concentrate.

2.3.2 F2F and 'buzz'

Face to face (F2F) contact was and is crucial in everyday communication and has multiple advantages above other forms of interaction. Storper and Venables (2004) recognize four different advantages of F2F; (1) as a communications technology, especially when information is tacit and not easily codified, which reduces to possibility of being transferred over large distances; (2) as trust and incentives in relationships, where F2F reduce incentive problems that arise in economic relations and promote the development of trust; (3) as screening and socialization in which F2F is the condition for social and professional networks to develop, and as (4) a motivational factor when F2F contact contributes to the competitive behavior of employees.

Reaping the advantages of these F2F features can be achieved by the increasing spatial proximity of firms, and by the co-presence and co-location of others creating a local 'buzz' (Storper and Venables, 2004) or 'local broadcasting' (Owen-Smith and Powell, 2004) in an urbanized and localized economy. The localized economy benefits from the effects of buzz which stimulates a learning process through organized and accidental meetings, and a shared and mutual understanding of knowledge, technologies and cultural traditions (Bathelt *et al.*, 2004). The emphasize lies on organized and accidental meetings since participating in a cluster is often not formalized and actors do not search a specific piece of knowledge. The nature of buzz is spontaneous, however, manifestations of buzz can occur both planned and accidental, during and outside work-hours; it can occur by talking to local suppliers, brainstorming, problem analysis but also by having lunch, during leisure activities or while talking to your neighbor. Co-presence increases the possibility of these meetings so innovations processes are likely to benefit from proximity. The spatial presence within a social and economic sphere is often enough to take part of the local buzz and reap the benefits of mutual information, however, the creation of a local buzz is not the direct consequence of the agglomeration of firms, it depends on the already existing social relations and history between firms and actors in the cluster (Bathelt *et al.*, 2004), or the presence of a catalyst such as a network organization.

To actually reap the benefits of the local buzz, one should be aware that the local learning process depends on external relations for new knowledge. Outside sources of knowledge are critical for the innovation process (Van den Bosch *et al.*, 1999). The degree and quality of local buzz and the organizational structure of the local economy determines the *absorptive capacity* of the local economic system. The concept of absorptive capacity emphasizes on a firm's ability to cope with, and to integrate new knowledge into the organization. However, before we elaborate any further on the concept of absorptive capacity, we stress the importance of external relations of a firm or cluster. Where knowledge spillovers are more

easily reaped by local networks instead of over long spatial distances, access to new knowledge is often acquired by 'network pipelines' (Owen-Smith and Powell, 2004).

2.3.3 Network pipelines

In their research on knowledge networks in the Boston biotechnology community, Owen-Smith and Powell (2004) stress the importance of other determinants for effective knowledge spillovers than just spatial proximity. They emphasize on the relation between formal and global- (pipelines) and informal and local (buzz) networks. Even within an agglomeration of firms, information not just flows into free space. Information flows between firms are based on trust and in order to build up trust within a cluster, organizations set up formal ties, the so called pipelines, which are often closed and designed to only benefit both parties at the end of the pipeline. When set up within a limited geographical distance it also signifies membership of the agglomerated community. Membership tends to increase transparency of the pipeline and eventually gives access to a wide range of informal knowledge flows (spillovers) within the community, while increasing a firm's visibility in the local labor markets (Owen-Smith and Powell, 2004). Where tacit knowledge flows more easily over informal networks and weak ties, characterized by local buzz (Bathelt *et al.*, 2004), they are based on the membership of a community, these memberships are stronger and more formal. The core of the network can thereby be characterized as 'strong', these formal ties however limit the flow of knowledge which is compensated by 'weaker' ties at the periphery of the network, which contains knowledge communities that are less formal and where knowledge transfers more easily based on trust of formal ties at the core of the network.

As shown in the paragraph on local buzz, tacit knowledge transfer benefits from proximity. However, in order to accommodate the local learning process within an agglomeration of firms, they rely on new knowledge in order to create innovative products and successfully develop the cluster (Bresnahan *et al.*, 2001; Coe and Bunnell, 2003). While knowledge exchange within a cluster is characterized by being accidental, the acquisition of new knowledge through external relations functions in a different way. In order to set up the global 'pipeline', firms rely on the weaker, more informal ties with other clusters or firms to make the first step to a formal and entrusted relation which in the end will lead to a carefully monitored and systematic exchange of knowledge (Bathelt *et al.* 2004). The process of building trust is slow and costly and the degree of success of the interaction depends on the degree of trust that exists between the firms. The type of knowledge that is transferred through these geographically dispersed networks is less tacit.

The relation between local buzz and global pipelines is emphasized in literature on absorptive capacity. Absorptive capacity is the ability of a cluster to spread and transfer new knowledge, obtained through global pipelines, within its boundaries and reap the advantages of the

newly gained knowledge. Bathelt *et al.* (2004) introduce the role of internal gatekeepers and boundary-spanners which should translate externally produced knowledge into forms that can be internally understood. The knowledge gathered through pipelines however, can be different from the currently owned knowledge which emphasizes the importance of a diversity of expertise to ensure distribution among the local network. The relation between local buzz and global pipelines is further emphasized by the mutual enforcement of the two concepts:

“The more firms of a cluster engage in the buildup of translocal pipelines the more information and news about markets and technologies are ‘pumped’ into internal networks and the more dynamic the buzz form which local actors benefit. Because of their potential to intensify local interaction, global pipelines support a cluster’s cohesion and strengthen the internal translation processes between cluster actors.”

(Bathelt *et al.*, 2004, p. 41)

The degree in which a cluster can benefit from the mix of local buzz and global pipelines depends on the nature of the industry and the type of knowledge needed in the innovation process which is further elaborated on in chapter 3.

Local buzz let firms engage in spontaneous, informal innovation processes in which information and new ideas are transferred through face-to-face contact, increasing the diffusion of firms, creating trustworthy social and professional networks where actors are motivated by each other’s appearance. These weak ties however only exist after pre-existing strong ties and in close proximity with each other. Geographically dispersed networks, or global pipelines, exist in another fashion. F2F contact is more difficult and costlier; therefore ties are more formal and contractual, so called stronger. These ties however can create new knowledge input which can be diffused by the local buzz. Subsequently, a cluster is able to attract and keep economic activity, when people in the network make connections to other places.

2.4 Conceptualizing the role of the expatriate

In previous paragraphs we have described several ideas on knowledge flows and their interaction with cluster development. We now want to introduce the expatriate within this framework. This is not only an opportunity to link several terms into a conceptual framework, it also provides us the necessary theoretical background to start our empirical research with. We present six conceptual roles for expatriates which are derived from the theory. The reason these roles are conceptual is because these are not mentioned specifically

in the literature, at least not in relation to expatriates. In this part we combine ideas on knowledge flows, cluster development and expatriates.

To conceptualize the role of the expatriate we first look at the knowledge flows within and outside the cluster. A first (1) role of the expatriate is that they bring new knowledge. Gertler and Wolf (2005) show one of the most important determinants in the innovation process is labor mobility, thus bringing new knowledge. Strengthening this thesis is the argument that tacit knowledge is more easily transferred through face-to-face (F2F) contact (Gertler & Wolf, 2005), re-enforcing the argument of co-locating in which F2F contact is more evident (Storper & Venables, 2004). However potentially weakening the importance of this role is the academic environment of the research context (Health Valley) in which more codified knowledge is transferred which benefits less from proximity as we have seen in chapter 2.3.1. Furthermore, the potential to bring new knowledge also depends on experience, since a PhD student can arguably bring less new knowledge than an experienced researcher.

The way in which new knowledge is reaped by the cluster is illustrated by the (2) absorptive capacity of a cluster (Bathelt *et al.*, 2004). The way in which new knowledge is transferred within a cluster or firm, is essential for its innovative opportunities. Bathelt (2004) emphasizes the role of internal gatekeepers which translate externally produced knowledge into a form that can be internally understood. This is a potentially important role for the expatriate, since knowledge that is externally produced is often transferred through global pipelines instead of local F2F contact, with the expatriates standing at the ends of the pipeline, their different background lets them translate this knowledge more easily than native researchers. Contradicting this role is the emphasis on different scientific background instead of their origin, in translating external knowledge. Since background can also differ between native researchers, it seems questionable that expatriates influence research simply by originating from another country. Far more likely, the scientific background determines the capability of the expatriate to translate new knowledge.

Building and maintaining global pipelines (3) is arguably the most important contribution of expatriates to the development of a cluster. Knowledge absorbed through global pipelines is essential for a cluster (Owen-Smith & Powell, 2004), since the cluster needs outside knowledge to 'feed' the local buzz (Bresnahan *et al.*, 2001; Coe & Bunnell, 2003). The nature of global pipelines is often formal, however, in order to set up these pipelines firms rely on more weaker and informal relations (Bathelt *et al.*, 2004). The expatriate, coming from external and foreign firms, institutions or places, has a certain network which can possibly benefit the cluster in the way that it is able to make more formal relations with outside knowledge (pipelines), through the informal connection of expatriates. The relation of the

expatriate is arguably strong with former colleagues, firms and institutions since these relations also benefit from former F2F contact (Brechi & Lissoni, 2003). Since the expatriate is a knowledge migrant with a by nature temporary length of stay, one can also argue that the expatriate will keep on benefiting the firms or cluster after they return to the home country, or migrate to another places. They arguably keep informal ties with the temporary place of stay due to social (F2F) contacts which increases their social network and can maintain or create new pipelines over time.

Two other arguments on the role of expatriates derive from the use of pipelines. First, pipelines link the local cluster to the global market, this is important since the global market determine supply and demand (Coe *et al.*, 2004). The expatriate can be of use to a firm or cluster in the way that it is better able to define the needs of the global market, it therefore functions as a coupling mechanism (4) between the local cluster and the strategic needs of global production networks. The expatriate brings knowledge on contemporary processes of global production networks on the base of which the firm and cluster can adapt their research and production processes in order to complement to global need. However, this role depends highly on the type of knowledge needed and the type of environment where this is needed, for instance within firms, institutions or universities. For example with codified knowledge, it is much more likely that the local cluster is already up-to-date on the topics that it is interested in, especially within an academic setting. However, in a more commercial setting where tacit knowledge is more important, the role could really suite the expatriate.

Secondly, the role of expatriates in facilitating transnational movement of people and ideas through their informal social networks (5) (Coe & Bunnell, 2003). Not only do informal networks of expatriates build and maintain pipelines, they also facilitate the international mobility of knowledgeable workers. Social networks are both a cause and effect of international mobility, since mobility increases social networks, while global social networks causes people to migrate. This could really help the cluster in terms that it receives a higher quantity of human capital, while at the same time increases its international reputation among knowledge workers. This 'snowball' effect seems to really suites the role of the expatriate, since it arguably keeps connections with their country and place of origin.

Finally the expatriate can influence social and cultural dimensions in the place of stay (6). Asheim and Gertler (2005) argue, as an explanation for the analytical knowledge based cluster, that besides the importance of proximity and employment opportunities there is a third process that explains the agglomeration of firms and the success of some clusters over others. It is the quality of life of some places that gives them an advantage over others, highly talented workers are essential for research firms and institutions and they tend to choose to

settle in places that offer a high quality of living. Expatriates bring with them certain social and cultural value which creates colorful and culturally diverse neighborhoods which increase the attractiveness to other expatriates since it makes it easier for them to integrate in local social networks and labor markets.

3. Researching Health Valley Expatriates

In the previous chapter I showed some theoretical insights in the world of expatriates, clusters and networks, how these connect and re-enforce each other and in which way they contribute to development. However, to make a valuable contribution to the economic geographic debate, I need the research the theoretical content in a certain place and for this research in particular within a certain cluster. I already explained the context of this research in the introduction where I pointed out the economic opportunities for Nijmegen in focusing policies and investments on life sciences and health care. This chapter aims to explain the concepts of Health Valley and give some inside on the current interest of expatriates within Health Valley. Finally I show some efforts already made to increase knowledge flows in several institutions of life sciences.

3.1 Cluster concept and network organization

Health Valley is both the branded name of a region in east-Netherlands and of a network-organization settled in Nijmegen. The Health Valley region comprises most of the province



Figure 3.1: Health Valley logo
Source: www.health-valley.nl

Gelderland with the core situated in the city-region of Arnhem-Nijmegen. Nijmegen is most important in Health-Valley since it is home to three hospitals (UMC St. Radboud, St. Maartenskliniek and Canisius-Wilhelmina Ziekenhuis) from which one is an academic hospital (UMC St. Radboud). Furthermore Nijmegen has several health related firms (NXP) situated within its city borders and different institutions (Donders Insitute, Nijmegen Centre for Molecular Life Sciences (NCMLS), Institute for Molecules and Materials (IMM)) affiliated with the Radboud University and focusing on health related issues. The name for the region however was invented by the network organization in order to put the region on the map. The use of the term 'valley' is somewhat curious since both Arnhem and Nijmegen are not situated in a valley. Most probably the word valley is chosen because of its association with high tech and innovation, originating from Silicon Valley, California (Van den Broek, 2008).

The network-organization Health Valley was founded to facilitate knowledge transfers and collaboration within the existing concentration of health related institutions and firms within the Nijmegen area. The goal is to create a network of innovative projects where knowledge-institutions, universities and firms work together in a high-tech and health related

environment. This goal is represented by three lines of action; first, to build and maintain knowledge- and business clusters through matchmaking. Second, to develop the region by attracting firms and third, marketing the region through publications and the website (www.health-valley.nl).

Health Valley is part of a larger, overarching idea of an innovative area in east-Netherlands called Triangle East-Netherlands. The Triangle comprises three valleys: Health Valley, Food Valley and Tech Valley, which together should contribute to an innovative and competitive economic landscape for the Netherlands. The goal of the Triangle is to develop the region into one of the top 5 innovative regions in the world by 2015, focusing on food, health and technology. Reflecting the Dutch valleys on Silicon Valley in trying to copy it is dangerous. Silicon had the right time and investors to make it attractive to both firms and researchers. All over the world regions are trying to copy the Silicon Valley model. However, they often forget to focus on existing local strength. Focusing on a sector associated with the existing economic structure in combination with investments and exploiting opportunities is creating a successful region (Van den Broek, 2008).

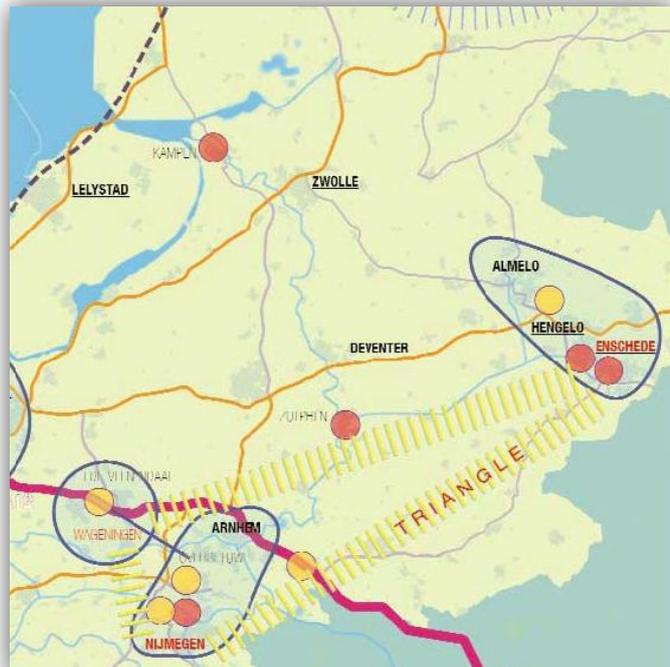


Figure 3.2: Triangle East-Netherlands. Source: Nota Pieken in de Delta, 2004.

Since this research doesn't involve any relations to the network organization Health Valley, and only aims to research employees working within the area of Health Valley, further writings, results and conclusions are aimed at the concept of Health Valley, as branded by local and national governments. This is also the concept we refer to in relation to the term cluster.

3.2 Expatriates in Health Valley

The exact number of expatriates currently working in Health Valley is not exactly known. Based on estimates from a study on the composition, perceptions and needs of expatriates in the city region Arnhem-Nijmegen (Research voor Beleid, 2008) we can conclude that there

are at least a 1000 expatriates currently working in the city of Nijmegen⁵⁶. The research also provides us with the numbers on the fields of interest for the Arnhem-Nijmegen city region expatriates. Four percent of the total number of expatriates gained their highest degree in 'health', which would currently mean a total number of 88 expatriates. From this number we can assume that the majority of these people are working in Nijmegen, respecting the amount of health related jobs in Nijmegen compared to the rest of the city region. However, this number is not representative for the total number of expatriates working within Health Valley. First of all, many expatriates working within Health Valley research positions gained their highest degree of education in another field of interest. In this research, multiple expatriates are interviewed who work in one of Health Valley's related institutes although graduating in different field of study. Despite this number we can't make significant estimates on how many expatriates work within Health Valley or health related institutes. Considering what I have heard and seen, at the NCMLS alone, more than fifty expatriates are employed.

3.3 Knowledge flows initiatives

The most obvious and important catalyst in increasing knowledge flows within Health Valley is the network organization Health Valley which aim is to increase communication and cooperation between several science- and firm related initiatives. One of the main events of this organization is the annual Health Valley Event, which takes place in Nijmegen. During this event, participants get a chance of presenting initiatives on innovations in the health sector. It also provides a platform for participants to share ideas and create new initiatives. The event creates a buzz of information and new ideas, aimed for health related businesses in east-Netherlands. It is therefore not aimed at Nijmegen only, but at ideas and initiatives in the health sector of east-Netherlands (www.health-valley.nl).

Other initiative includes the technology platform of the NCMLS. This unique research setting gives researchers access to an extensive knowledge infrastructure all within walking distance. This setting advocates a multi-disciplinary approach, new research strategies are developed (www.ncmls.eu).

The IMM is facilitating spin-offs with the initiation of a new Innovation Lab. This lab is set up to provide young researchers with lab-space and technical support. The startup of spin-off business should narrow the gap between scientific research and practical development

⁵ Estimates based on continues growth of expatriates

⁶ According to this article, the number of expatriates in 2008 was estimated around a 1000 (<http://nieuws.nijmegenonline.nl/nijmegen-expatdesk/>)

(www.ru.nl/imm), while keeping young valuable human capital within boundaries of Health Valley.

Finally the Donders Institute for Brain, Cognition and Behavior affiliates and sets up research programs with other institutes such as the Max Planck Institute for Psycholinguistics (MPI) and the Centre for Language Studies (CLS) contributing to local knowledge flows. The institute also helped initiating the Erwin L. Hahn Institute for Magnetic Resonance Imaging in Essen, Germany, which contributes to a more international and formal knowledge flow (www.ru.nl/donders).

4. Methodology and Research Process

4.1 Research Strategy

The highly explorative character of this research leads to the use of case-study strategy, in which we explore a strictly context based single case study. Choosing this strategy lets us exploring this phenomena in a highly qualitative manner, researching a relative small number of research units. Of course, a single case-study doesn't provide a basis for general conclusions; however it does give an indication on how expatriates can affect cluster development and form a valuable starting point for other research attempts with a similar focus.

4.2 Research Methods

The research will contain a triangulation of methods including a literary review, qualitative in-depth interviews and a quantitative survey. The main focus of this research will lie on the qualitative interviews supported by the quantitative survey outcomes. The reason for this approach is the predominantly explorative nature of the research. So far there hasn't been any research on the matter and it is highly explorative to research the role of expatriates in cluster development. We also research networks, and in particular the role of the social. These are difficult to put in numbers since it is not the number of relations that is important in determining the influence of expatriates on development; it is the quality of these relations and the perception of the expatriate on these relations that determine the importance of the network. The quantitative data obtained in this research can form as a wider basis of opinions on literature findings in chapter 2 and create a stronger and more representative research. The triangulation of these methods should allow us to derive qualified insights on the issue.

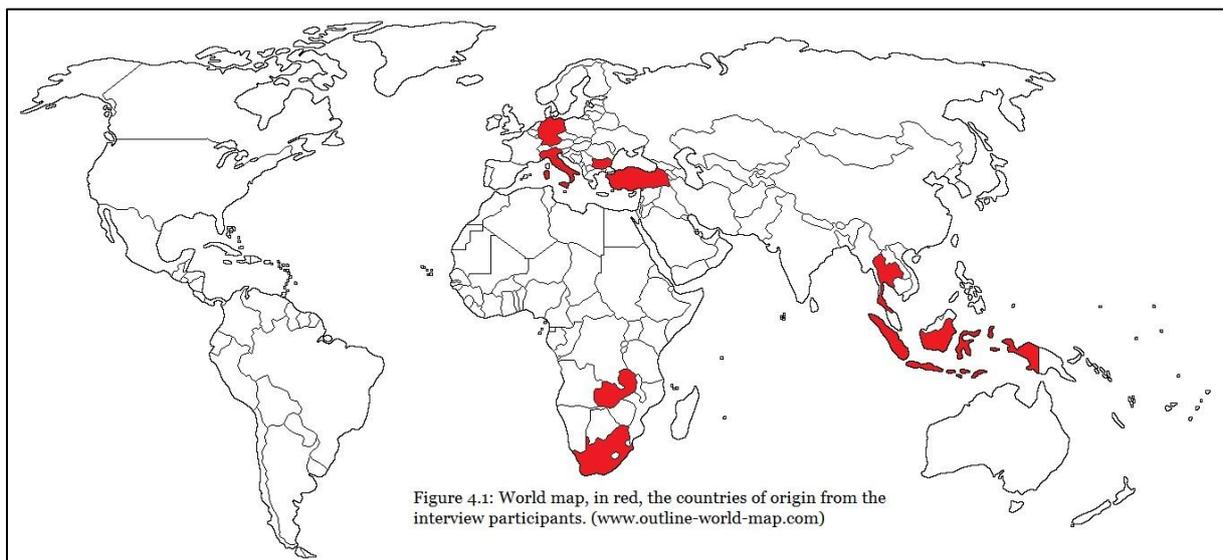
4.2.1 Qualitative in- depth interviews

In this research there will be a strong focus on PhD students, which has multiple explanations. First of all the majority of expats living and working in Nijmegen's health sector is a PhD student, coming from all over the world and from different institutions and universities they represent the connections between Nijmegen and the world. Great advantage of using PhD students is that they are still highly dynamic; they stay for a period of 4 or 5 years after which they often move to other locations or back to their country of origin. They also start their academic career in Nijmegen which can benefit the university, institutions and colleagues later on in their career. Furthermore, PhD students are highly

accessible and willing to contribute to scientific research. Aside from these more practical reasons there is also a more strategic reason for using only PhD students; the explorative nature of the research. Using a homogetic group of research units, gives us the opportunity to make some general descriptive statements and make connections between certain phenomena, which would be a lot more difficult with a heterogenic group.

Presumably the downside of using PhD students is their lack of experience. Often they do their PhD research after their master education or after working a couple of years in the field. They haven't had time to build a solid and important network and their added economic value is questionable. Still they represent a large group of employees in the health sector in Nijmegen and they do influence the reputation of Nijmegen University and hospital in other parts of the world.

In total eight in-depth interviews with PhD students from all over the world have been conducted. The interviews lasted for about three quarters of an hour, and were all conducted in a cafeteria near their working environment. I chose the locations in consult with the interviewees and because they all had PhD positions, and shared their working environment with others, we had to conduct the interviews in the cafeteria. All interviewees were working within Nijmegen health sector; however, they all had different backgrounds and were working at different institutions. I interviewed four men and four women. For the sake of this research it is interesting to know where they come from and from which university, since this research focuses on network relations (figure 4.1).



The first interviewee was approached through a personal contact, the rest by relying on a 'snowball' effect, where interviewees introduced me to other colleagues and friends of them. Three contacts were obtained through the head of the NCMLS (Nijmegen Center for

Molecular and Life Sciences). I approached him with the question if he could give me records from some expatriates working within the Health sector. He gave me six names which I approach all through email, three didn't reply to my request and the others are included in this research. The interviewees all work in Nijmegen in the health sector and except for one, they all lived in Nijmegen as well, one lived in Wageningen. Their stay in Nijmegen ranged from half a year to six years, while some also got their master's degree in Nijmegen and continued with a PhD research, other's already worked for several years before applying for a position here.

Participant	Gender	Profession	Time in Nijmegen	Field of study
1	M	PhD	2-5 years	Molecular Biology
2	M	PhD	1-2 years	Biomaterials
3	M	PhD	less than 1 year	Internal medicine
4	F	PhD	2-5 years	Combined genetics and neurobiology
5	M	PhD	2-5 years	Physiology
6	F	PhD	2-5 years	Biotechnology
7	F	PhD	2-5 years	Biomaterials
8	F	PhD	more than 5 years	Hematology

Table 4.1: Composition of interviews.

The interviews have been conducted through an interview outline that was created beforehand.⁷ The interview started with the explanation of what my research was about. All interviewees were interested in the research; however, despite efforts to prepare the interviewees for my questions by sending them a file on the background of my research and the questions they could expect, none of them actually read the file. The reason I did this was a remark during the evaluation of the first interview, in which the interviewee indicated that she would like more information before hand to be better prepared.

The first questions regard some general questions on their origin and current profession. Since we focus on network relations, I also found it interesting to know how they came to the attention of their current position and how they applied. Then I asked them about how they see their role in contributing to development. I did this prior to presenting my conceptual roles of expatriates that I found in the literature. I asked them to comment on these roles, and if they acknowledge these roles to be important. The interviews were semi-structured, since sometimes they acknowledged different roles throughout the interview and elaborated on that further. However, I maintained the line off asking them to comment on the presented roles. By providing them with some ideas on the role of expatriates, I tried to trigger them into thinking about how they see themselves in relation to knowledge flows and cluster

⁷ See Appendix A for the interview outline

development. In the end this results in an overview of how they think about themselves in relations to this context.

All interviews were held in English and were recorded. Both positively influenced the pace of the interview, although English was never a native language for both sides. However, all interviewees had good understanding of my intentions and interpreting their answers was not difficult since the level of English was sufficient for all of the interviewees. Since the interview was recorded, it was possible to listen to the interview again and evaluate through an evaluation form⁸ that I made. The main comments on each of the roles were written down carefully and in exact words, however, in deliberation with my supervisor I decided not to fully transcribe the interview, due to the lack of added value. However, the interviews are available if needed.

In order to make the interviews operational for analysis, we use a process of selective coding⁹. This means that there are already six codes existing prior to the analysis of the interview in order to structurally analyze the interviews. The six existing codes are derived from the literature and represent the six conceptual roles I found and described in chapter 2. Not only does it structure the coding process, it also ensures a link between the literature and empirical findings. The next step is to analyze the comments of the interviewees on these roles and find patterns in their answers to the questions. This will lead to new codes which will either confirm or disprove the conceptual role. Beside the selective coding process some answers lead to more open coding, since these answers did not comply with any of the six initial codes. Relations between these codes will create new codes and possible roles of the expatriate in developing the cluster.

Additional to the in-depth interview, I asked the respondents to fill in a form that is equal to question number 15 in the questionnaire¹⁰. In the interview I had a chance to explain the six conceptual roles I presented to them. Also they took some time to think about, and elaborate on that role, whilst in the questionnaire; I only had a limited amount of space to explain the role succinctly.

4.2.2 Questionnaire

To complete the triangulation of methods I issued a questionnaire among expatriates in the Health Valley area. The questionnaire is produced after the interview protocol from which I used some parts and included them in my questionnaire. The questions in the questionnaire were divided into four themes. Starting and ending with some general data and more specific

⁸ See Appendix B for the evaluation form.

⁹ See Appendix C for the list of codes.

¹⁰ See Appendix D for the questionnaire.

questions in between. The questions were primarily closed questions, however in several occasions the respondents were able to give multiple answers, because a single answer to these questions would be too limited.

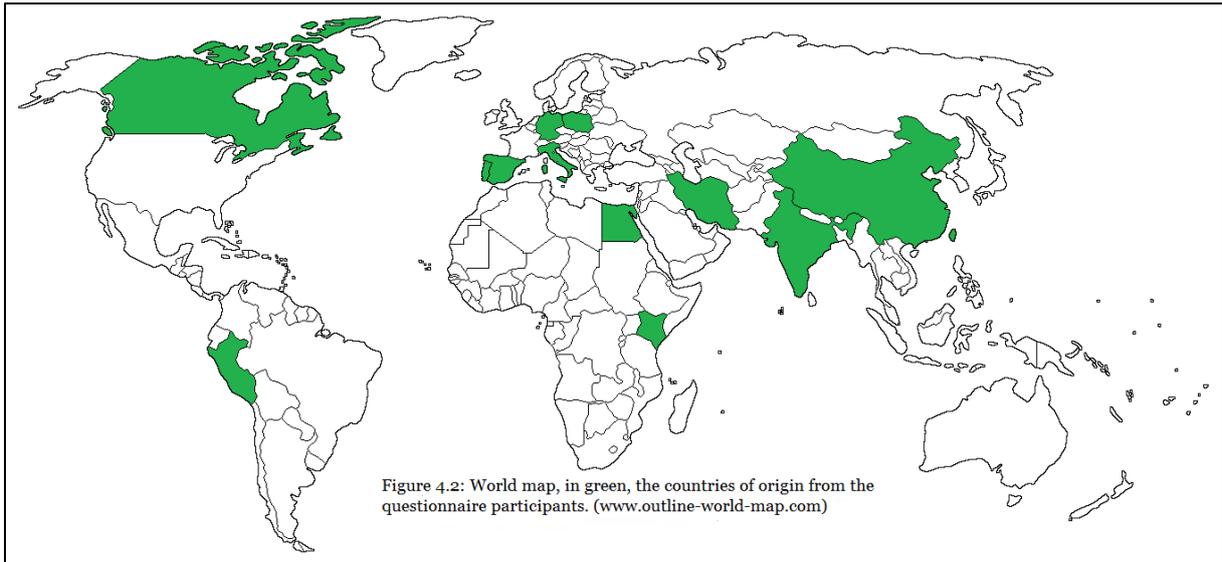
General Data	Question 1 to 4
Network Relations	Question 5 to 12
Health Valley Nijmegen	Question 13 and 14
Role of Expatriate	Question 15
General Data	Question 16 to 18

Table 4.2: Questionnaire divided in themes.

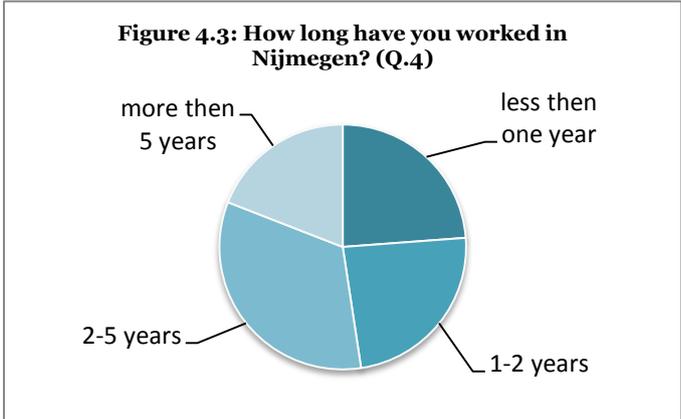
An important question for this research was question number 15. The expatriates were asked to give their opinion on the six roles described in chapter 2. They could react to each role in rather they thought it to be ‘very important’, ‘important’, ‘neutral’, ‘not important’ or ‘not applicable’. The figures in chapter 5 translate these quotes into numbers ranging from 1 (very important) to 5 (not applicable).

The questionnaire was conducted through Google Docs. This concerns an online application from which the respondent can electronically conduct the questionnaire. I chose this form because I would approach the respondents through email. It was therefore more appropriate to conduct a questionnaire through the internet. The chances of getting responses increased in this way, since the respondent was able to participate from their home or work environment with a low threshold. Constraints of this method are the incapability to explain certain terms which can lead to less significant answers. I tried to cope with this issue by asking the participants to the interviews the same question and compare their answers in analyzing the results.

Respondents were approached by email, through the interview contacts and through friends working in the health sector. Again, the respondents were asked to spread the questionnaire among their networks. These efforts lead to 21 responses. The respondents all worked within health related institutions in Nijmegen, and were living here for a period of 2 to 10 years. The respondents originated from the following countries:



The presence of male/female was half on half, while 15 respondents were between the ages of 25-35. Another 2 between 18-25, 4 respondents were between the age of 35-50. The length of stay is divided quite equally; most respondents stayed here between 2-5 years which corresponds with the fact that most respondents were PhD students. The respondents who lived here for over 5 years worked as a manager (2), researcher (1) or as a dentist (1). The respondents who replied being here less than a year, all were PhD students, from which is to be expected that they stay here for at least four years, therefore these can be regarded as expatriates.



more than 5 years

less than one year

2-5 years

1-2 years

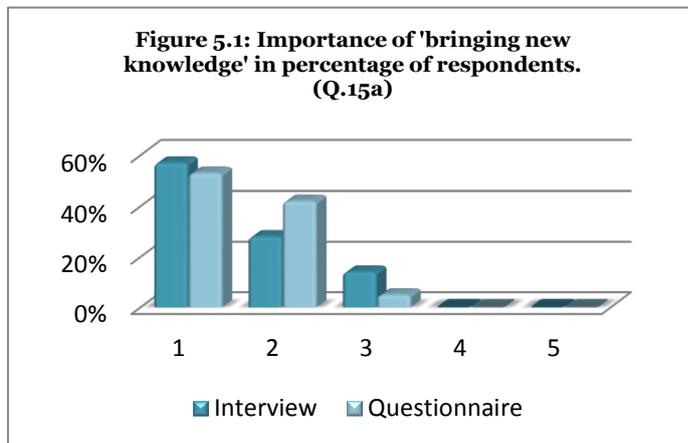
were PhD students, from which is to be expected that they stay here for at least four years, therefore these can be regarded as expatriates.

5. Field Data Analysis

This chapter aims to present the results of the empirical research by dealing with each conceptual role, presented in chapter 2, individually. Both the results from the in-depth interviews, as well as from the questionnaire will be analyzed in order to build a significant argumentation.

5.1 Bringing new knowledge

What was apparent from the interviews as well as from the questionnaire is that the respondents found this role to be very important or important, as shown in figure 5.1. There is hardly any difference from respondents from the interview compared to respondents from



the questionnaire. This doesn't seem strange since it is quite clear what is meant by this role. However, it is interesting to analyze the responses of the interviewees, these elaborate on what type of knowledge is actually transferred.

The initial thought of many respondents was one of denying

bringing any specific knowledge to their new research department. However in explaining different types of knowledge they did recognize bringing certain tacit knowledge to their new work environment. This knowledge predominantly contained experiences with techniques to conduct practical research. Although they also learned new techniques here, all felt they also contributed their ways of doing research to their department. The main reason for this can be found in the fact that they acknowledged that people in the same research department came from various backgrounds. One respondent state it as follows: *“different people from different backgrounds come together and exchange ideas, so you have very diverse ideas about tackling a single problem”*. Many of the interviewees acknowledged the importance of having people from different scientific backgrounds in a research project. This not only increases the quality of the project, it also increases your personal knowledge by learning from other people's experiences.

Other comments on 'bringing knowledge' focused on cultural and 'world view' issues: *“when you come here you just bring your own way of doing things”*. This is a comment shared by

different interviewees, and most of them recognize the importance of having researchers from different cultural backgrounds in the research group.

One final interesting comment was one from a researcher from South-Africa. He stated: *“The patients that we are working with are very rare in Europe, we see these people with the same conditions mainly in Africa.”* His statement was backed up by an interviewee from Thailand; he also acknowledged that in their home countries they had better access to research material than we do here. For instance in research on HIV and Malaria, which aren't very common in the Netherlands, the department here can use the network that expatriates have among 'research material' in their home country. The expatriate therefore not only brings different tacit knowledge, they can also facilitate research on endogenous diseases.

5.2 Internal gatekeeper

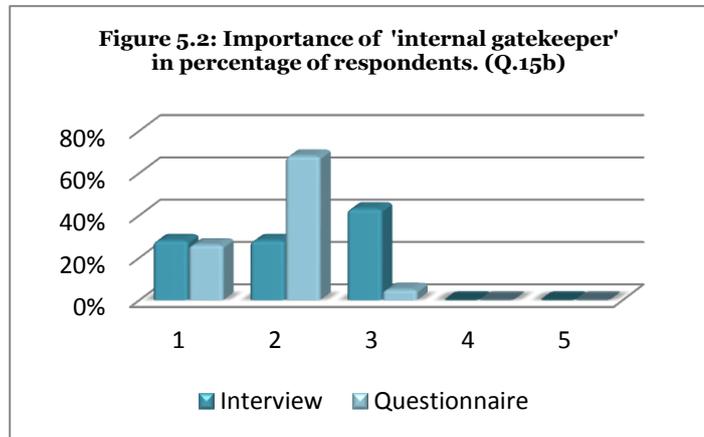
In presenting this role to the interviewee, the limits of the type of respondents became most obvious. Since the interviewees existed only of PhD students, the answers were bound in an academic setting. This setting differs from for example a industrial setting in the way that knowledge is spread mainly through publications. This accounts at least for codified knowledge which is most important in the academic setting, since the quality of research is measured by the amount and quality of publications, which is different from a industrial setting where product innovation and profit is a more important determinant for success. Codified knowledge will then be transferred through closed pipelines, whilst in the academic setting publications are public and available for anybody. If not published, temporary results are shared between researchers in the same scientific field during scientific meetings and conferences. This creates a more open flow of knowledge because there are only view pipelines and no gates to keep. The knowledge that is internally transferred are the experiences with tacit knowledge, explained in the previous paragraph.

If there are pipelines in the academic world, for instance in collaborations leading to publications (see §5.1.3), the role of understanding and using knowledge is one not specific to the expatriate. Many interviewees again, pointed out the importance of scientific background. In a research group, knowledge is shared and transferred; the kind of information determines who you approach with your questions: *“It depends on your background not on your origin”*.

Although most interviewees couldn't recognize themselves in this role, some did give specifics in the way they thought expatriates differ from native researchers. Flexibility and adapting to new situations and people were suggested as specific to the expatriate in dealing with new knowledge. They argue that someone who is bound to the local setting has a limited

view and is not flexible in adapting to new knowledge, whilst the expatriate find ways in getting what they want.

In the questionnaire the phrase ‘internal gatekeeper’ was explained as: ‘Understanding outside knowledge and diffuse this knowledge throughout the department’. Respondents to the survey found this more important than people from the interview (figure 5.2). The interviewees, despite sometimes denying the role, didn’t respond negatively in the questionnaire. What is apparent from both the survey and the interview is



that this role is found to be less important than the previous role.

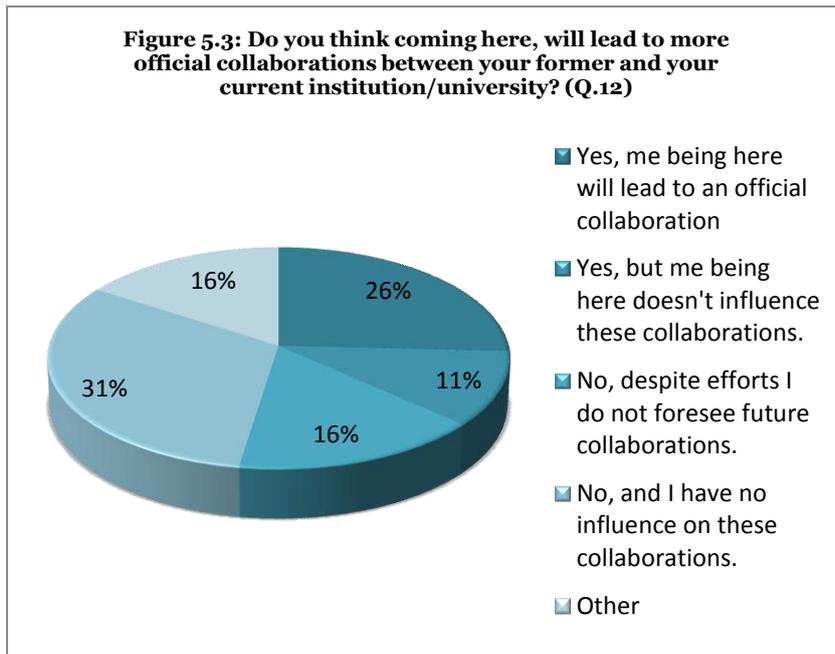
What we can conclude from this is that the role of expatriates in knowledge flows is more important in coming here, then actually work here. Once working here, the role of the expatriate is not that different than that from a native researcher. I think this is especially true for the academic world, where both expatriate and native researcher work with the same knowledge, quality of work then more depends on skills than origin.

5.3 Building and maintaining pipelines

In the previous paragraph, we already somewhat downsized the importance of pipelines in the academic field of research, showing that a lot of knowledge is public, to be used by everybody. However, the importance of collaboration in the academic environment is beyond question, or as one interviewee stated: *“Nowadays, if you do research by yourself and you publish a paper with only your name on it, you find it hard for people to regard you as a serious researcher, but if you are going to have collaboration, then definitely people will know that your work is well researched. The more collaboration you have, the more chances you have of people funding you, because they know, with collaborations, the chances of an experiment failing is pretty much reduced.”* His statement and the importance of collaborations is supported by most respondents. The collaborations between researchers from different departments, institutes and universities we regard as pipelines, and the knowledge transferred between these nodes, are not public, and only become public when published. The role of expatriates in building and maintaining pipelines was most apparent in literature on the subject, facilitating these pipelines was a role which seems most important.

In interviewing the PhD students on pipelines, almost all referred to their position as a PhD student and their incapability to set up collaborations. They referred to several research and development programs between universities as the pipelines in the academic world, which they had no influence over. However, they did acknowledge that they had smaller collaborations with other PhD students elsewhere in order to publish articles, and were fully aware of the importance of these collaborations. The main advantages of these collaborations is that it is increasing the network of Nijmegen health departments, even though the contacts have no permanent character, still, as some of the participants agreed upon, the contacts you work with will always remain. You can always approach those contacts, even after official collaborations have finished. Secondly, despite the scale of the collaboration, knowledge is transferred through a pipeline. Knowledge which is often not published yet, and to that point only benefits both ends of the pipeline. The main problem of these smaller collaborations however is the lack of distinctiveness of expatriates in building these collaborations. Native researchers are in need of these collaborations as well and establishing these collaborations often occurs through scientific meetings, conferences or through the supervisor of the research projects (figure 5.5). These are as much accessible to expatriates as to native researchers. The collaborations that arguably are specific to expatriates are formal and embedded within a department or institution, and derive from initial informal contacts of the expatriate with a former university or company. Some interviewees did refer to collaborations that they were part of, however these collaborations already existed prior to them coming here.

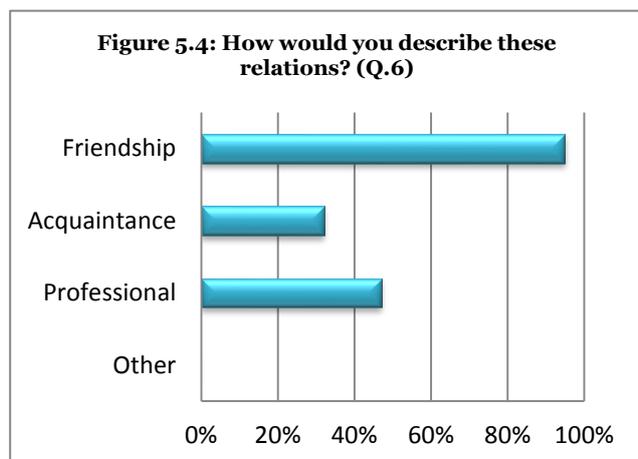
Although none of the participants felt they had any influence on collaborations between departments, institutions and universities now, some of them felt that their position changed towards their old university and colleague's. One participant said: *"My old professor's talk to me in a totally different way, it is more formal."* Another interviewee: *"Me being here is actually trying to set up a long term relationship between the two universities"*. These statements are hopeful for future formal collaborations between the health departments of the University of Nijmegen and other universities around the world. In the questionnaire I also asked the participants if there were any collaborations between their former work place and their current institutions. 95% percent of the participant answered 'no' to this question. The next question was if their stay here will lead to future collaborations (figure 5.3), 26% the respondents thought that their presence would lead to future official collaborations, whilst 48% didn't foresee any collaboration in the future. The one person that did acknowledge an official collaboration between the former and current institution had nothing do to with this collaboration. This means that a quarter of the respondents are aware that their presence can lead to future collaborations and are confident that this will occur in the future. The bias in the question is the lack of definition in 'official relations'. However, as we concluded earlier



on, smaller collaboration also consist of pipelines, since knowledge transferred through smaller collaborations, isn't available to others.

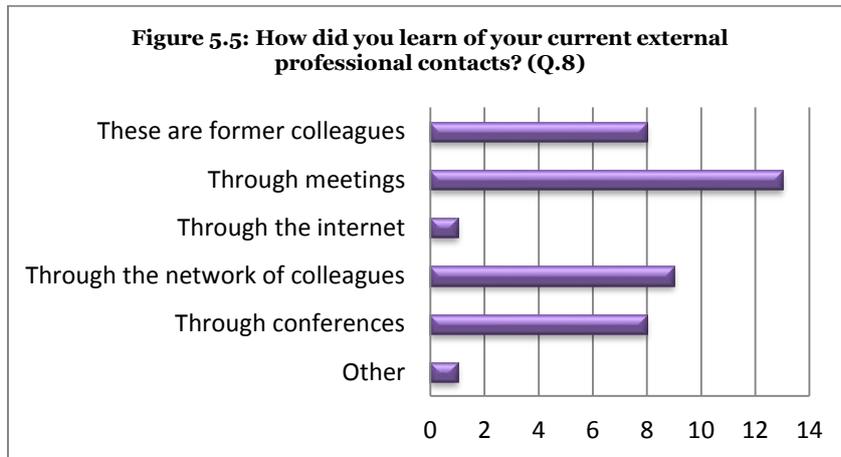
Many interviewees addressed an important issue in explaining the lack of formal collaborations to their

former university or institution. Informal contacts of many PhD students contained friends from the Master's education. Despite acknowledging that many fellow Master students continued their career in science, informal contacts didn't lead to more professional relations. The main argument was that this was caused by a difference in scientific background. Although graduating in the same field of study, research projects in life sciences are very specific, which uphold collaborations between former friends or colleagues. Academic research only profits from collaboration if the shared knowledge is on the exact same level. Methods used and data transferred are very specific, thus ruling out collaboration research on slightly different topics. The same question was asked in the survey, referring to their former colleagues and friends from their country of origin. 95% of the respondents declared that they still had contact. What is remarkable is that, as shown in figure 5.4, nearly half of the respondents referred to these contacts as 'professional'. In another question the respondents were asked if they had any professional contacts outside Nijmegen. Sixteen respondents had contacts outside Nijmegen. Next they were asked how they learned of these contacts (figure 5.5). Again, half of the respondents described their external professional contacts as former colleagues or friends.



This research does not provide a real explanation for the discrepancy between the answers to the questionnaire and the interview. The questionnaire provides us with numbers that confirm professional relations of Nijmegen expatriates with former colleagues and friends

half of the time. The interviews however indicate that professional relations with former colleagues and friends are difficult, because of background differences.

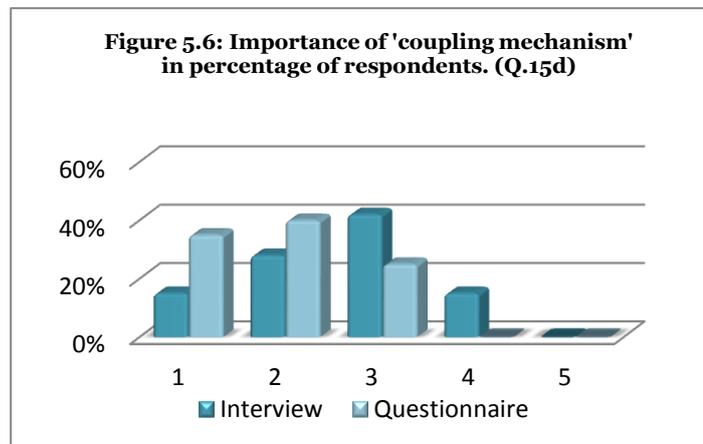


5.4 Coupling mechanism

Coupling the local research to the global demands, that is the idea of the role of the expatriate. When presenting this role to the interviewees, several of them had difficulties with the word ‘global’. Expatriates do have experiences abroad what doesn’t mean that they know about problems all over the world. However, this does actually demonstrates the role of the expatriate in informing local institutions on problems from the global. The interviewees came from all over the world, just like the respondents to the questionnaire which creates a pool of experiences with problems elsewhere. Bring these experiences together and you have knowledge on the issues that are enacting in different parts of the world. One interviewee said: *“Scientist are all trying to solve their own problems, in Africa, many scientist focus on HIV and TB, but if you come from here, there is probably a different focus. Even if I’m coming here from South-Africa, I still try to solve problems from home... the world is trying to get together in trying to solve the world problem, what the primary problem is however depends on where you come from”*. This proves that the expatriate is actually aware of their role of bringing knowledge on outside issues, that the institution or universities have no knowledge of. The capacity of the institution or university to reap the benefits of this knowledge can be considered as absorptive capacity, which was part of the role of internal gatekeeper; diffusing outside knowledge throughout the cluster. This research hasn’t actually examined the absorptive capacity, although in paragraph 5.1.1 we do acknowledge the internal transfer of practical skills (tacit knowledge). One comment of an interviewee might give some indication on the absorptive capacity of the Nijmegen health institutions: *“I would say the work environment is really positive...really open minded and the department is excepting new things and new lines of research.”* However, we cannot make sufficient conclusions out of this one comment, although it is suffice to acknowledge the role of the

expatriate in broadening native researchers view on important scientific issues elsewhere in the world. Arguably this can lead to better quality in publications and new ideas for research.

‘Coupling mechanism’ was explained in the questionnaire as: ‘inform your current institution on what is important in your field of study’. It lacked the addition of ‘origin’ to the phrase which might have increased the importance. Despite that, the participants described the role as important in the role of expatriate (figure 5.6).



5.5 Facilitate transnational mobility

Expatriates attract other expatriates, that is the idea behind this role. However facilitating mobility can also infer promoting Nijmegen. Building the reputation of Nijmegen can facilitate new transnational mobility. In the questionnaire, six in ten people admitted that they never heard from Nijmegen before coming here, while only one in five heard of Health Valley before. From the interviews, not one knew Nijmegen before applying for a position here. I think you can't expect people to know the city of Nijmegen or the university, however, in coming here, the expatriates can build the reputation of Nijmegen by promoting the institution or university elsewhere. The expatriates from the interview almost all promote the institution and university that they are currently employed in, in their private contacts. Three of the interviewees also did a presentation on their current work at their former university, promoting their institution to new potential researchers. In the questionnaire I asked the respondents on how they learned of their current position. Seven in ten people learned of their position through the internet. From the interviews I already concluded that many found a job application just by 'googling', while only some learned of their current profession through their supervisor or colleagues. This implies that it is not the social network that is important in facilitating mobility, but it is the electronic network of computers that is attracting most expatriates.

Still, during conferences, scientific meetings and other collaborations, the interviewed expatriates did promote Nijmegen and the university. They agreed on the excellent working conditions and academic climate that is characterizing Nijmegen and the university. Without exception they praised the facilities and research attitudes. The working conditions not only applied to wages, but also the importance of leisure time compared to other countries, or as

one participant said: *“Your life is much more important here. In Italy it is all about work, but here the supervisors also tell you that it is important to also do something else. It influences my the quality of my work, while at the same time influence the way I feel about going to work.”* The experiences that these expatriates gain here, will travel with them to other parts of the world, and these might influence other people’s decision in coming to Nijmegen.

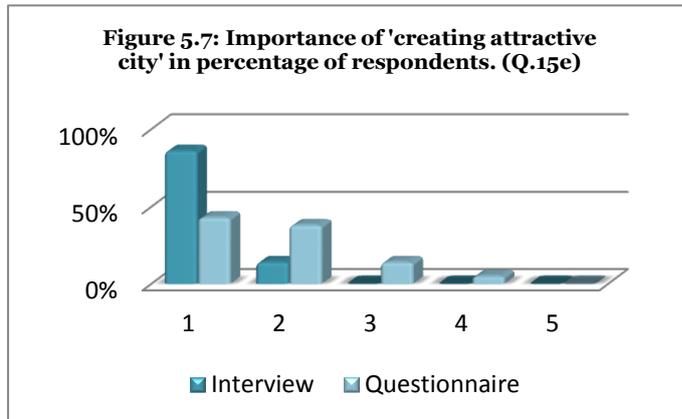
Expatriates can also help in welcoming new expatriates. Most interviewees said they got a lot of help from the International Office, that helps newly arrived foreign researchers in adapting to their new environment. However, expatriates do appreciate other foreigners which find themselves in the same position. One participant said: *If an expatriate comes here, it is nice if they meet another expatriate, because you meet somebody who is also naïve about this place...you can adjust at your own time...you won’t feel the pressure of trying to speak Dutch.* The presence of other foreigners can influence the way in which expatriates feel about their work and environment. However, it does not directly influence mobility, although it does influence the attractiveness of the city.

5.6 Creating attractive city

The final role of expatriates refers to bringing a cultural and socially dynamic sphere to the city, thus making the city more attractive. An attractive city makes it more easy for the expatriate to integrate and will influence his current work, future decisions and communications on Nijmegen to others. Nijmegen is quite small, and that is recognized by all interviewees. However, this is not always negative, since it is less time consuming and less distracting, it creates a good academic city. Most interviewees do acknowledge the absence of cultural events and rather go to Utrecht or Amsterdam. The problem of being a small city is that it is not easy to build a reputation like Utrecht or Amsterdam. As we have concluded from the previous paragraph, Nijmegen is not well known to people who are applying for a position here. Creating an attractive city and facilitating a high quality of life will not directly attract expatriates to the city. However, these kinds of cities are more likely to attract firms, since these firms are opting for a good quality of life for their employees.

Several interviewees state that to them, the number of expatriates has increased in the last four years. Which is perceived positive by the interviewees: *The Radboud University has opened up a lot more to international students I think... this makes it more easy for the people who came after me.* I would also say this is a positive development, although it has minor effects on mobility of expatriates (5.1.5), it does influence the perceptions of expatriates on Nijmegen, and how they communicate their experiences to others. More influential will probably be the larger pool of international talents that creates not only a

social and cultural dynamic sphere in the city, but also increases the academic environment in Nijmegen.



On this subject, the answers in the questionnaire and the answers from the participants of the interview were slightly different. The interviewees perceived this role as very important, while the respondents of the survey were more moderate in their reaction (figure 5.7). 'Creating attractive city' was translated in the questionnaire

as: 'increase attractiveness of Nijmegen to other foreigners'. My explanation for this discrepancy is the fact that the interviewees filled in the questionnaire after the interview. We already discussed the issue, and they had time to think on how they perceive the city, and how they influence other expatriates in adapting to the new environment. This made them aware that almost all of them help new expatriates when coming here. Another explanation is the length of stay in Nijmegen. Half of the participants of the survey stayed here for just two years, while most interviewees were at the end of their PhD's. Arguably they had more experience in helping other expatriates, making them more aware of their role in creating an attractive environment.

5.7 Other roles for expatriates

During the interviews, I asked the participants if they recognized any other roles for them in contributing to development. Why are expatriates beneficial for the department? Although these questions didn't trigger any immediate responds, during the interview, there were a view interesting comments on the difference between expatriate- and native researchers, and the added value of expatriates.

Mentioned by half of the participants was the difference in motivation and mentality between foreign and native PhD students. They regarded the native researcher as less focused and less motivated compared to the foreign student, influencing the quality of work. The interviewees gave multiple explanations. First, native researchers are less focused because they have more distractions. For an expatriate coming here, especially in the first two years, you have a strong focus on your work, since you have fewer distractions from your social life. Secondly, the mentality of expatriate is more ambitious. To come to the position to where they are now, expatriates had to conduct a bigger effort then native researchers, this not only makes them more ambitious, it also influences the pressure on expatriates to really achieve something.

Thirdly, one participant argued that native PhD students had more time to finish their research, whilst the expatriates had only four years. This puts more pressure on the work and influences the quality of work.

The problem with all these comments is that we can't check or confirm these. These are experiences from expatriates, and more than the rest of the interviews, these experiences are based on feelings instead of actions. However the idea that the expatriate is better motivated than a native researcher is not completely unthinkable. The expatriate had to put more effort in coming here than the native student, they arrive in a different environment where work is the only support, at least for the first year. The origin of the expatriate can also influence their motivation in succeeding, whilst Dutch researchers are raised in a prosperous environment, they have multiple chances of succeeding in life. For expatriates from Africa, Asia or South-America, working in this environment is a chance to have a better live. These however are assumptions that are not researched in this thesis. The feelings and experiences of these expatriates don't support any conclusions on the subject.

Another remarkable comment also came from different participants. The presence of expatriates increases the chances of getting funding, while also improving expectations on the quality of the research. If the research project only consists of native participants, the EU is more reluctant to grant funding, since it only benefits the Dutch country. A mix of researchers coming from different countries improves the chances of getting funding. Furthermore, an environment of different skills and background, increases expectations on the quality of research, since it is regarded to be more thorough.

6. Conclusions

6.1 Constraints

This thesis attempted to build new ideas on the role of expatriates in developing cluster in using their network relations. However, the fieldwork of the thesis predominantly focused on the academic environment, providing ideas on how expatriates can help this environment to develop. The thesis hasn't been able to link the academic environment to firms, which would lead to more sufficient conclusions on cluster development. It now lacks the idea of a cluster environment since relations within different parts of the cluster or not well researched. The academic world is in this research presented only by PhD students, although important they do not represent the entire academic setting in Health Valley. The availability and accessibility of PhD expatriates was tempting and used well, constraining this research in making conclusions aimed at PhD expatriates which narrows the possibility of making any generalizations.

Furthermore, the cluster Health Valley isn't mentioned very often in the empirical part of the research which is caused by a lack of reputation and awareness among expatriates that they actually work within this environment. Although collaborations are established, and knowledge is shared between firms and science due to efforts of the network organization Health Valley, the expatriates doesn't seem aware of the collaborations and are limited to their own departments and institutions. This doesn't mean that there isn't any internal buzz, it just doesn't spread along the lines of Health Valley.

6.2 Results

The thesis presented six roles which were derived from literature on the subject of knowledge flows, cluster development and network relations. Furthermore, it presented an overview of the ideas and experiences of expatriates working within Nijmegen health cluster, and showed their network relations and shared knowledge flows. Next we will discuss the most important findings and relate these to the used theories and research questions.

In the theoretic framework of this research, extensive research is conducted on internal and external knowledge flows. Putting the expatriate in these knowledge flows was one of the goals of this research. How do these look like? What do they bring? And does this differ from native workers? The role of the expatriate is one of bringing a broader view to the local work environment. By broader view we mean the way on how we look at research, and which methods we use to conduct this research. Even in very specific research, different methods are used around the world; working with these methods creates skills, which can be

transferred to other in collaborations. This influences the internal buzz of the cluster. Initially we had some questions regarding the importance of internal buzz since life sciences arguably are based on analytical knowledge which can be codified and thus is easily transferred. However we found that life sciences involve a lot of practical skills which is more tacit knowledge and not easily codified hence not easily transferred. Departments can benefit from the practical skills that are taught elsewhere by employing expatriates. Furthermore we learned that within research projects or science departments, people from different scientific backgrounds collaborate. This positively influences research quality and therefore also building reputation among the academic world.

In the academic world of life sciences collaborations are indispensable. They influence the quality of research, the importance of publications and the distribution of funding. In order to set up collaborations you have to know how to get them. This thesis focused mainly on smaller collaborations between research projects and individuals which lead to publications. The capability of creating collaborations depends on the position that you are in. Large collaborations between universities and institutions aren't set up by PhD students, smaller collaborations however are made by every layer of researchers. These collaborations are the pipelines through which knowledge is transferred and which is only received by both ends of the pipeline. Ways in which you obtain these collaborations differ from scientific meetings, to conferences, and colleagues. This research hasn't been able to present a clear view on the role of the expatriate within these processes. Although expatriates do make collaborations, what sets them apart from native workers is the capability of building formal relations with previous colleagues, departments or universities. Here the results from the interview and the survey differed, putting the thesis in a dilemma which data to use in final conclusions. The questions in the survey were answered twice in the same way, making conclusions more trustworthy and proving data on the idea that expatriates do build formal contacts with former colleagues and friends. The main factor that influences decisions whether or not to collaborate with former colleagues or friends is the scientific background. The respondents to the interview acknowledged that they lacked collaborations with former colleagues due to differences in scientific background. Although they graduated and worked within similar fields, when applied to their current profession, large differences in research prevents them from making any beneficial collaborations.

In addition to the conclusion of the role of the expats in bringing new knowledge, we argue that different views from all over the world, gives the department or institution a better idea on important issues worldwide within life sciences. However, the way the department or institution deals with the information, does not depend on the expatriate. The absorptive capacity is not influenced by the expatriate; it is more culture specific to the place of stay.

They way in which research departments and institution are 'open' to new information and suggestions regarding new research issues, influences the degree of absorptive capacity.

Furthermore we argue that the expatriate is influencing the attractiveness of the city, especially to other expatriates. For an expatriate coming here, it is very important to integrate and meet new people to feel right at home. Since native colleagues often already have a social life, for expatriates it is nice to meet someone in a similar position. This creates a bond, which influences the state of mind and eventually the quality of work. As an academic city, Nijmegen does a pretty good job in facilitating good working conditions, since the expatriates describe Nijmegen as quiet and clean. It is small so commute times are low, and the city is not distracting so focusing on your work is easier. The city lacks however some cultural events and therefore is considered not very interesting to most expatriates. Although the quality of life is high, most expatriates never heard of Nijmegen before coming here. Often, before coming here, their goal is to find a job abroad, which leads them to search on job quality, not only quality of life. However, expatriates do promote Nijmegen as a city, and the institution that they are working in as an employer to other researchers during conferences and meetings. This does influence the reputation of Nijmegen within the academic world and could in time, influence mobility to Nijmegen. However for now, most expatriates find their profession through the internet while only a few are connected through their social and professional network. Still, the increased number of expatriates could benefit future mobility of new expatriates.

To conclude we argue that the most important roles of expatriates in developing Health Valley are bringing new knowledge, and facilitating mobility of new expatriates. The expatriates contributes new knowledge to the internal buzz, despite the focus on analytical knowledge, life sciences depends heavily on different methods and ways of doing research, which are described as tacit, and not easily transferred over large distances. This research does confirm the importance of formal and external pipelines, however, the role of expatriates in making these pipelines is not specifically different than that from native researchers, which also have to collaborate in order to perform solid and sufficient research. The expatriate does influence the quality of life of other expatriates, since is makes the expatriates feel more at home and creates a social life for the temporary migrants.

The largest shortcoming of this research is the focus on academic researchers and the lack of focus on the cluster. Since arguably the clusters consist of both firm and science related professions, this research only managed to research the latter, giving insights in the processes of expatriates within the academic world. Also, the cluster Health Valley isn't mentioned very often which is caused by a lack of reputation and awareness of expatriates that they actually work within this environment. Although collaborations are established, and knowledge is

shared between firms and science due to efforts of the network organization Health Valley, the expatriates doesn't seem aware of the collaborations and are limited to their own departments and institutions. This doesn't mean that there isn't any internal buzz, it just doesn't spread along the lines of Health Valley.

References

- Asheim, B. & M. Gertler** (2005) The Geography of Innovation: Regional Innovation Systems, in J. Fagerberg, D. Mowery and R. Nelson (eds) *The Oxford Handbook of Innovation*. Oxford: Oxford University Press.
- Bathelt, H., Malmberg, A. & P. Maskell** (2004) Clusters and Knowledge: Local Buzz, Global Pipelines and the Process of Knowledge Creation. *Progress in Human Geography*, 28:1, pp. 31-56.
- Beaverstock, J.V.** (2002) Transnational Elites in Global Cities: British Expatriates in Singapore's Financial District. *Geoforum*, 33, pp. 525-538.
- Breschi, S. & M. Lissoni** (2003) Mobility and social networks: localized knowledge spillovers revisited. CESPRI Working Paper no. 142, University Bocconi, Milan.
- Bresnahan, T., Gambardella, A. & A. Saxenian** (2001) 'Old Economy' Inputs for 'New Economy' Outcomes: Cluster Formation in the New Silicon Valleys. *Industrial and Corporate Change*, 10:4, pp. 835-860.
- Castells, M.** (2000) *The Rise of Network Society*, second ed. Blackwell, London.
- Coe, N.M. & T.G. Bunnell** (2003) 'Spatializing' knowledge communities: towards a conceptualization of transnational innovation networks. *Global Networks*, 3:4, pp. 437-456.
- Coe, N.M., Hess, M., Yeung, H W-C., Dicken, P. & J. Henderson** (2004) 'Globalizing' Regional Development: a Global Production Networks Perspective, *Transactions of the Institute of British Geographers*, 24:4, pp. 468-484.
- Gereffi, G. & M. Korzeniewicz** (1994) *Commodity Chains and Global Capitalism*. Praeger, Westport.
- Gertler, M.** (2003) Tacit knowledge and the economic geography of context, or The undefinable tacitness of being (there). *Journal of Economic Geography*, 3, pp. 75-99.
- Gertler, M. & D. Wolfe** (2005) Spaces of Knowledge Flows: Clusters in a Global Context. Paper presented at the DRUID Tenth Anniversary Summer Conference 2005, Copenhagen, Denmark, June 27-29.
- Henderson, J., Dicken, P., Hess, M., Coe, N.M. & H W-C. Yeung** (2002) Global Production Networks and the Analysis of Economic Development. *Review of International Political Economy*, 9, pp. 436-464.
- Jaffe, A., Trajtenberg, M. & R. Henderson** (1993) Geographical Localization of Knowledge Spillovers as Evidenced by Patent Citations. *Quarterly Journal of Economics*, 108, pp. 577-598.
- Kennedy, P.** (2004) Making Global Society: Friendship Networks Among Transnational Professionals in the Building Design Industry. *Global Networks*, 4:2, pp 157-179.
- Millard, D.** (2008) The Impact of Clustering on Scientific Mobility. *Innovation: The European Journal of Social Science Research*, 18:3, pp. 343-359.
- Ministerie van Economische Zaken** (2004) *Pieken in de Delta: Gebiedsgerichte Economische perspectieven*. Ministerie van Economische Zaken (EZ): Directie Ruimtelijk Economisch Beleid.

- Owen-Smith, J. & W.W. Powell** (2004) Knowledge Networks as Channels of Conduits: The Effects of Spillovers in the Boston Biotechnology Community. *Organization Science*, 15:1, pp. 5-21.
- Porter, M.E.** (2000) Location, Competition, and Economic Development: Local Clusters in a Global Economy. *Economic Development Quarterly*, 14:1, pp. 15-34.
- Research voor Beleid** (2008) Feeling at home? Facilitating expats in the process of settling, working and living in the City Region Arnhem Nijmegen; A study on the composition, perceptions and needs of expats and their employers. By B.J.Buiskool and L.Boer, Zoetermeer.
- Saunders, M., Lewis, P. & A. Thornhill** (2008) *Methoden en technieken van onderzoek*. Vierde editie. Pearson Education Benelux, Amsterdam.
- Storper, M. & A.J. Venables** (2004) Buzz: face-to-face contact and the urban economy. *Journal of Economic Geography*, 4, pp. 351-370.
- Ten Berge, H.** (2008) *Stickiness in Health Valley?: Bloeiende eenheid of utopie? Een studie naar succes- en faalfactoren rondom het gezondheidscluster Nijmegen*. Unpublished master's thesis. Radboud University, Nijmegen.
- Tindemans, P.** (2008) East Netherlands an an Innovation Region: Can a Triangle between Valleys compensate for low critical mass?, in W. Hulsink en H. Dons (eds) *Pathways to High-tech Valleys and Research Triangles: Innovative Entrepreneurship, Knowledge Transfer and Cluster Formation in Europe and the United States*. Wageningen, Springer.
- Van den Bosch, F., Volberda, H. & M. de Boer** (1999) Coevolution of Firm Absorptive Capacity and Knowledge Environment: Organizational Forms and Combinative Capabilities. *Organization Science*, 10:5, pp. 551-568
- Van den Broek, J.** (2008) *City of Health: Etiket of Inhoud? Een kritische analyse van het Gezonde Stad concept en de Health Valley ontwikkeling in Nijmegen*. Unpublished master's thesis. Radboud University, Nijmegen.
- Williams, A.M., Baláž, V. & C. Wallace** (2004) International labor mobility and uneven regional development in Europe. *European Urban and Regional Studies*, 11:1, pp. 27-46.

Internet references

- 'Affiliated institutes'. Donders Institute. <http://www.ru.nl/donders/collaborations/affiliated/>. 7 aug. 2012
- 'Health Valley Event 2012'. Health Valley. <http://health-valley.nl/event/>. 29 jul. 2012
- 'Innovation Lab'. IMM. <http://www.ru.nl/imm/valorization/innovation-lab/>. 7 aug. 2012.
- 'Technology platforms: from molecule-2-man'. NCMLS. <http://www.ncmls.eu/technology-platform/>. 7 aug. 2012

Appendix A

Interview Protocol

Name:

Title:

Date:

Group/Department:

Years in NL:

Interviewed by:

As stated in my interview request, this interview is part of my master's thesis in Human Geography. The subject is the influence of expatriates on Health Valley development through network relations. In order to find out how the networks of expatriates look like, I organized a series of interviews with expatriates working within Health Valley. The goal is to draw a mental map of your network relations within and outside Health Valley, and acknowledge and value relations which can help the cluster to further develop.

The information you provide in this interview will be used to prepare a simple theory in local context on the use of expatriates in innovation and developing Health Valley cluster. My interest is in learning from your experience in network relations and knowledge flows. The interview will be recorded and used only by me. Quote's from this interview could be used in my thesis, however, this will not be published.

The interview takes about one hour.

ORIGIN

- ◆ Where do you come from?
- ◆ Where do you work and where do you live?

PROFESSION AND HISTORY

1. To begin with, I'd like to learn about your profession.
 - ◆ What is your profession? What is your specialization?
 - ◆ What was your prior education and where did you study?
 - ◆ At which university or institution did you study?
2. For this research it is interesting to know, how you came to this profession and which 'lines' you had to follow in order to come where you are right now.
 - ◆ How did you learn of your current position?
 - ◆ Why did you choose this position?

NETWORK RELATIONS AND KNOWLEDGE FLOWS

This research focuses on relations between people, however, to signify the importance of these relations there should be a certain economic value to these relations. Knowledge flows are an important determinant for innovation and economic development. I want to know which relations transfer what kind of knowledge and are important in bringing innovation to the region. The idea is that expats, through their networks, play an important role in transferring specific types of knowledge.

- ◆ What do you think is your role in knowledge flows?
- ◆ Is your role different from local researchers/workers?
- ◆ Does your current role suits you? Or do you prefer a different one, what would it be?

ROLE OF EXPATRIATES

In my theoretic research I have recognized some possible roles for expatriates. I would like to discuss these one by one, and ask if you would comment on these possible roles.

Expat as:

- 1. ...bringing new knowledge to the cluster which creates innovation.**
 - ◆ What is your contribution to this department?
 - ◆ Do other researchers benefit from your knowledge?
- 2. ...as an internal gatekeeper, understanding new knowledge from outside, and transfer this knowledge throughout the cluster.**
 - ◆ Do you translate knowledge from outside to others?
 - ◆ Are you asked for help in understanding new knowledge?
- 3. ...building and maintaining pipelines: Predominantly formal contact to outside knowledge centers, which over time can lead to more formal and official knowledge contacts.**
 - ◆ Do you have any remaining professional contacts? How would you describe these contacts (formal/informal)?
 - ◆ When you leave, will the department or university still benefit from these contacts?
- 4. ...as a coupling mechanism: how can the cluster adapt to the global market.**
 - ◆ Expatriate as knowledge source on what is important in the global market in order for the 'cluster' to adapt to these conditions.
- 5. ...facilitate transnational mobility through social networks.**
 - ◆ Do you promote the Netherlands or the city of Nijmegen through your external social networks?
- 6. ...creating an culturally and socially dynamic sphere in their temporary place of stay.**
 - ◆ Do you feel you make a contribution to the city?

Appendix B

Evaluation form interview

Name Interviewee:

Profession:

History as expatriate:

Own interpretation of the role in knowledge flows:

Coding:

Answers to the six conceptual roles of the expat in developing the clusters through networks relations:

1. Bringing new knowledge

Coding:

2. Internal gate keeper

Coding:

Coding:

4. Coupling mechanism

Coding:

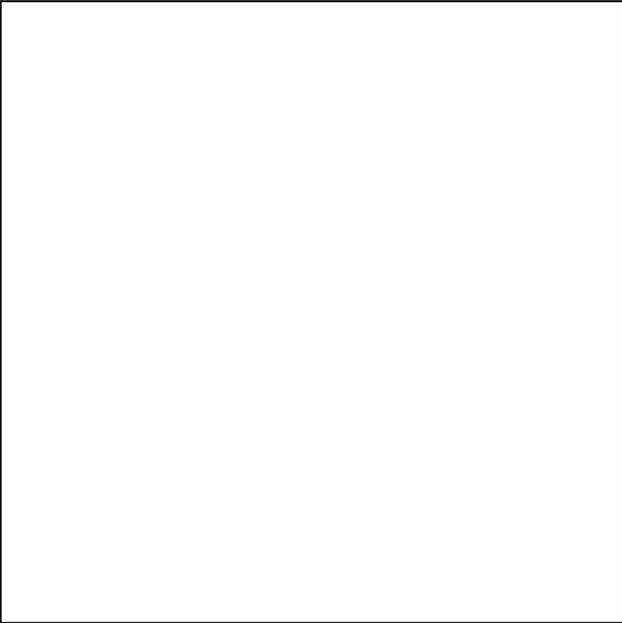
5. Facilitate transnational mobility

Coding:

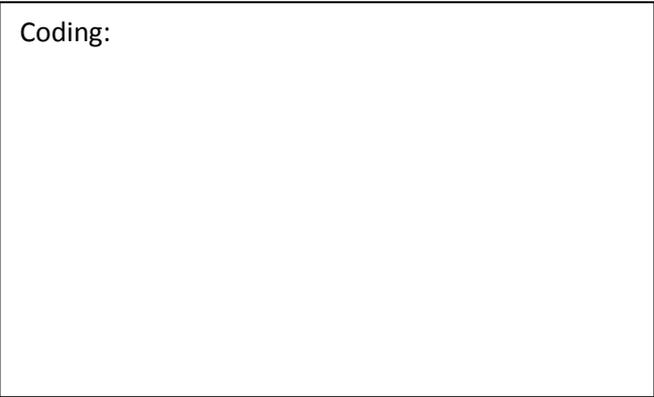
6. Creating a culturally and socially dynamic sphere in place of stay

Coding:

Other contributions to possible roles of expatriates



Coding:



Appendix C

BNN: Bringing New Knowledge

BNN: CULTURAL related differences	BNN-CUL
BNN: EXPERIENCES	BNN-EXP
BNN: BACKGROUND differences.	BNN-BGR
BNN: TACIT knowledge.	BNN-TAC
BNN: RESEARCH MATERIAL	BNN-RM
BNN: CODIFIED knowledge	BNN-COD
BNN: CONTEXT of lab	BNN-CON

IGK: Internal Gate Keeper

IGK: FLEXIBLE in dealing with situations	IGK-FLEX
IGK: ADAPTING to different people	IGK-ADA
IGK: BACKGROUND differences	IGK-BGR
IGK: CULTURAL related transfers	IGK-CUL
IGK: EXPERIENCES	IGK-EXP

BMP: Building and Maintaining Pipelines

BMP: POSITION of expatriate	BMP-POS
BMP: provide RESEARCH MATERIAL	BMP-RM
BMP: COLLABORATION in research	BMP-COL
BMP: FACE-TO-FACE contact	BMP-F2F
BMP: CONTACTS	BMP-CON
BMP: contacts are CONTEXT in environment	BMP-TXT
BMP: EXCHANGE of people	BMP-EXC
BMP: Scientific BACKGROUND	BMP-BGR

CMC: Coupling Mechanism

CMC: CULTURAL differences CMC-CUL

CMC: ORIGIN CMC-ORI

CMC: GLOBAL view CMC-GLO

CMC: EXPERIENCES CMC-EXP

FTM: Facilitate Transnational Mobility

FTM: PROMOTE Nijmegen in country of origin FTM-PRO`

FTM: REPUTATION of department FTM-REP

FTM: RETURN to country of origin FTM-RET

FTM: WELCOME new expatriates FTM-WEL

CAC: Creating Attractive City

CAC: OPENED up to international students CAC-OPN

CAC: PROCEDURES are better than before CAC-PRC

CAC: INTERNATIONAL place CAC-INT

CAC: CITY CAC-CITY

CAC: EVENTS CAC-EVN

Appendix D

This survey is conducted through the internet with the use of Google Docs. The survey can be viewed at the following link:

<https://docs.google.com/spreadsheet/viewform?formkey=dDlEekF1SjduVUZ3elkyao4tRog4dGc6MQ>

The following survey is derived from this site.

Survey on the social and professional networks of expatriates in Nijmegen

This survey is on network relations of expatriates working in the health sector in Nijmegen. Questions regard to your social and professional network relationships, and the role expatriates play in contributing to development of Nijmegen's health sector. The survey will take 5 minutes and is conducted for a Master thesis in Human Geography at the Faculty of Management, Radboud University. For questions and comments you can send an email to timmyvisser@student.ru.nl

1. Where are you from? (place, country)
2. What is your profession? (Please also name the institution and department where you work)
3. How did you learn of your current position?
 - a. Through my supervisor
 - b. Through the internet
 - c. Through conferences
 - d. Through flyers
 - e. Through colleagues
 - f. Other:
4. How long have you worked in Nijmegen?
 - a. Less than one year
 - b. 1-2 years
 - c. 2-5 years
 - d. More than 5 years
5. Do you still have contact with former colleagues or classmates from your country of origin?
 - a. Yes (continue to the next question)
 - b. No (continue with question 7)
6. How would you describe these relations? (multiple answers possible)
 - a. Friendship
 - b. Acquaintance
 - c. Professional
 - d. Other:.....
7. Do you have any professional contacts outside Nijmegen?
 - a. Yes (continue to next question)
 - b. No (continue to question 10)
8. How did you learn of your current external professional contacts? (Multiple answers possible)
 - a. These are former colleagues or friends
 - b. Through meetings
 - c. Through the internet
 - d. Through the networks of colleagues
 - e. Through conferences
 - f. Other:.....

9. How would you describe these contacts?
- Formal
 - Informal
10. At which institution or university did you study or work before you came to Nijmegen?
-
11. Is there any official collaboration between your former institution/university and your current institution?
- Yes
 - No
12. Do you think, you coming here, will lead to more official collaborations between your former university and your current institution?
- Yes, me being here will lead to an official collaboration.
 - Yes, but me being here doesn't influence these collaborations.
 - No, despite efforts I do not foresee future collaborations.
 - No, and I have no influence on these collaborations.
 - Other:.....
13. Did you know of the existence of Nijmegen before you applied for your current position?
- Yes
 - No
14. Do you know Health Valley?
- Yes
 - No

15. Health Valley is a cluster of health related institutions and businesses situated in Nijmegen. We define six different roles for the expatriate in contributing to cluster development. These roles are specific to expats as opposed to native workers. We ask of you to read these carefully, and give your rating on how you think about that specific role.

	Very Important	Important	Neutral	Not important	Not applicable
1. Bringing new knowledge to the workplace, think of both theoretical and practical knowledge					
2. Understanding outside knowledge and diffuse this knowledge throughout the department.					
3. Building contact between your current and former institution. (former workplace, or where you did your bachelor/master)					
4. Inform your current institution on what is important in your field of study.					
5. Facilitate mobility of new expatriates by recommending your institution to foreign friends or colleagues.					
6. Increase attractiveness of Nijmegen to other foreigners.					

16. Do you recognize any other ways in which you, as an expatriate, can contribute to the development of your department of the city of Nijmegen.
17. What is your gender?
- Male
 - Female
18. What is your age?

- a. Between 18-25
- b. Between 25-35
- c. Between 35-50
- d. Between 50-65
- e. 65+

Thank you for your time. Please forward this survey to any expat contacts that work within the health sector Nijmegen.