

University of Twente







Business and Science Park Organizations: Influenced or Influential?

The case of Hermia Tampere (Finland) and Kennispark Twente (Netherlands)

Master thesis Business Administration Author: Maarten Reezigt Studentnumber: s0064874

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1. Preface

For many companies and organizations, 'innovation' appears to have been the magic word of the past years. It is popular to describe yourself as an innovative champion and a simple look at the first page of the website of many multinationals will tell us that the word 'innovation' is a hit. However, the development of innovations, and especially technological innovations, requires more than just nice words and classy terminology. Co-creation (Prahalad & Ramaswamy, 2004), innovation clustering (Etzkowitz, 2005) and open innovation (Chesbrough, 2003) are the popular concepts of the innovation spaces of today. As a result, specific public or private environments are created to help, support and enable developers to come up with new ideas and concepts. In this thesis, we will take a closer look at one of the oldest and most popular examples of these environments: business and science parks.

Although research on business and science parks themselves has been quite extensive, a factor that is often overlooked is the business and science park organization. The 'business and science park organization' might not sound familiar to many. The connection, by name, to the business and science parks is clear but the many different purposes of the organizations are far from common knowledge. As a result, the varying structures of these organizations and the resulting performances are, even among academical researchers, fairly unknown.

This thesis is an attempt to place these multifunctional organizations into a modest spotlight. It is an exploration into the public-private partnership constructs of these organizations and the actual effect of them on both the park itself and the surrounding region. The empirical research, which provides us with real world examples, is provided by the experiences of two business and science park organizations: Kennispark Twente (Enschede, The Netherlands) and Hermia (Tampere, Finland).

However, this thesis would not have been able to cover this subject without the support of many people in both The Netherlands and Finland. My coordinators at the University of Twente, Hans Vossensteyn and Gert-Jan Hospers, have been very supportive with both critical and helpful reviews of my research. In Finland, Mika Kautonen provided me with similar feedback with regard to the empirical research in the city of Tampere. I'm also thankful for the time that over twenty interviewees reserved for me. Last, I'd like to thank Sonja and my family for always supporting me in my studies over the past years.

Maarten Reezigt April 29th, 2010

2. Management summary

Introduction

Since the first foundation of business and science parks, accompanying developmental organizations ('business and science park organizations') have not always received full attention. This is believed to be caused by the fact that the activities and efforts of these organizations are often not publicly visible (Anttiroiko, 2004). Creating connections, forming and managing projects and the overall development of a region is a scenery most visible in meeting rooms instead of practical and touchable products. The internal structure of these organizations is often only known to its own employees and the influence of this on the performance is still a fairly undiscovered area of research (Anttiroiko, 2004). This research project tries to make an empirical effort in doing so, based on the business and science park organizations of Hermia, Tampere (Finland) and Kennispark, Twente (The Netherlands).

Tampere and Twente are two regions with similar historical aspects. Both regions have a comparable number of inhabitants, share a history in textile industries, include a technical university and both regions do not form the financial or political centers of their country. These similarities are critical when assessing the influence of the constructs of these organizations on the performances because it eliminates a number of basic external influences that might affect the analysis. It is therefore interesting to compare the historical path of the two regions and to seen where they stand today.

Research question

The structure of this master thesis is based on the main research question:

Are the *technological specialization(s)* of the parks influencing the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations and are these *Public-Private Partnership (PPP) constructs* influencing the *performances* of the parks?

Answering this main question requires, at both business and science parks, research focused on the three key variables: *the technological specialization(s), the Public-Private Partnership (PPP) constructs* and *the performance* of both parks.

Research methods

To assess the three key variables, three specific theories were used. The analysis of the technological specialization(s) is based on the elements of Porter's Diamond mode, the analysis of the PPP-construct is based on Etzkowitz' Triple Helix model and the analysis of the performance of both parks is based on Anttiroiko's definition of success for business and science parks. Two methods of data collection were used: document analysis en partially-structured interviews. These methods were both practiced in Tampere and Twente.

The technological specializations(s)

The determination of the technological specialization(s) at both parks shows different results for both parks. Hermia Tampere is mainly focused on ICT related companies, projects and development although the ICT cluster is marketed in different ways. Kennispark Twente appeared less specialized and more of a generalist with specializations in ICT, Nano-technology and Biomedical Engineering. The path that led to

the establishment of the specializations has also been quite different. This is based on a number of national and international actors that influenced both the two different countries and the two different regions.

The Public-Private Partnership constructs

When comparing the current formal overview of both organizations, the situation is quite similar. The university actors owns 60% of the shares of the Hermia organization and the governmental actors 40%. At Kennispark, the governmental actors represents 66% of the formal influence and the university 33%. Both organizations allow room for both the university and the governmental actors but the leading position differs: the university at Hermia and the government at Kennispark. For Hermia, this is a big change since the old Hermia. The former domination by the government seemed to have a large impact on the organizational structure of Hermia and its performance. The new setting of the helices is expected to help the organization to overcome a number of the problems that influenced the old organization.

Hermia and Kennispark are funded in very different ways. Both organizations have a source of structural income but the construct is very different. Kennispark receives annual fees from both the university and governmental actors. These costs cover the organizational costs of Kennispark and enable the organization to focus on the Kennispark projects without concern for their own survival. In contrast, Hermia is not supported by the university or the government and needs to cover its own costs. Its source of structural income are industrial partners: companies can become a member of Hermia's 'innovation network' which grants them access to Hermia's projects. Since these membership fees are not sufficient to cover all organizational costs, Hermia is forced to continuously search for new funding and often goes *"where the money can be found"* (Jussila, 2009).

In both cases, the main initiator of the organization is also perceived to be the most important actor in the current organization. This makes sense at Kennispark since the university is still very active in the Kennispark organization. At Hermia, however, the city of Tampere has switched its leading position with the technical university of Tampere although this did not prove to be public knowledge yet. In Twente, the broad involvement of both the university and the governmental helix is seen as essential for the success of Kennispark. The employees of Hermia also regard the organizational changes that include a more balanced involvement of the university and government as very positive. It is interesting to see that at Twente, the perceived PPP-construct is quite similar to the PPP-construct of the formal organization. In Tampere, it is very different from the current formal PPP-construct.

The performances

When comparing the quantitative performances of Hermia and Kennispark, the increases at Kennispark are impressive. At Kennispark, a total of approximately 540 new knowledge intensive jobs were created in three years while Hermia only recorded an increase of 25 jobs. When looking at the total number of knowledge intensive jobs, Hermia is still way ahead of Kennispark as it provides over 1.500 jobs more. At Hermia, the generation of jobs and the total number of jobs are highly depending on the actions taken by Nokia. Nokia provides about 2.800 of the 4.125 jobs at Hermia and is of major importance to both the Hermia business and science park and the Tampere region.

When comparing the regional effects of both business and science parks, two different images arise which are coherent with the image of the quantitative comparison. Most indicators are better or broader developed at Hermia while Kennispark appears to be a relatively young pioneering concept and park. In Tampere, Hermia is considered one of the cornerstones of the regional economy and when asking around in Tampere, almost anyone would be able to tell you where to find the park. Kennispark is less known in

the Twente region but it now appears to put some serious effort in getting the region acquainted with both the concept and the name Kennispark. Of course, the time span is relevant. Kennispark has been using the name Kennispark since four or five years, although the physical business and science park was established around the same time as Hermia was established. However, the name 'Hermia' was the original name of Tampere's business and science park and it has never changed.

The differences between the established Hermia park and the pioneering Kennispark park are also noticeable when looking at the other effects on the region. Hermia companies have established connections with companies located outside the Hermia park and also the larger regional industries have found their way to the park. In this respect, Kennispark is lagging behind. Most companies at Kennispark are not involved yet with other regional industries and at this time, the larger regional industries (mainly Thales and Ten Cate) are not connected at all. Often, the companies at Kennispark are somewhat connected to national or international players but the regional level is fairly underdeveloped. The difference here appears to be the presence of the Hermia organization and the Kennispark organization. While the efforts of the Kennispark organization are relatively new, the Hermia organization has been along for over two decades. Since both organizations are attempting to improve the connections between the university and the industries, the absence of the Kennispark organization over the past fifteen years might have been an influential factor.

Answering the research question

The findings for the three key variables were used to answer the main research question. The influence of the technological specialization(s) on the PPP-construct and the influence of the PPP-construct on the performances have been assessed and compared for both business and science parks. An overview of the individual assessment of both parks is presented at page 5.

When comparing the influence of the specializations on the PPP-constructs of both B&S park organizations, the results are actually quite similar. When assessing the influence of the technological specialization(s) on the PPP-constructs, both parks were found to be free of any influences by any particular technological specialization(s). At both parks, there has been no indication that the PPP-construct was designed with any particular specialization in mind. When assessing the current structures, both the old and the new Hermia organization and the Kennispark organization showed no traces of treating certain specializations in a different way than others. Both PPP-constructs also did not include any particular representatives of any of the specializations. At the Kennispark organization, there was one representative of a cluster that was not satisfied with the position of his cluster. However, his argument is better described by saying that he would have liked to see more attention for his cluster, based on the performance record of the cluster in the past. Therefore, it is my estimation that he would actually have preferred to have a stronger position for that particular cluster than the relatively equal treatment which is currently practiced.

When assessing the influence of the PPP-construct of the business and science park organizations on the performances of both parks, both outcomes were concluded to be positive. The main difference between Hermia and Kennispark appears to be the degree of influence.

At both parks, it proved to be hard to connect the PPP-construct directly to quantitative performances, at Hermia this was mainly caused because the Hermia organization does not claim to be connected to many of the determined quantitative performance indicators. At Kennispark, it was caused by the fact that, although the industrial helix has been missing, the results were still very positive. Including the industrial

helix might have improved some of the indicators even more but there is no way to compare this possibility with the current setting as there is no way to create quantitative data for this hypothetical situation. However, qualitative performances will, eventually, also influence the quantitative performances of both parks. A qualitative indicator like, for example, the cooperation between the helices will also benefit the willingness to work together in projects and would therefore also benefit the creation of knowledge intensive jobs or the number of spinoff companies.

When comparing the influence of the PPP-construct on the qualitative performances, the Hermia organization and the Kennispark organization are sharing one aspect: a limited role for industrial partners. As the old Hermia organization was dominated by the city of Tampere and it also dominated the PPP-construct. This left little (formal) room for the university and industrial partners which, in turn, affected the cooperation between the different helices. However, at Kennispark, only the industrial partners are missing which means that the negative influence on the cooperation of the helices is smaller than at Hermia. Where the PPP-construct of the Hermia organization used to be a governmental monoculture, Kennispark included balanced positions for the university and the governmental actors.



An overview of the outcomes at both business and science parks

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3. Introduction

3.1 Research motives

Business and science (B&S) parks and business and science park organizations are no brand new phenomena. Both have been around in many different forms and based on many different structures in all parts of the world. However, what triggered my interest in these parks was the recent foundation of a business and science park organization in the region where I study: Twente. This initiative, Kennispark, has been trying to improve the performances of the twenty year old business and science park of Enschede.

Kennispark is one of the regional efforts to use to the knowledge and the possibilities of the University of Twente to its full extend. Twente has been a region that suffered from an industrial downfall only a few decades ago and the regional economy has been recovering ever since. The average income per person in its largest city, Enschede, is still about 12% below the national average. In fact, Enschede was, together with the city of Emmen, claimed to have the lowest average income of any city in The Netherlands (CBS, 2008). However, the University of Twente has played an important role in the 'reinvention' of the Twente region and the concept of Kennispark is one of the latest additions to put the university to work for the regional development of Twente.

This interest in Kennispark is shared by the Center of Higher Education and Policy Studies (CHEPS), located at the University of Twente. As business and science parks are, for universities, a way to commercialize their knowledge, their interest was drawn to the new developments of the park where CHEPS is actually located itself. Commercializing knowledge allows higher education institutions to generate income from external sources which attracts the attention of, for example, many Dutch universities. Creating potential partners, renting university facilities to spinoff companies and bringing the university and industry closer together would add to the benefits of a successful business and science park

One of the main points of interest proved to be the way that business and science parks are organized and how these parks are performing. With Kennispark as the primary case, we searched for a well established business and science park with a similar concept to compare and, perhaps, learn from. The Hermia business and science park in Tampere (Finland) was selected because the Tampere region shows a high number of similarities to the Twente region. We then focused on potential influences on the performances of business and science parks. This led to the conclusion that the construct of the Public-Private cooperation at business and science park organization might influence the actual performance of the park. After conducting initial research about this subject, it became clear that there is very little (scientific) information available about this subject. It is therefore the foundation of an interesting exploratory and descriptive master thesis.

3.2 Scientific relevance

Business and science parks have been thoroughly assessed in scientific literature. As there is a large variety of different park concepts and constructs, many case studies have focused on different aspects of these parks. However, it is interesting to see that research on the performances of business and science parks is extremely rare. The scientific relevance is therefore based on the explorative and descriptive nature of this thesis, concerning business and science park performances and the influence of business and

science park organizations on these performances. In the end, I hope that this master thesis will contribute to the understanding of how the performances of these parks can be assessed and how the cooperation constructs of the business and science parks can influence these performances.

3.3 Tampere and Twente: a short introduction

Tampere and Twente are two regions with similar historical aspects. Both regions have a comparable number of inhabitants, share a history in textile industries, include a technical university and both regions do not form the financial or political centers of their specific countries. The downfall of the textile industry in Western Europe, as a result of the rise of low labor-cost countries, also presented a similar challenge to both regions: how to alleviate this rapid decline in income and labor provision? These similarities are critical when assessing the influence of the organizational constructs of these regions on the performances because it eliminates a number of basic external influences that might affect the analysis. However, the direct connection between the organization structure and the performance of business and science parks is still affected by many external actors. It is therefore attempted to assess the influence of the construct on the performance inductively; the differences in results (performances) are traced back to the constant (PPP-constructs) which might be a result of a causal path (Yin, 2003).

	Tampere (Finland)	Twente (Netherlands)
Population main city	211.544 (Tampere)	157.325 (Enschede)
Population region	470.000 (Tampere)	620.000 (Twente)
Industrial heritage	Textile and supportive industries	Textile and supportive industries
Technical University	Yes	Yes
Social studies University	Yes	Yes, but limited.
Distance to political center	173km (Helsinki)	179km (The Hague)
Distance to economical center	173km (Helsinki)	138km (Amsterdam)
Selected business and science park	Hermia, Tampere	Kennispark Twente, Enschede
Selected organization	Hermia Plc.	Kennispark Twente

Figure 1: A basic overview of the Tampere and Twente region

In this master thesis, I will use the regions of Tampere and Twente to study a shared phenomenon: the presence of a business and science park and its organization. These organizations are meant to support the business and science parks, with activities varying from real estate management to incubation activities and attracting companies to the park, but they are also contributing to the regional development of both the Tampere and Twente regions.

Since the first foundation of business and science parks a few decades ago, accompanying developmental organizations have not always received full attention. This is believed to be caused by the fact that the activities and efforts of these organizations are often not very visible to the public eye (Anttiroiko, 2004). Creating connections, forming and managing projects and the overall development of a region is a scenery most visible in meeting rooms instead of practical and touchable products. The ownership structures of the organizations appear quite diverse, there is no standard and many are organized in unique ways. The

internal structure of these organizations is often only known to its own employees and the influence of this on the performance is still a fairly undiscovered area of research (Anttiroiko, 2004). This research project tries to make an empirical effort by comparing two of these organizations, based on the business and science park organizations of Hermia, Tampere (Finland) and Kennispark Twente, Enschede (The Netherlands). At times, Kennispark Twente will be referred to as just 'Kennispark'.

3.4 Research question and research objective

3.4.1 Research objective

The research objective of this Master thesis is to study the origin, development and organization of the PPP-constructs of business and science park (organizations), in particular 'Hermia' and 'Kennispark Twente', and to assess the possible relationship of the PPP-constructs with the technological specializations and the performances of these parks.

The structure of this Master thesis consists of an introductory chapter, the theoretical framework and the methodology chapter followed up by the empirical research. To answer the research question, the empirical research will focus on analyzing the three key variables: the technological *specialization(s)*, the *PPP-construct* and the *performance*. All three variables are characteristics of the central research objects: the business and science parks of Tampere and Twente. The three key variables will be assessed in different ways since the nature of the variables requires different means of research. The thesis will be finalized with conclusions and recommendations.

3.4. Central research question

The goal of this master thesis is to answer the main question concerning the business and science parks of Tampere (Hermia) and Twente (Kennispark Twente):

Are the *technological specialization(s)* of the parks influencing the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations and are these *Public-Private Partnership (PPP) constructs* influencing the *performances* of the parks?

To answer this central research question, it is required to consider which variables should be assessed. As the research question concerns the influence of the technological specialization on the PPP-construct and the influence of the PPP-construct on the performance of the parks, three variables can be identified as required to answer the main question:

- The technological specialization(s) of both business and science parks
- The public-private partnership (PPP) constructs of both business and science park organizations
- The performances of both business and science parks

To answer the main question, all three variables will be assessed for the business and science parks of Tampere and Twente. This requires an in-depth analysis of both the regions, based on the following three sub questions:

1. What are the technological specializations of both business and science parks?

Including the historical development of the specializations will lead to more insight in their influence on both the business and science park (organizations) and the concerning regions. It will also provide an

introduction to both the regions. This will make the environments in which both business and science parks are functioning easier to understand.

2. What are the PPP-constructs of both business and science park organizations?

A framework will be required in which all active business and science park stakeholders can be represented. This framework should provide a clear view on the current ownership and internal organizationl structure. Next, the framework should present a clear overview of their organizational and financial efforts within the organizations. Last, the outcomes should be comparable for both business and science parks.

3. What are the overall performances of both business and science parks?

The performances of both parks are highly dependent on their activities. Measurement and comparison should therefore based on a number of 'universal business and science park activities, results and effects' which can be assessed at both parks. This performance might include both quantitative and qualitative measurements.

By answering these three sub questions, we hope to find evidence for the expected links between these phenomena in two cases: Tampere and Twente.



Figure 2: The Master thesis research plan

3.5 Conceptualization of the master thesis

From a historical perspective, Tampere and Twente showed a number of similarities but how about today's situation? When looking at the regions, both ended up with different technological specializations. It is therefore interesting to analyze how both regions came to their specialization(s) and to assess how these specialization(s) developed, both starting from a very similar situation. The specializations of both regions will be analyzed using Porters Diamond model which assesses why particular industries become competitive in particular locations (Trail & Eamonn Pitts, 1998). As my starting point, I will use the specific specializations of both regions. Next, I will try to assess how both regions ended up with their specializations, using the elements of Porters Diamond model as the determinants of the specialization outcome. This will change the scope of the analysis from deductive research to inductive research.

The specialization(s) of both business and science parks might have had an important impact on both the business and science park as they now are. The public-private-partnership (PPP) construct behind both parks might be influenced by the type of technological focus that is present at both parks. Important is the fact that Porter describes most globally competitive industries to be geographically clustered within that nation, indirectly supporting the emerge of business and science park as clusters of focused knowledge valorization. Porter (1990) defines 'clusters' to be groups of interconnected firms, suppliers, related industries and specialized institutions in particular fields that are present in particular locations. As a business and science park brings these actors together to 'produce' a center of 'business and science' excellence, it can be seen as a catalyst of government-university-industry clustering and therefore the technological focus and the resulting clustered spin-off companies are an interesting subject of analysis for Porters Diamond model. In order to analyze the specializations in both regions, the Diamond model elements will be used as determinants in the process of the specialization. This will change the perspective from deductive research to inductive research.

In order to assess the PPP-construct of the business and science parks itself, the most influential and renowned model can be credited to Etzkowitz. His work on the Triple Helix Model (2000) has become the leading analytical tool for government-university-industry relationships. The Triple Helix model will be used to analyze the current situation at both business and science, focusing on the organizational form (the construct) of this public-private-partnership (PPP). The model does not normatively prescribe the collaboration in local networks but it does suggest that a three-dimensional (triple helix) design is 'sufficiently complex to analyze the integration and differentiation among the subdynamics' (Ashby, 1958; Leydesdorff & Fritsch, 2006).

The Triple Helix Model of government-university-industry relations provides a neo-evolutionary model of the process of innovation that is amenable to measurement. Economic exchange, intellectual organization, and geographical constraints can be considered as different dynamics that interact in a knowledge-based economy as a complex system (Leydesdorff and Meyer, 2005). Applying the Triple Helix Model at the regional level of business and science park interactions between government, university and industry will present an understanding of how these actors work together. Also, it will provide insight in how all three involved actors cooperate in the 'construct' behind the business and science parks.

It is interesting to compare the outcomes of Porters Diamond Model with the Triple Helix Model of Etzkowitz. It is possible that the choice of innovation specialization, as analyzed by the Diamond Model, also translates into a certain predetermined construct of cooperation at the business and science parks, as

assessed by Etzkowitz Triple Helix Model. This question is symbolized by the first two "Influence?"'s in the model for both Tampere and Twente. If there is a 'fit' between the outcomes of both theoretical models, the PPP-construct behind the business and science parks might prove to be a (partial) result of the chosen technological focus. This might be the case when, for example, the presence of a strong cluster leads to an organizational structure that is adapted to this clusters needs. We will be focusing on the technological specialization(s) but naturally many other factors, such as (inter)national legislations, are also influencing the PPP-construct. After this analysis, the constructs behind the business and science parks of Tampere and Twente will be ready to be paired with their performances, in order to present a comparison of both constructs and their performance.



Figure 3: Conceptualization of the theoretical framework

The next step is comparing the Triple Helix Model analysis of the PPP-construct with the performance results as defined by Anttiroiko's business and science park success indicators (Anttiroiko, 2004).

Anttiroiko's success factors define what actual 'success' is for business and science parks and the performance analysis will be paired with the PPP-construct in order to answer the question if the PPP-construct is a factor of influence on the overall performance of the business and science parks. This question is resembled by the second pair of "Influence?"'s in the conceptualization model. In order to answer this question, it is important to exclude possible external influences on the performance as much as possible.

As a result of the research, I will answer the main research question: first, are the technological specialization(s) influencing the PPP-constructs at the business and science parks? And second, are the PPP-constructs influencing the overall performance of the business and science parks?

4. Theoretical framework

4.1 Introduction to the theoretical framework

The empirical case study comparison of the business and science parks 'Hermia' Tampere and 'Kennispark' Twente will be based on a theoretical framework based on a combination of three theories. Every framework is used to analyze one of the key variables of the research objects: the technological specialization(s), the PPP-construct and the performances.

Porters Diamond model (1998) will be, as mentioned, used to provide insight in the technological specialization(s) of both regions. The resulting business and science park (organizations), and their PPP-constructs, will be analyzed using the Triple Helix model of Etzkowitz (2005). Last, the performance of both business and science parks will be assessed using Anttiroiko's definition of success for business & science parks (2004).

4.2 Porters Diamond model: the competitive advantage of a region

4.2.1 Introduction

In 1990, Michael Porter posed a fundamental and challenging question: why do some nations succeed whilst others fail in international competition? Porter discovered in the late eighties that his previous five forces model (1979) and value chain model (1985) alone were insufficient to analyze how companies based in different nations competed (or nations competed as facilitators of industries). As the world was evolving and the globalization of many companies became a reality, it was important to help companies understand issues that were relevant when competing with players in different nations.

As increased technological innovation and globalization of the markets has taken place, theories based primarily on factor endowments such as the Absolute Advantage Theory (Smith, 1776) and the Comparative Advantage Theory (Ricardo, 1817), cannot explain either the success of some countries that lack natural resources, or the poor performance of countries that have enormous natural endowments. Porter (1990) argues that productivity is the most important factor for international competitiveness and he posed that an increase in productivity would directly increase the standard of living. Improved productivity would rely on increasing workers' skills, developing technologies, producing quality products, and reducing costs (Porter, 1990; Barragan, 2005).

Porter's research consisted of two different steps. In the first step, Porter analyzed clusters of successful industries and mapped these in 10 of the most important trading nations. The second step deals with the

way that competitive advantage is created, relying heavily on historical analysis. Although this model was developed to analyze the competitive advantage of one nation over another, it focuses on the local clustering of industries within those nations. In this study, the model will be applied to analyze the regional business and science park clusters as the regional innovation structure may be similar to a national one. It changes the perspective from a macro-economical (nation) scale to a meso-economic scale (region), based on the same elemental analysis. Although the Diamond model was developed to analyze nations, Porter concludes that 'competitors in many internationally successful industries , and often entire clusters of industries, are often located in a single town or region within a nation' (Porter, 1990). Additionally, Porter observed that cities and regions can contain a large number of rivals, customers and suppliers leading to not only efficiency and specialization but also to a concentration of information and visibility on competitors (Van den Bosch, Den Man, Elfring, 1997). Porter concludes by stating that the Diamond model can also be applied at the regional level: 'Indeed, the reasons why a particular city or region is successful in a particular industry are captured by the same considerations embodied in the 'diamond"(Porter, 1990).

While Porter initiated his research by looking at the region and analyzing its competitive advantages, I will start with the existing specializations and I will try to explain the rise of these specializations in Tampere and Twente using the elements that Porters Diamond model provides to explain the competitive advantages of a nation or region. First, I will determine the specific specializations of the business and science parks of both regions. Next, these specializations will be analyzed and I will try to assess why both regions ended up with their specializations, using the elements of Porters Diamond model as the determinants of the specialization outcome. This will change the perspective of the model as a deductive analyzing method to an inductive research method and the elements and external determinants of the Diamond Model will be used as analyzing tools.



Figure 4: Porters Diamond Model (Porter, 1998)

4.2.2 Elements of the Diamond model

The four broad factors (1,2,3 & 4) that Porter presents are all interacting with each other on a reciprocal basis. However, the two external determinants (5 & 6) are influencing the four broad factors but these factors, in their turn, are not able to influence the two external determinants.

In Porters opinion, the firm strategy, structure and rivalry (1) are influenced by the flexible environment of the firm. It is direct competition that forces firms to produce innovations and increase their productivity. Fierce direct competition forces companies to develop superior technologies, products and management practices to survive.

Also, a product's design almost always reflects the home market demand conditions (2). In respect to the economies of scale, each producer wants to serve a geographically extensive market from a single location; in order to minimize transportation costs, a company will choose a location with a large local demand (Mishra, 2009). Price elasticity plays a role in conditioning demand for products. Price inelasticity can help firms develop new technologies without cost consideration. This can be a result of, for example, governmental subsidies to support innovation in a particular region.

The existence of nearby related and supporting industries (3) eases the coordination of technology and labor. In Silicon Valley, for example, the workforce is extremely mobile and knowledge flows relatively freely between competing firms (Porter, 1998). The clustering of industry also results in the reduction of transportation costs.

The fourth element concerns the factor conditions (4). Factor conditions are about creating a match between the factor endowments of the country, or region in our case, and the needs of the industry. Important factor endowments include infrastructure, capital, (technological) knowledge, human resources, geographical climate and the available workforce (Curran, 2000).

The two external determinants, chance and government, are able to influence the four primary factors, but they cannot be influenced by those factors themselves. The role of government (5) is to influence the four basic elements within the diamond. This can be positive or negative influences, depending on their impact for the industry and the region. For example, policies directed at the capital markets and education have an impact on the 'factor conditions'. Subtle governmental influences on the market might support 'demand conditions' and the government might also shape firm 'strategy and structure' through its impact through market regulations, tax policies and antitrust levels (Porter, 1998).

The other external influence is chance (6). Porter defines chance events as the ones that have little to do with the situation in a nation or region and are largely outside the control of firms (Porter, 1998). Examples of chance events could be significant shifts in exchange rates, decisions taken by foreign governments and wars but also strong leadership or random instances of 'luck' or misfortune. However, performing well at the other elements of the model would increase, of course, the chance of enforcing a positive event of chance. Concerning higher education, chance could also include new inventions or patents but also the recruitment of a future research 'star' or many other influential events (Curran, 2000). These chance events are important because they create discontinuities which allow shifts in the competitive position (Mishra, 2009).

4.2.3 Clustering

Porter makes one further crucial assumption: a nation's most globally competitive industries are likely to be geographically clustered within that nation (Kuah & Day, 2005). As captured by Martin and Sunley (2002): "the competitive diamond is the driving force behind cluster development, and simultaneously the cluster is the spatial manifestation of the competitive diamond". In other words, the competitive

advantages of regions are a natural source for clustering, supporting (specialized) business and science parks as a very explicit exemplary result. Arthur (1990) noted that strong clusters also tend to attract more firms and those regions with a strong innovative record have an advantage in achieving more innovation: they become 'self fulfilling'.

In the same respect, Porter and Stern (2001) argue that nearby related and supportive industries concentrated in geographical regions improve the innovation process. The networks established within the cluster also increase communication (Podolny and Page, 1998; Porter, 1998). This flow of communication among firms nurtures the learning process (Powell, Koput, and Smith-Doerr, 1996) and creates knowledge (Maskell, 2001). Clustering is therefore an import aspect of the establishment of technical specialization(s), as present at both business and science parks.

4.3 The Triple Helix model; government-university-industry collaboration and regional development

4.3.1 Introduction

The boundaries between public and private, science and technology, university and industry are in flux (Leydesdorff, 2000). Clustered university–industry–government relations can be considered as a triple helix of evolving networks of communication (Etzkowitz & Leydesdorff, 1997). This "triple helix" is more complex than the mutual interactions between the "double helices" on which it rests. As Etzkowitz concluded in his research during the late nineties of the last century, relations between government and university, university and industry and government and industry have exceeded their bilateral boundaries, rendering the double helix approach of co-evolving cooperation obsolete. Bilateral relations have expanded into triadic relationships among the three helices of university, industry and government, especially at the regional level (Etzkowitz, 2002). The result is a new model, the Triple Helix model, which is the successor of the traditional views on university-industry-government relations. These were based on two different models, concerning the United States (the laissez-faire model) and the former Sovjet Union (the top down model):



In the former Sovjet Union, the state would dominate both the universities and the industries, as illustrated by the model in which the state incorporates industry and the university. The United States model presents the institutional helices as separate from each other. Both of these previous models, whether it was one helix dominating the others or a complete separation of helixs, are moving to a model where all three institutional helixs overlap and cooperate with each other (Etzkowitz, 2005).

The dynamic of society has changed from one of strong boundaries between the separate institutional helices and organizations to a more flexible overlapping system. The university has become a firm founder through incubator facilities; industry is an educator through internal company education systems and government is a venture capitalist through several investment programs for the promotion of innovation (Etzkowitz, Gullbrandsen and Levitt, 2000). Government has also encouraged collaborative R&D among firms, universities and national laboratories to address issues of national competitiveness (Wessner, 1999).

4.3.2 The triple helix model

The "triple helix" is a spiral model of innovation that captures multiple reciprocal relationships at different points in the process of knowledge capitalization (Etzkowitz, 2002). It concerns the triad of government-university-industry relationships.



The Triple Helix denotes the government-university-industry relationship as one of relatively equal, yet interdependent, institutional helices which overlap and cover, at times, the role of different helices (figure 5) (Etkowitz, 2002). The Triple helix model is used for both macro-economic (nation) and meso-economic (region) research. The future macro-economical developments are expected to be the outcomes of changes in the 'regional' contingencies and their relevant environments (Leyesdorff & Etzowitz, 1998). The contextual changes can be perceived from the perspective of the local institutions of university, local government and local industry. The Triple Helix is, however, not a normative model. The model does not normatively prescribe the collaboration in local networks but it does suggest that a three-dimensional (triple helix) design is 'sufficiently complex to analyze the integration and differentiation among the subdynamics' (Ashby, 1958; Leydesdorff & Fritsch, 2006).



Figure 8: The three helices and the position of tri-lateral networks and hybrid organizations (Etzkowitz, 2000)

The triple helix consists of three different dimensions: internal transformation, the influence of one helix upon another and the creation of a new overlay of trilateral networks and interactions between the three helixes. The creation of this trilateral network will be lead by a Regional Innovation Organizer (RIO), which will create a consensus space to bring the three actors together. As business and science park organizations tend to fulfill the position of creating a network between the three helices, they can be seen as the active RIO's in the regions of Tampere and Twente. An analysis of Tampere and Twente based on the triple helix model will create a better understanding of the involvement of the local university, industry and government within these organizations because it offers an schematic overview of the stakeholder positions (as represented by their helices). The purpose of these networking organizations is to create so-called 'science cities' or regions. Science cities are 'regional development projects, based upon university-industry-government collaborations, that creatively synthesize local and national resources to achieve science-based economic growth' (Etzkowitz, 2005). Typically, the presence of an entrepreneurial university is required because of the technological knowledge that is provided (idem).

In contrast with the Triple Helix Model itself, the centralized position of a business and science park as a part of all three helices can be seen as a normative prescription. It is important for networking organizations to be involved with every actor to enable the business and science park organization to function as a 'spider in a web'; involved in every decision and connected to all. The position of the business park organizations within the Triple Helix will therefore be assessed for both Tampere and Twente.

4.3.3 Toward a knowledge-based region

Regional development has transformed as the traditional factors of production (land, labor and capital) (Etzkowitz, 2008) give way to regional development based on knowledge in both high-technology and older manufacturing industries. Regional development is more and more dependent on the willingness to cooperate within the region. If this requirement is met at the Tampere and Twente regions, a regional triple helix can be conceptualized as a series of knowledge, consensus and innovation spaces (Etzkowitz, 2005). These spaces represent three stages of development that are required to establish a local triple helix.

Stage of development:	Characteristics:
1. Creation of a <i>knowledge</i> space	Focus on "regional innovation environment" (geographically) where different actors work to improve local conditions for innovation by concentrating related R&D activities and other relevant operations.
2. Creation of a <i>consensus</i> space	In the consensus space, ideas and strategies are generated in an organizational "Triple Helix" model of multiple reciprocal relationships among institutional sectors (government, university, industry)
3. Creation of an <i>innovation</i> space .	Attempts at realizing the goals articulated in the previous phase, establishing and/or attracting public and private venture capital (combination of capital, technical knowledge and business knowledge) is central.

Figure 9: The three stages of regional development (Etzkowitz, 2008)

The first stage, the creation of a 'knowledge space' focuses on the concentration of related R&D activities in a local area that have been identified as a precursor to knowledge-based regional economic development. The availability of these activities is critical to science-based regional economic development but not sufficient, it can be seen as the foundation for the triple helix ideal. In the knowledge space, universities and research institutes are the primary actors and the goal is to create research projects with economical or social relevance (Etzkowitz, 2006).

The 'consensus space' brings the different actors (public, private & academic) together to generate new ideas and set shared goals. It is focused on the overlapping area of the three actor helices, as created by trilateral networks and hybrid organizations (figure 6) and would therefore the position of 'Hermia' in Tampere and 'Kennispark' in Twente in an optimal situation. The creation of the consensus space is therefore the 'home' of the Triple Helix model as the equal relations between government, university and industry should be established here. The consensus space will therefore be the main interest of research for analyzing the 'PPP-construct' behind both business and science parks.

Last, the 'innovation space' is where the goals, as set in the consensus space, are realized. All three actors need to contribute, in respect to their specific background and specializations, to come to a combined achievement. The hybridization of organizational roles and functions, arising from the interaction that occurs in the consensus space is an expected development. The result is the emerge of organizations with elements of theory and practice of different helices. The focus is, dependent on the type of space, on different aspects of internal and external reforms.

To assess the position of the business and science park organizations within the Triple Helix model, elaboration on the role of the three different Triple Helix institutions (Government-University-Industry) is required.

4.3.4 The entrepreneurial university as the cornerstone of the triple helix

Perhaps the most influential stakeholder in the regional triple helix network is the (entrepreneurial) university. The university, as an institution of medieval origins that played a supporting role in feudal and industrial society emerges as the key institution of the knowledge-based society, playing a role in economic and social development as well as research and education. The difference between a university and an entrepreneurial university rests on four pillars (Etzkowitz, 2005):

1. Legal control over academic resources, including physical property in university lands and buildings and intellectual property emanating from research.

2. Organizational capacity to transfer technology through patenting, licensing, incubation and contract activities for third parties but also through education (Kautonen, 2009).

3. An entrepreneurial ethos among administrators, faculty and students.

4. Academic leadership able to formulate and implement a strategic vision.

The university has a primary position within the innovation process, as required for business & science parks. Universities include basic features as its high rate of flow through of human capital (students) who are a continuing source of potential innovators and inventors. The university is a natural incubator of new startup ventures, providing an intellectual, commercial and conjoint support structure for teachers and students. Universities are also the center of multidisciplinary networks emerging from faculties, teachers and students with different academic backgrounds.

Universities are rigid organizations, with departmental and disciplinary structures resistant to change (Hultman, 1998). However, it is the diversification within the university that enables it to create new working fields by reinventing existing working fields and drawing faculties with related interests together, supported by hiring in new personnel to develop new areas.

The implications of the triple helix model for the academic world can be summarized by three key elements: first, a more prominent role for the university in innovation; second, a movement toward collaborative relationships among the three major institutional helices in which innovation policy is increasingly an outcome of interaction among university, industry and government; thirdly, in addition to fulfilling their traditional functions, each institutional helix also 'takes the role of the other operating on a y axis of their new role as well as an x axis of their traditional function' (Etzkowitz, 2005).

4.3.5 Government; towards innovation stimulator

In recent decades, the role of the government has evolved into an entrepreneur, not only regulating but also revising and stimulating the interaction between the different helices of the triple helix model. In the United States, government has changed the rules for competition among firms. It encourages companies to collaborate with each other, and with universities in joint research and product development efforts through competitive grants programs and tax credits (Etzowitz, Gulbrandsen and Levitt, 2000). Government helps to support the new developments through changes in the regulatory environment, tax incentives and provision of public venture capital (Eisinger, 1997).

The route to a 'common' triple helix of relatively equals differs significantly, depending on the starting point of a statist (for example the former Sovjet Union) or a laissez-faire (for example The United States) society. The different starting points of states also translate into different governmental approaches affecting the trajectory and the visibility of a triple helix, whether it is organized openly and transparently or is routed through hidden channels (Etzkowitz, 2008). It is important to notice that national research policies have been integrated with regional policies, sometimes directly (e.g. Sweden) and sometimes indirectly (e.g. United States). This depends on the governmental system of a country. The centralized system of Sweden makes top-down interventions or support easy where the United States needs a more bottom-up approach because of the decentralized system.

4.3.6 The evolution of industries

The industrial institution within the Triple Helix model is far less developed in comparison with the governmental and the university institutions. When analyzing on the regional level, the relevant governmental actors are limited to local, regional and to some extend national agencies. The university is one single institution, although consisting of many different research groups, faculties and institutes. However, the industrial institution consists of a broad spectrum of small, medium and larger companies which differ for every region.

The industry within the Triple Helix can be categorized as, one, the existing industries and, second, the newly formed spin-off companies (Etzkowitz, 2008). While attracting existing industries has always been the first priority in regional development, the spin-off companies, either from an existing firm or a research group, are more and more emerging as the engine of regional economic growth. It is widely recognized that growing new firms from regional advanced research, instead of attracting only branch plants from somewhere else, has been a successful strategy (Etzkowitz, 2008).

Most business and science park organization tend to promote both. Attracting branches of existing (multinational) industries and supporting the foundation of spin-off companies are often both the concern of a business and science park organization. The industrial institution within the Triple Helix model therefore represents both small, medium and large branches of existing multinationals and the spin-off companies that are generated or facilitated at the business and science park.

4.4 Defining 'success' for business and science parks

4.4.1. Introduction: defining business and science parks

Literature on the business and science parks involving, on an equal base, university, government and industry is still scarce. Also, the goals differ for every business and science park, making it harder to develop a performance framework that suits all business and science parks. Therefore, most of the general assessments of business and science parks are made in relation to the expectations concerning the parks (Etzkowitz, Webster, Healy, 1998). In 'The global competition of high-tech centers', Anttiroiko (2004) describes the varieties in which high-tech centers and networks are available. In respect to his categorization, the business and science parks of Tampere and Twente can be described as 'science parks':

Туре:	Names:	Major actors:	Functions/Goals:	Examples:
Science Park	-Science park -Research park -Technology park -Technopark -Software park -Technology precinct -High-tech park -Knowledge park -(Park-like technopoles)	- (IT) Firms - (local) Government - University	- Industrial growth - (Regional development)	 Hsinchu Kerala Sophia-Antipolis Cambridge, Mjärdevi (Sweden), Innopoli (Finland)

Figure 10: Anttiroiko's definition of science parks (Anttiroiko, 2004)

Science parks do not automatically create positive effects, especially not in the short term. The high-tech industries or R&D units do not necessarily offer a great number of jobs for an individual area (Anttiroiko,

2004). A known risk is that, in the US experience, the global success of high-technology companies or spinoffs is often linked to a single product and the global growth in demand for it. Finland's innovation model, the 'Finland model', also bears this risk as it is relying heavily on the success of one very influential spinoff: Nokia.

4.4.2. Measuring success at business and science parks

In regional development, actual 'success' means in practice 'the creation of multiplier effects and positive externalities strengthening the regional economy, in addition to which high technology should help to reform the existing industries and services' (Anttiroiko, 2004). Measuring the performance of business and science parks can therefore be performed by analyzing the variables that represent this practice, as split up by:

- 1. The creation of multiplier effects that strengthen the regional economy.
- 2. The creation of positive externalities that strengthen the regional economy.
- 3. The 'high technology' should help to reform the existing industries and services.

Science parks offer a conducive environment to product development, cooperation with R&D organizations, support from technology transfer agencies, brand name, and quality premises. The question is, if these possibilities will also benefit the regional economy and the existing industries and services to create a successful science park.

In addition to Anttiroiko's definition of success, the performance of both business and science park organizations can also be assessed using the publicly available data on their generation of several products or outcomes. These B&S park organization products include the number of generated patents, the number of generated spinoffs and the number of generated jobs that are claimed to be the result of the business and science park organizations. This data will be analyzed for both business and science park organizations. Additionally, the effects of the business and science parks on the cooperation between the helices and their representatives can also be assessed.

5. Methodology

5.1 Introduction to the methodology

The theoretical framework, as presented in the last chapter, defines the models that will be applied to both regions and ultimately the conceptual links between those models. In order to compare the specialization, the PPP-construct and the performance of the business and science parks of Tampere and Twente, it is important to define a research plan. A requirement for the elaboration of a research plan is defining the object of research and the key variables for analysis. The research plan contains a description of the characteristics of this research object. This will be followed up by a description of the collection of necessary data, as well as a plan for analyzing this data.

5.2 Research object

The research object is the carrier of the properties or characteristics in which a researcher is interested (Geurts, 1999). In this thesis, the subject of interests are the technological specializations of both regions, the PPP-construct behind the public-private-partnership cooperation at the business and science parks of Tampere and Twente and the performance that is paired with it. The main characteristic in this research will therefore be the 'specialization', the 'PPP-construct' and the 'performance'. The carrier of these characteristics is the same for all three variables: the business and science parks. Therefore, in order to complete a case study comparison based on the characteristics of the 'specialization, the 'PPP-construct' and the 'performance', the business and science park (organizations) of 'Hermia' in Tampere and 'Kennispark' in Twente are defined as the research objects. The business and science parks and their constituent partners/members are also the units of analysis in this research. Business and science can be defined as 'a property-based initiative which is in physical proximity to, and has operational links with, an institution of higher education or a center of advanced research, designed to encourage the formation and growth of knowledge-based firms, facilitating through active intervention the transfer of technology from the research and academic institutions on site to the firms and organizations on the park or it's surroundings' (European Commission, 1990).

5.3 Key variables

The key variables are the characteristics of the research object which are indispensable to the research (Geurts, 1999). In this thesis, the key variables are the 'specialization', the 'PPP-construct' and the 'performance' of the research objects: the business and science parks of Tampere and Twente. These key variables will be operationalised in the sections 5.5 to 5.7.

5.4 The case study comparison

5.4.1 Introduction

To compare the research objects (the business and science parks of Tampere and Twente) on the key variables (the specialization, the PPP-construct and the performance), I have chosen to perform a case study comparison.

According to Babbie (2004), case studies are the 'in-depth examination of one or a few instance of some social phenomenon, such as a village, a family or a juvenile gang'. In this master thesis, the social phenomenon is our research object: the business and science park. The 'instances' are comparable with the key variables in this master thesis. Therefore, the instances that are assessed are the business and science park 'specialization', 'PPP-construct' and the 'performance'. In this master thesis I will compare the

outcomes of the case studies of two research objects (or social phenomena's), the business and science parks of Tampere and Twente. This defines the master thesis as a case study comparison of the business and science parks of Tampere and Twente.

In his much cited works, Yin (1981) emphasizes two important characteristics of case studies. First, a case study does not imply that a certain form of evidence must be used (Yin, 1981). Case studies can be performed using both quantitative and qualitative research. The evidence may be presented by fieldwork, records, reports, observations, interviews, historical analysis, archival records or a combination of these. Some studies are based on a combination of quantitative and qualitative research (e.g. Gross et al., 1971) and some studies rely on quantitative data only (e.g. Vietorisz and Harisson, 1970). Second, a case study does also not imply that a certain method of data collection must be used (Yin, 1981). Yin states that it is a common misconception that case studies are only based on participant-observation or ethnographic research. Numerous case studies have been performed using other methods (Yin, 1981 on e.g. Allison, 1971; McClintock, Brannon & Maynard-Moody, 1979) and a combination of different data collection methods within one research project has become quite common.

This analysis by Yin leads to two conclusions: in respect to quantitative or qualitative research evidence; both are feasible within case studies. Also, in respect to data collection, numerous research methods are available and can be correctly implemented. These conclusions are used to ground the evidence and data collection methodology in this master thesis.

5.4.2 Evidence and data collection

In order to assess the key variables, I will use both quantitative and qualitative research methods. Qualitative research is aimed at gathering an in-depth understanding of a research case (Denzin, Norman & Lincoln, 2005). It is used when a researcher is interested in the essence of a casus and the goal of the research is to understand, describe and discover (Grix, 2004). An advantage of qualitative research is the presence of an observing and analyzing researcher (Babbie, 2003). It is expected that valuable research outcomes can be captured through the social interaction between the researcher and (representatives) of the research object, in this thesis: the business and science parks. Qualitative research uses data obtaining methods which are adjustable to the social context, for example partially-structured or even open interviews which are easily adjusted by the researcher. In contrast to quantitative research, interaction between the research bias (Grix, 2004) although bias is still possible by, for example, identifying with the research object. Qualitative research often involves thorough interviews and observations without focusing on quantitative research data.

Quantitative research can be described as a research method of numbers and statistical methods. The data collections tends to be based on 'numerical measurement of specific aspects of phenomena; it abstracts from particular instances to seek general description or to test causal hypotheses; it seeks measurement and analyses that are easily replicable by other researchers' (King, Keohane & Verba, 1996). It enables the researcher to compare numerical data based on statistical methods or numerical comparison. In contrast to qualitative research, it aims to shut out all external influences caused by, for example, the researcher and the social context to minimize the risk of biased results. Quantitative research data is often used to compare scores, performances or measurements.

5.4.3 Data collection methods

In order to assess the key variables, different evidence and data collection types are required:

Key variable:	Model:	Evidence type:	Data collection:
1. Specializations	Porters Diamond (1998)	Qualitative	Document analysis
2. PPP-construct	Triple Helix Model (2000)	Qualitative	Document analysis and interviewing key stakeholders
3. Performance	Anttiroiko's definition success (2004)	Qualitative & Quantitative	Document analysis and interviewing key stakeholders

Figure 11: The key variables and their associated research types and methods

1. The 'specializations' variable will be analyzed using qualitative research on the innovative focus in which both regions have specialized themselves. Qualitative research is used when a researcher is interested in the essence of a casus and the goal of the research is to understand, describe and discover (Grix, 2004), as is the case with the assessment of this variable. For the 'specialization' variable, I will try to provide this understanding for both regions using an analysis of documents on both regions, including scientific journals, articles and essays on the regions of Tampere and Twente and their history. Non-scientific data might also prove to be a contribution to understanding the emerge of the innovative technological specializations of both regions.

2. The 'PPP-construct' variable will also be assessed using qualitative research. With this variable, we will try to understand the current and historical construct of the public-private partnership behind both business and science parks. It will describe the current formal and informal state of the cooperation between both business and science parks. The research method will be both document analysis and interviews with key stakeholders. The historical analysis will be aimed at the historical emergence of both business and science parks and the interviews will help us to understand the current situation at both parks.

3. Last, the 'performance' variable will be analyzed using both qualitative and quantitative research. The qualitative research will focus on the performance indicators that would benefit from an analysis beyond the numerical, such as the actual feelings of the involved stakeholders about the business and science parks. This will be completed by a quantitative analysis of the performance as measured with, for example, the number of spinoffs and patents. Both the qualitative and the quantitative performance indicators will be assessed using a combination of document analysis and interviewing key stakeholders.

5.5 Operationalisation of the 'specialization' variable

Key variable:	Model:	Evidence type:	Data collection:
1. Specializations	Porters Diamond (1998)	Qualitative	Document analysis

The innovative technological 'specializations' of both the Tampere and the Twente business and science (B&S) parks can be analyzed using the elements and external determinants of Porters research on the Diamond Model (Chapter 4.2). The first step is to determine the specializations of both the Tampere and Twente B&S parks. This will be done using document analysis. Possible sources are the annual reports of the business and science parks, previous research concerning the regions of Tampere and Twente and public information on both regions. When the specializations are determined, I will study the historical path to these specializations. Next, the influence of the different actors and factors will be assessed using the elements and the external determinants of the Diamond Model as analyzing tools. The role of these elements and externalities in the specialization process will, as stated in chapter 4.2, also be the indicators when analyzing the regional specializations:

Indicators (elements):

- Regional firm strategy, structure and rivalry
- Regional (historical) demand conditions
- Regional related and supported industries
- Regional factor conditions

Indicators (external determinants):

- The (historical) role of the government
- Chance factors

To assess the 'specialization' variable, the influence of the six indicators on the specializations of both regions is required. To do so, a broad spectrum of sources for document analysis will be used. Possibilities are scientific journals and articles, historical data on the regions, annual reports of involved governmental and private actors and information on the industrial changes in both regions.

The indicators will be assessed on the regional level. This means that when looking at the, for example, firm strategy, structure and rivalry, this aspect of the firms will be studied at the regional Tampere and Twente industries. An exception to this 'regional scope' is the governmental indicator. National, regional and local government all have the ability to have an impact on every cluster within a nation. Also, possible local branches of multinational companies that are present at the business and science parks will only be assessed at the level that is of influence for the region.

The goal will be to understand how both regions developed their specific technological specializations and what (elements) influenced the process. This will result in an overview of relative role of every Diamond model elements in respect to the other elements in the specific region. As a result, the influence of the elements for both regions is not one-on-one comparable, since they assessment is relative to the specific region.

Key variable:	Model:	Evidence type:	Data collection:
PPP-construct	Triple Helix Model (2000)	Qualitative	Document analysis and
			interviewing key stakeholders

5.6 Operationalisation of the 'PPP-construct' variable

The operationalization of the 'PPP-construct' aims at defining and analyzing the organizational construct behind the business and science parks of Tampere and Twente. The research is based on the Triple Helix Model (Etzkowitz, 2000) and will be conducted using a qualitative combination of document analysis and interviewing key stakeholders.

The ideal position of business and science parks as tri-lateral networks within the Triple Helix model can be seen as a business and science park organization 'utopia'. The PPP-construct is build upon the equal cooperation of the three key stakeholders: the university, the industry and the government and the business and science parks can be found at the exact center of this cooperation. When applying the model to a specific region, the 'university', 'government' and 'industry' will focus on the regional actors that represent these helices (Etzkowitz, 2001). In order to assess the actual Triple Helix model in the regions of Tampere and Twente, the position of these key stakeholders needs to be researched in combination with the cooperation construct that unifies them. A difference between the university and the governmental and industrial institutional helices is that the university can be seen as a single entity, while the government and industry consist of several different actors. To assess the governmental and industrial institutional helices, I will determine the relevant actors for both regions to come to a representative view.

This research will be conducted by both document analysis and interviewing the key stakeholders. Both will be aimed at determining the position of the stakeholders within the Triple Helix, to assess the instruments and goals of the stakeholders and to come to a proper depiction of cooperation within the business and science parks. This will be concluded in a visual representation of the formal and informal situation in both regions, based on the Triple Helix model. In order to assess the cooperation of the three helices, a number of indicators can be determined:

Objective indicators:

- The organizational structure (organizational schematics)
- The legal form of the PPP-construct
- The composition of the organization governing bodies and the decision making powers among the three partners.
- The investment of the three stakeholders in the business and science parks
- The long-term interests of the three stakeholders.
- The definition of success for all three stakeholders

Subjective indicators:

- The reflection of the involved stakeholders on the cooperation with the other stakeholders
- The perceived position of the business and science parks among the helices
- (Reoccurring) tensions between the three stakeholders
- Possible suggestions to improve the cooperation construct

In order to assess these indicators, I have chosen to perform my qualitative research based on both document analysis and in-depth interviews of the key stakeholders regarding the two business and science parks. The analysis of the objective indicators will be based on both document analysis and half-open interviews, while the perceptive indicators will be based solely on half-open interviews as it is relatively hard to assess personal perceptions based on documents.

Document analysis

The objective indicators will be assessed using document analysis. Annual reports of the business and science park organizations are especially interesting because they provide insight in the formal structure of the PPP-cooperation behind both business and science park organizations. Furthermore, every document available on the PPP-construct behind both the business and science parks, scientific and non-scientific, might add to the analysis of the PPP-construct.

Interviewing key stakeholders

The key stakeholder interviews will be used to assess the perceptive indicators. As a result of the literature analysis on the Triple Helix model, actors have been chosen to represent each key stakeholder (university, industry, government) within the Tampere and Twente regions. An overview of these interviewees is available in Appendix A.

To contribute to a well balanced view on the PPP-construct behind both business and science parks, I have chosen to also interview several generally involved actors. These are actors who are closely related to the business and science park organizations but have no formal part in it. This might enable them to be more objective and critical on the subject than actors who are formally involved.

The questionnaire (as enclosed in appendix x) are aimed to provide detailed information on both the objective and the perceptive indicators. For every indicator, the interviews contain matching questions for the interviewees, also adjusted to the helix they represented. When interviewing the general actors, the scope was broadened to all three helices. Every indicator was assessed by at least two, differently formulated, questions to increase the reliability of the information.

5.7 Operationalization of the 'performance' variable

Key variable:	Model:	Evidence type:	Data collection:
Performance	Anttiroiko's definition success (2004)	Qualitative & Quantitative	Document analysis and interviewing key stakeholders

The operationalization of the 'performance' variable aims to define the measurement of the performance of the business and science parks of both Tampere and Twente. For analyzing succes Anttiroiko's definition of the performance of business and science parks will be used (2004)

Antirroiko defines 'success' to be the 'creation of multiplier effects and positive externalities strengthening the regional economy, in addition to which high technology should help to reform the existing industries and services' (Anttiroiko, 2004). As concluded in chapter 4.2.2., this will lead to the following business and science park success factors:

- 1. The creation of multiplier effects that strengthen the regional economy.
- 2. The creation of positive externalities that strengthen the regional economy.
- 3. The 'high technology' should help to reform the existing industries and services.

To examine the performance of business and science parks, these success factors need to be translated into performance indicators. These performance indicators should be able to produce a measurement tool for a balanced view on the 'success' of both business and science parks. Also, the data on the generated 'products' of both business and science park organizations will be assessed. To do so, I have chosen the following objective and perceptive indicators:

Objective indicators:

- The number of generated spinoff companies
- The number of generated patents
- The number of generated knowledge intensive jobs
- The number of geographically facilitated firms

Subjective indicators:

- The visible effect on the region
- The strength of a multiplier effect on the region
- The effect of business and science park knowledge & technology on existing industries
- Other (external) positive effects on the region
- The increased knowledge of the involved helices, as a result of the cooperation.
- The possible increase in cooperation between the three helices

The qualitative and quantitative research will be split along the lines of the objective and perceptive indicators. The objective indicators will be assessed using quantitative research, as all the indicators can be measured numerical. This research will be conducted using document analysis. The quantitative objective indicators will provide the possibility to produce a comparison based on numerical performance. The perceptive indicators will be assessed using qualitative research. These indicators are not directly measurable using quantitative methods and therefore the perception of key stakeholders will be assessed using half-open interviews. Also, the goal of the perceptive indicators is primarily to understand and to describe, which makes it a feasible example of qualitative research (Grix, 2004).

Document analysis

As the document analysis will be aimed at researching the objective performance indicators, every scientific and non-scientific document with data on these subjects will be valuable. For both regions, numerical information for the past several years is required in order to complete the comparison. Possible sources are the annual reports, additional documents by both business and science parks and previous research on both regions.

Interviewing key stakeholders

As with the 'PPP-construct' variable, the key stakeholder interviews will be used to assess the subjective indicators. To do so, the same stakeholders will be questioned about their perception of the performances of both the business and science parks. An overview of these interviewees is available in Appendix A. The interviews will be used to obtain detailed personal experiences with the 'success' of both business and science parks, to be compared to Antirroiko's definition.

In addition to questioning the actors that are involved within the business and science park organizations, I will also interview several generally involved actors, as I did for the 'PPP-construct' variable. These are the same actors who are closely related to the business and science park organizations but have no formal part in it. The interviewing questions (as enclosed in appendix x) are aimed at assessing the performance of the business and science parks, they are designed to research the perceptive indicators. The feeling about the performance and the personal experiences with the performance of both business and science parks are required to assess these indicators.

6. The technological specializations of Hermia and Kennispark

6.1 Determining the technological specializations of Hermia

The city of Tampere facilitates two different universities: the University of Tampere (UTA) and the Tampere University of Technology (TUT). Both universities play a role in the influential 'Tampere Region Centre of Expertise Program', which defines the technological focus of the Tampere region (Seppälä, 1998). This program is part of a nationwide program on 21 different area's in Finland. The purpose of the program is to focus measures on key industries of national importance and is based on the utilization of regional expertise; in Tampere supported by both of Tampere's universities. The program is published by the steering group formed by the council of the Tampere region, the city of Tampere, the city of Kangasala and the 'Hermia' business and science park organization (the object of research in Tampere).

The centre of expertise program determines Tampere as a participant in seven expertise clusters for the period 2007-2013 (Centre of Expertise Programme, 2008):

- Intelligent machines (national coordination)
- Ubiquitous computing (national coordination)
- Digital contents
- Energy technology
- Nanotechnology
- Health technology
- Biotechnology

Since some of these clusters are still in development, we cannot just label them as the current areas of expertise in Tampere. However, in the Technopolis annual report of 2008, the following clusters are named as strong areas of expertise of the Tampere region (Technopolis, 2009):

- ICT and laser technology
- Biology and health technology

- Knowledge-intensive business services (offering services concerning the above specializations (Kautonen, 2009))

This key areas are also confirmed in the article 'Modeling the Triple Helix from a Small Country Perspective: The case of Finland' by Kaukonen and Nieminen (2004). Of these three clusters, only ICT and laser technology is represented at the Hermia business and science park. Biology and health technology can be found at Tampere's Finnmedi business and science park and knowledge-intensive business services can be found in smaller business parks in the city center. It is also noted that the highly diversified ICT sector is increasingly converging into a digital media cluster (Kautonen et al., 2002; Kostiainen, 2000). The ICT cluster at Hermia is split up in three different customer groups: ICT industries, mechanical engineering and energy technology (Räsänen, 2009).

6.2 Determining the origin of the technological specializations of Hermia

6.2.1 Introduction

To determine the origin of the technological specialization of Hermia, a view on the history of the city and

its region is required. This will provide an insight in the process that lead to the current strengths of the region, as defined in paragraph 6.1.1.

Starting from the 1920's, the Tampere heavy industry dominated the economy of the Tampere region. In 1960, approximately 50% (33.000 jobs) of the Tampere workforce was employed in local industries (Kostiainen, Sotaratu, 2002). These included mainly textile, metal and mechanical engineering industries. The Tampere textile industry was massive, which earned Tampere the nickname 'Manchester of the North'. The rapid decline of the industries and the decrease in industrial jobs started in the mid-1970s and continued until 1995, stabilizing at approximately 20.000 working places by the end of the 20th century. At this time, this represented less than 20% of the total amount of jobs in the Tampere region (Statistics Finland, 2009).

6.2.2 The decline of Tampere's industries

Several reasons have been identified as contributors to the industrial recession, linking local, national and global factors (Kositainen, Sotaratu, 2002). At the local level, Tampere's industries were very laborintensive, the machine power used per worker was only one-half of the national average. Also, the production value per worker was only two-third of the national level. Since the real hourly wages increased by 500% during the 1945-1975 period, the labor-intensive industries in Tampere faced a significant disadvantage (Martinzez-Vela, Viljamaa, 2007). Next, the oil crisis of 1973 caused problems in Finland because it was, and still is, largely dependent on imported energy (Helle, 1987). Also, at the end of the 1980s and in the beginning of the 1990s, Finnish industries were severely affected by the major changes in Eastern Europe, especially because exports to the Soviet Union were considerable. According to Kositainen and Sotaratu (2002), the textile industry was hit hard: "*it was expressly the textile industry that had been so massive and which, ultimately, lost many jobs*".

What also contributed to the decline of heavy industries in Tampere was the fact that new countries began to develop textile industries and managed to get hold of a share of the market. The Tampere textile industry lost ground to newcomers because raw materials had to be imported (Rasila, 1992). Some firms, however, were able the avoid the recession of the traditional Tampere industries. The engineering industry managed to retain it's significant role because it succeeded in the development of technology of an increasingly high level (Kositainen, Sotaratu, 2002). The engineering industry also knew how to use the possibilities that the technical university of Tampere offered in the research and development of new technologies. The technical university played an especially large role as a provider of "*skilled labor, technical know-how and problem-solving abilities relevant to the local industry*" (Martinez-Vela, Viljamaa, 2004). What remained of Tampere's industries at the beginning of the 1990's was a core of mechanical engineering and automation industry and a nascent telecom industry spearheaded by Nokia and its affiliates like Telecom Finland (now Teliasonera) and Tieto Enator while the promise of ICT, media and healthcare technologies beckoned (Mathur, 2005).

6.2.3 The creation of an academic environment

Establishing a university in Tampere was one of the most important factors with regard to the future of the city. Creating a knowledge economy, to facilitate technological specialization, requires the availability of educational and research institutes (Etzkowitz, 2005; Gibbons et al., 1994; Porter, 1998; David & Forey, 2001). It was also in the interest of Tampere to stop the brain drain that was caused by the fact that no academic education could be offered in Tampere. Founding a university was therefore one of the first priorities for Tampere's city management. However, the University of Tampere (UTA) was not established until 1960 when the School of Social Sciences (YKK) was transferred from Helsinki to Tampere
(Antikainen, 1981). The UTA offered mainly social-oriented studies and Tampere also aspired to establish a technical university to extend the studies of UTA with a number of technical studies. In 1972, the Tampere University of Technology (TUT) was established (Ahonen, 1993). In addition to teaching and research, the new technical university was also focused on industrial cooperation (Kositainen, Sotaratu, 2002), of which the engineering industry was one of the earliest examples (Martinez-Vela, Viljamaa, 2004). It is claimed that the engineering industry could not have renewed themselves to rise to the international top at their specific specializations without the activities of the TUT (Kositainen, Sotaratu, 2002). The university developed a methodological approach for combined university-industry activities on their own terms of contract, which later became the national standard. The university of Tampere and the Tampere University of Technology now have a combined total of over 27.000 students (City of Tampere, 2009).

Next to the universities, the second foundation for Tampere's knowledge economy became the Technical Research Centre of Finland (VTT). VTT is somewhat comparable to the Dutch TNO and a part of the Finnish innovation system as a non-profit research organization under the domain of the Ministry of Employment and Economy (VTT, 2009). VTT intends to connect technology and businesses by connecting companies with certain research and development needs to research institutes that can fulfill them. This can be at a VTT institute but also at external research institutes. Since the beginning of the 1970s, a change in legislation made it possible for the institute to start branches outside the Finnish capital Helsinki. The increasing expertise created by the two universities in Tampere made it an interesting place for research and VTT would help private actors to find their way to this expertise. The first step to Tampere's specialization in health and biology and health technology was made in 1974 when VTT founded the laboratories of medical and occupational safety in Tampere. Later in the 1970s, the textile laboratory was also transferred to Tampere's local specialized research centers and companies in need of this expertise.

At the beginning of the 1980s, the increasing globalization and global competition lead to the conclusion that some of Tampere's remaining industries would not survive (Kautonen, Koski & Schienstock, 2004). The resulting job losses lead to a change in the regional industrial policy on this subject: *"the old will be renewed as far as possible, and dying occupations and jobs will be replaced by something new that has never ever existed yet"* (Seppälä, 1998). Based on this principle, regional key economic actors, with an import role for Tampere's industries, agreed in 1983 to the following measures to facilitate the modernization of the Tampere region (Seppälä, 1998):

- The establishment of close cooperation's between universities, industry, and municipalities to develop industries based on new technology (basically the first setup for a Triple Helix of regional cooperation)
- The foundation of a science park
- The setting up of a regional business development and venture capital company
- The encouragement of initiative, creativity, and entrepreneurship by supporting measures in education, training and mentoring activities.

In 1985, based on these measures, the city of Tampere, the TUT and the UTA established the Research Institute of Information Technology in cooperation with regional industries. This proved to be one of the cornerstones of the developing ICT cluster later on (Kautonen, Koski & Schienstock, 2004). In 1986, 'Hermia' was founded as a business and science park in the near proximity of the TUT. Tamlink Ltd. was established in the same year to promote the transfer of technology between the TUT and regional industries and to aid the cooperation on research and development between these actors. In 1990, the 'Hermia public company' was founded for the continuing development of the business and science park (Kositainen, Sotaratu, 2004).

Combined, an environment of academic research and teaching was created in Tampere in the period starting from the late 1950's until 1990. Tampere established two universities who's success in external cooperation becomes apparent in the fact that *"the relative proportion of external R&D funding in Tampere was at the highest level in all of Finland in the 1990s"* (Kostiainen, 2000). Tampere also established several (VTT) laboratories and research institutes and finally the 'Hermia' business and science park and it's supportive organizations. These developments were further complemented by a rising number of educational institutes for applied sciences, often focused on technical subjects (Kositainen, Sotaratu, 2002). Taken together, the foundation for a regional knowledge economy was established.

6.3 Applying the elements of Porters Diamond to the specializations of Hermia

6.3.1 Introduction

Indicators (elements):

- Regional firm strategy, structure a	and rivalry	(1)
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- Regional (historical) demand conditions (2)
- Regional related and supported industries (3)
- Regional factor conditions (4)

Indicators (external determinants):

- The (historical) role of the government (5)
- Chance factors

The indicators, as used in this thesis, are based on Porters Diamond model. As in Porters Diamond model, the competitive position of a cluster and the development of a region or cluster can be analyzed when the model elements are treated as conditions that influence all the other elements of the model. In order to research the historical development of Tampere's specializations, I will attempt to analyze this by elaborating on the role of these indicative elements.

(6)

6.3.2 The rise of Tampere's specializations

The development of Tampere cannot be seen separate from the innovation stimulating efforts of the national government (5). Finland has established a large number of innovation stimulation programs to support both research and the interaction between industries and academical knowledge (Arnold et al., 2003)¹. However, when regarding the historical path to Hermia's ICT cluster, local government officials (5) took the first step. The efforts of the city of Tampere at the end of the 1950's to establish the foundation of a more diversified and knowledge-intensive economy resulted in the root of all of Tampere's specializations: the University of Tampere and the Tampere University of Technology, both providing a

¹ A comprehensive overview of the role of the Finnish central government in stimulating innovation can be found in the paper 'Innovation and Research Governance in Finland' by Arnold et al. (2003).

significant boost to local research quantity and quality (4). The initial aim of the city of Tampere (5) was to find a way to compensate for the loss of jobs in the traditional industries and to increase the below-average educational level of the population of Tampere. The emerge of Tampere's research institutes also resulted in the improvement of other factor conditions (4), by offering the regional industries and companies with similar research interests (3), such as the experienced engineering company Nokia, the potential of high skilled employees. By initiating both universities, the city of Tampere (5) established the foundation for the regional knowledge economy.

When looking at the ICT specialization, one of the first important events proved to be the creation of a professorship and a faculty of Computer Sciences at the UTA in 1965 (Kurki-Suoni, 2005) which established a new field of research (4) in Tampere. This was the first professorship in Computer Sciences of the Nordic countries (Kositainen, Sotaratu, 2002). The students and recent graduates of the department of Computer Sciences also founded the very first computer software spinoff company in Tampere: Softplan (Kurki-Suoni, 2005). Softplan had a remarkable impact on the development of the Information Technology sector in Tampere and worked, for example, for Nokia (Kaarninen, 2000). As Nokia became rapidly expanding, it took over the entire company. Some of the employees applied at other companies but some of the employees also founded new spinoff companies of which most also became active in the computer software development branch, hereby creating the first forms of competitive rivalry (1) in the emerging ICT cluster. After this start by the UTA, the foundations for Tampere's information technology cluster were mainly created at the TUT. Computer Science became a fast growing study and it attracted prominent Finnish scientists to work as lecturers and professors at the university (Hietala, Kaaminen, 2005) which further improved the quality of the educational and research facilities (4) in Tampere. Also, a substantial number of small and larger companies proved to be very eager to start using information technology (Kositainen, Sotaratu, 2002), resulting in an increased development pace of the ICT sector by local demand elements (2). This increase in demand also leads to an increasing number of emerging ICT companies in the region. This stimulated the local rivalry (1) which is seen as a critical development in the competitiveness of regions by Porter (1998). In order to support the development of the research on Computer Sciences, the TUT had many partners like the Tampere Chamber of Commerce and local industry key actors that helped the university to stay in contact with Tampere's industries (Ahonen, 1993). Several local industries acknowledged the (strategical) potential of cooperation with universities (1) and the cooperation provided a strong tie between the TUT (4) and the regional industries with similar interests (3).

Another milestone was, as mentioned before, the establishment of the Research Institute of Information Technology. This was a combined effort of the TUT and the UTA (4), the city of Tampere (5) and several industrial partners (3). As one of the earlier organizational examples of the Triple Helix model, this cooperation was founded as early as 1985 and it increased both the condition of Tampere's education and research (4) and the cooperation among the involved partners. The institute focused mainly on *"digital image processing, artificial intelligence, automation technology and micro processors"* (Seppälä, 1998) and became an important partner to local industries (3). It also developed into an important actor in Tampere's cluster of information and communication technology (ICT). Later on, it changed its name to the Digital Media Institute and it was selected by the end of the 1990s to be a Centre of Excellence by the Academy of Finland (Kositainen, Sotaratu, 2002; Loimio, 1998) in a national government (5) effort to improve the innovative strength of regions with a certain potential. This proved the high standard of information technology research in Tampere, benefitting the regional factor conditions (4).

When looking at the past 15 years, the role of Nokia cannot be overlooked. Nokia is an example of a company which company structure (1) was flexible enough to survive the industrial decline in Tampere by switching their product lines several times. The company Nokia is named after a small town next to Tampere and is rooted as a diverse engineering company producing paper, rubber, cables and other industrial products (Nokia, 2009). The activities related to information technology increased when the company bought Softplan in 1986 (Kositainen, Sotaratu, 2002). The vast international experience of the TUT in electronics and microprocessors (4) helped Nokia in their research and development projects. Both groups of Nokia, Nokia Mobile Phones and Nokia Networks were continuously expanding and the number of personnel increased to a total of almost 4.000 employees (Kautonen et al., 2002). This made Nokia the largest private employer of, mainly highly educated, personnel (4) in Tampere at the end of the millennium. At the present time, an important part of Nokia's research and development activities are still located at the Hermia business and science park. Besides Nokia, many other new companies have been established or have moved to the region. In 2002, the total of ICT companies was estimated at 300, providing 8.500 jobs for the region (Martinez-Vela, Viljamaa, 2004).

6.3.3 Conclusions

The rise of the technological specializations of the Twente region was influenced by many different factors and actors. To assess the role of the different elements of Porters Diamond mode, I will summarize their influences.

Indicators (elements):

1. Regional firm strategy, structure and rivalry

As Tampere's industries were declining, a number of them (mostly mechanical engineering companies) succeeded to survive. This was mainly caused by their cooperation and partnerships with the technical university of Tampere which was the result of an intelligent firm strategy. These surviving industries also created the first new forms of regional rivalry. In addition, new spinoff companies intensified the local rivalry and these new startups also created the foundation of local rivalry in the new ICT specialization as concluded to be so important by Porter (1998).

2. Regional (historical) demand conditions

In the process to specialization, the ICT spinoffs were helped by the interest and technological expertise of the surviving mechanical engineering industry. The first ICT spinoffs were able to succeed and make their impact because of the immediate availability of regional demand of their services. This was, again, mainly by small and medium sized local engineering companies that survived the downfall of Tampere's larger industries.

3. Regional related and supported industries

At the start of the ICT specialization, the new spinoff companies benefitted from the availability of the remaining industries. The spinoffs in the ICT cluster had the potential to become a useful resource to aid industrial research and to form alliances or joint research ventures with the surviving industries. Development agreements formed by the 'old' industries and new spinoff companies have become very common within the ICT specialization. In addition, the continuing cooperation with regional industrial partners is considered to be an important influence on the successful emerge of Tampere's ICT sector and, in the end, to the recovery and reinvention of the region (Kautonen, Koski, Schienstock, 2004).

4. Regional factor conditions

The history of Hermia's ICT specialization shows a dominant role for the educational and research institutes of Tampere, as part of the factor conditions. The establishment of both the universities in Tampere, initiated by efforts of local public officers, opened up a broad spectrum of opportunities for the region.

The availability and the quality of education and research proved to be a very important factor in the establishment of the ICT specialization at multiple times. In Porters publication 'On competition' (1998), high-skilled employees, quality research institutes and high quality communications are considered to be "*critical for the creation and development of a competitive advantage in technology-intensive industries*". Since the activities at business and science parks are very explicit examples of technology-intensive industries, the important role of the educational and research institutes in Tampere is coherent with this view. One interesting conclusion is the fact that the ICT specialization was established after the universities of Tampere were able to pave the way with high quality research. The research on 'Computer Science' at the UTA proved to be the beginning of the first, and very influential, ICT spinoff company Softplan. The valorization of knowledge was preceded by the universities of Tampere reaching a certain level of quality in the respective research fields.

The high quality research of the universities of Tampere also lead to multiple research institutes which further improved both education and research in Tampere. The universities, as well as local schools of applied sciences, also improved the conditions of the Tampere region by, for example, increasing the average educational level of the population of Tampere. This provided a pool of high skilled potential employees for Tampere's new industries.

Indicators (external determinants):

5. The (historical) role of the government

The establishment of both the universities in Tampere were initiated by efforts of local public officers and it opened up a broad spectrum of opportunities for the region. In respect to Porters Diamond model, this is coherent with the role of the government that is advocated by Porter: enabling and supporting the elements with different kinds of incentives (Porter, 1990). Therefore, the critical first step in the foundation of the knowledge economy of Tampere can be credited to the leading officeholders and elected officers of Tampere during the end of the 1950s and the beginning of the 1960s. After the establishment of the universities, the local, regional and national government remained active supporters of research, both as a financial supporter and as an influential actor involved in innovation stimulating policies and organizations. In this respect, the active work of many leading background individuals contributed to the birth of the knowledge economy in Tampere (Inkinen, 2006).

6. Chance factors

In the development of Tampere's ICT specialization, the role of chance appeared to be limited. There were, for example, no foreign influences that created a better environment for the development of the ICT specialization and the rise of specialization was a result of many different experts instead of one or a limited number of very influential individuals.

Overview of events:

Taken together, the road to the current ICT cluster of Tampere, as represented at Hermia, was a complex

process involving many different actors but with an important role for the universities and research institutes of Tampere . The founding and continuing (financial) support of the universities can be credited to the local government. Next, the surviving mechanical engineering industries proved to be very influential. They provided both regional demand for, and formed partnerships with, the small developing ICT cluster pioneers. They mechanical engineering industry and the developing ICT cluster of Tampere have been very useful to each other at many different instances. Last, although instances of chance will always be present, for example in having the right people at the right place at the right time, there appeared to be no large external influences on the specialization process in Tampere. An overview, as perceived by me and based on my research, is presented below.

Diamond element / cluster	Regional firm strategy, structure and rivalry (1)	Regional demand conditions (2)	Regional related and supported industries (3)	Regional factor conditions (4)	The role of government (5)	The role of chance (6)
Information and Communication Technology	М	М	Н	Н	Н	L

Figure 12: The influence of the Diamond model elements on establishing the specializations, indicated by low (L), medium (M) and high (H)

6.4 Determining the technological specializations of Kennispark

In the 1970's, the economic downfall of the Twente region resulted in its European status declining into a "European Union Objective 2" region (Van der Sijde et al., 2002) which meant that Twente received additional European funding to aid regional development. One of the resulting programs defined a number of special regional projects in cooperation with the University of Twente: the 'Value Added Technologies' (VAT Project). The goal of the VAT Project (1998-2002) was to 'promote the region of Twente together with spearheads of the university in order to attract high-tech and knowledge-intensive companies and activities' (VAT, 1998).These university spearheads were defined to be (Van der Sijde et al., 2002):

- Information and Communication Technology (ICT)
- Nanotechnology
- Biomedical Technology
- Laser Technology

More recently, research on the profiles of the present companies and the potential attractiveness to new companies at 'Kennispark' Twente confirmed these specializations, and their presence at the business and science park, with the adjustment that Laser Technology has become a part of the ICT specialization (Stec, 2006). These three specializations are also confirmed by Blaauw (2007), Hulsink, Bouman and Elfing (2007) and the University of Twente which claims that the research at the UT is 'internationally acclaimed, especially in the areas of ICT, bio and nano-technology' (University of Twente, 2009). Blaauw also mentions the associated research institutes: CTIT (ICT), MESA+ (nano-technology) and BMTI (biomedical engineering).

6.5 Determining the origin of the technological specializations of Kennispark

6.5.1 Introduction

Looking at Twente's rich industrial heritage, the Twente region emerged as the leading Dutch textile industry region during the mid 19th century. It was the Dutch central government that initiated the startup of the local textile industries after a search for the most suitable region. Twente was chosen because of the lack of industries at that time (which would mean that the newest technologies could be implemented from scratch) and the long held tradition of domestic wool production (Van Geenhuizen, Van der Knaap, 1994). Other reasons were the relatively low wages and the fact that the Dutch government realized that it was necessary to support several underdeveloped regions to decrease the chance of uprisings or revolutions (with England in 1848 as a much feared example (Benneworth et al., 2005)). Twente's textile industries prospered for several decades, protected within the boundaries of a national monopoly position (Benneworth, Hospers, 2007). The emerge of the textile industry also brought along the buildup of a number of successful associated industries like machinery and metal engineering to support the textile factories. Most of the textile industries were founded in the city of Enschede while most of the supporting industries (metal, machinery, eventually followed by electronics) was concentrated in the city of Hengelo (Benneworth, Hospers, 2006). The region specialized in "textiles, specialized clothing and machinery, synthetical materials and metal-electronic devices" (Benneworth et al., 2006). During the 19th and the first half of the 20th century, "Twente was constantly growing in textiles and metal manufacturing" (Hospers, 2005) which provided a total of approximately 55.000 jobs in 1955 (Lambooy, 1995).

6.5.2 The decline of Twente's industries

After the second world war, one of the first and very influential setbacks for Twente's textile industry proved to be the loss of the Dutch East Indian colonies (later renamed to Indonesia) in 1949 (Benneworth, Hospers, 2007). The textile industry lost both a successful export market and a source of cheap raw materials (Benneworth et al., 2005). A new opportunity was, however, presented by the founding of the European Economic Community (1957) and the Benelux union (1958). This provided new market opportunities as the export of Dutch products became less impeded by protective national legislations of other European countries. Despite these developments, the Twente textile industry continued to "shed labour at an alarming rate" (Benneworth et al., 2005) caused by a number of different factors and resulting in the downfall of the textile industry in the 1960s and 1970s. An important factor was the relatively large increase in wage costs since 1964 (Van Geenhuizen & Van der Knaap, 1994). In the 1960s, Dutch labor costs were ranked only 10th in the world but by 1979 they reached the top-5, mainly caused by social benefit contributions and taxation. Next, the protected national monopoly position that was granted to Twente's textile industry was abolished in 1952 with the establishment of the Benelux free trade union (Benneworth, Hospers, 2007). Additionally, on the international scale, the Netherlands had relatively few policies aimed at protecting the national textile industry, it favored international specialization and division of labor (De Jager, 1991). Another factor of influence was the fact that Dutch politics refrained from supporting the industry in (technological) developments, contrary to several other European countries (Boussemart, De Bandt, 1988). As a last but important influence, Twente lacked a culture of innovative entrepreneurship (Lambooy, 2005) deeming most of Twente's industries relatively unable to cope with the competitive changes. In 1970, only 22.100 of the 44.000 (1955) industrial jobs were left and in the 1980s, only 8.200 remained (Lambooy, 1995).

Only a handful of the(textile) industries managed to survive, with Royal Ten Cate as one of the most notable examples. Royal Ten Cate became the most influential remaining textile company by buying many other declining textile companies (De Vries, 2005). The company was able to diversify and internationalize but also entered new markets (for example industrial fabrics and technical components & fabrics) (Benneworth, Hospers, 2006). Another company that is still active is defense-specialist Thales, established as an industrial engineering company in 1922 (Thales, 2009). However, both companies have been unconnected to the University of Twente for a long time. Royal Ten Cate because it used to be a rather low-tech company and Thales because of its defense-ties which also required a certain degree of reservation in cooperation with third parties (Hulsink, Bouman and Elfing, 2007). Benneworth and Hospers (2007) also note that only *"recently the university and industry began cooperating in promoting innovation drawing upon Twente's textiles tradition"*.

6.5.3 The creation of an academic environment

As regional textile industrialists in Twente became aware of the problems concerning innovation and productivity, a foundation was established in 1949 to lobby for the creation of a technical university in the east of The Netherlands (Benneworth, Hospers, 2007). The proposed technical university was meant to support the industries in the east of The Netherlands which experienced the first steps of the industrial decline. This foundation assigned three professors to produce two reports: one on the purpose of a university in the east of The Netherlands and one on the choice of location (idem). Subsequently, the Dutch Minister of Education announced the creation of a third technical university in 1961: the Technical Polytechnic of Twente (THT) was established in the city of Enschede (Schutte, 1999). The university admitted its first students in 1964 but falling revenue per student and declining numbers of students

threatened the new university's status (Benneworth, Hospers, 2007). Also, the university proved to be unable to halt the decline of Twente's textile industries and the collapse of the industries added to the question if the universities resources would not be better spent at universities closer to the Dutch financial and business centers (Groeneman 1991, Tweede Kamer, 1979). However, skillful management by Professor Van den Kroonenberg (Schutte, 1999), redefined the focus of the university; instead of supporting the declining textile industries, the university started focusing on the 'reanimation' of Twente's industries (Benneworth, Hospers, 2007). The university emphasized the creation of spinoff companies in order to aid the regional economy. The name of the university was subsequently changed into the 'University of Twente' (UT) with the motto 'the entrepreneurial university' to represent the university's new chosen path.

As a result, a 'Twente model' emerged in the 1980s consisting of four principles to support the entrepreneurial strategy (Arnold et al., 2006):

- The foundation of a transfer organization in 1979 to support the interaction between the UT and small and medium sized enterprises (SME's) and to increase industrial income for the university (Maassen, Buchem, 1990). This foundation was named "Transferpunt" at first, then changed to "Transfer research and development", followed by "Liaison group" and recently it has become a part of the NIKOS innovation research institute.
- The foundation of the Business Technology Center (BTC) in 1982 as an incubator for UT spinoff companies. The BTC is located at the site now called Twente's 'Kennispark' and the original investments were made by the UT, a Dutch bank and an American computer company (Benneworth, Timmermans, 2005).
- The foundation of the Holding Technopolis Twente (HTT). Since universities are not legally allowed to pursue commercial activities, the HTT was created as a legally separate entity.
- The startup of the TOP-program in 1984, supporting graduates and staff of the UT to establish their own spinoff companies. This program is now coordinated by the NIKOS institute of innovation research.

The TOP-program was funded by the Ministry of Economic Affairs after research on the development of promising UT spinoff companies (Van der Sijde et al., 2002). The program proved to be highly successful in creating firms, jobs and publicity (Benneworth, Hospers, 2007 on Lazzeretti, Tavoletti, 2005) but a change of interest by following up university boards, financial pressure and the loss of a national grant did strip the surrounding supportive organizational structures. Nonetheless, the University of Twente achieved the most spinoffs of any Dutch university by a milestone (Benneworth, 2003).

Also, as the BTC proved to be too small for a growing number of successful spinoff companies, the premises around the BTC were used to extend the available capacity. The University of Twente developed these new premises in cooperation with the municipality of Enschede and the Institution for the development of Overijssel (OOM) as a Business and Science Park (BSP) (Hulsink, Bouwman, Elfring, 2007), building the foundation for 'Kennispark' as it is now. The BSP was a science park pioneer by the fact that it was the first in The Netherlands (Van der Sijde et al., 2002). By 2005 the area covered about 40ha and provided more than 4.000 jobs (Kennispark, 2009) and the BSP and the University together form a high technology quarter for the city of Enschede (Benneworth, Timmermans, 2005).

The change in the university strategy in the 1980s also laid the foundation for the establishment of several multidisciplinary research institutes. The university reasoned that the interaction between the research of

different disciplines would be likely to create new views and technologies that would lead to new spinoffs. Twente was also the first Dutch university to establish multidisciplinary research institutes (De Weerd-Nederhof et al., 2003). The specific choice of institutes was influenced by a special EU-sponsored project (the VAT Project), defining the high-potential technological strengths of Twente based on the university research on 'ICT, Microsystems/nanotechnology, Biomedical technology and Laser technology' (Van der Sijde et al, 2002) (see chapter 6.4.1). As these specializations were represented among several different disciplines, a number of new research institute emerged in the following years; BMTI (biomedical engineering and recently renamed to MIRA) being the first in 1991 (Arnold et al, 2006). The other spearheads of UT technological research followed with the establishment of the CTIT (ICT & laser technology) institute in 1994 and finally MESA+ (nano-technology) in 1999.

Besides the University of Twente, the Twente region also includes a number of schools of applied sciences, of which 'Saxion' is by far the largest, to add to the regional level of the skilled workforce. However, Dutch governmental applied research institutes like TNO are not strongly represented in Twente (Twente has one relatively small department of TNO's quality control). This is remarkable because of the considerable research facilities of TNO at the other two technical universities in The Netherlands. The limited number of institutions within Twente's knowledge structure emphasizes the important role of the university. It is clear that the UT has a great influence on Twente's academical and research environment by an increasing visibility in regional policy making, social and political activities and the emphasis on entrepreneurship (Benneworth, Hospers, 2007). The university has become *"one of the determinants of regional policy and one of the flagships of development in the region"* (Boucher et. al, 2003). Besides the benefits of the UT, the region of Twente is still somewhat limited in its knowledge structure, heavily depending on the university (Arnold et al., 2006).

6.6 Applying the elements of Porters Diamond to the specializations of Kennispark

6.6.1 Introduction

Indicators (elements):

- Regional firm strategy, structure and rivalry (1)
- Regional (historical) demand conditions (2)
- Regional related and supported industries (3)
- Regional factor conditions (4)

Indicators (external determinants):

- The (historical) role of the government (5)
- Chance factors (6)

As with Tampere's specializations, the elements of Porters Diamond will be used to assess the technological specializations of the Twente region business and science park. The establishment of the specializations and the critical events in their historical path will be analyzed using the Diamond elements as elaborative tools to create an overview of the impact of every element in this process.

6.6.2 The rise of Twente's specializations

The foundation of the university of Twente proved to be an influential step for the region of Twente, improving the factor conditions (4) by creating both higher levels of education and higher levels of research. When looking at the establishment of the university, local textile industrials can be credited to

have taken the initiative, being in demand for a regional academic research partner (3) (Benneworth, Hospers, 2007). The first steps in the decline in Twente's textile industry lead to the understanding that the industries were in need of innovative and productivity-improving focused research (Hiemstra-Kuperus, 2004) which was not yet available in the proximity of the Twente region. This awareness resulted in a combined strategical effort of these industries (1) to establish a technical university in the east of the Netherlands. These efforts succeeded in 1961, when the Dutch national government (5) announced the foundation of a technical university in the city of Enschede. However, the newly established university was unable to halt the decline of Twente's textile industries and this loss of purpose, caused by the decay of its related and supported industries (3), threatened the existence of the newfound university. The universities rescue, a change in direction from an industry supportive function to a 'regional reinvention' function, can be mainly credited to the strong leadership and vision of an influential university rector: Professor Van den Kroonenberg (Benneworth, Hospers, 2007). In respect to Porters elements, this event of 'the right man at the right place at the right time' can be described as an instance of chance (6), one that proved to be crucial in the further development of the university. Another change was the fact that the university decided to extend the technical base of the university with social faculties to attract more students (Arnold et al., 2006), hereby improving the diversity in education and therefore the factor conditions (4). The newfound use of the university was grounded in the creation of an entrepreneurial atmosphere and environment to stimulate new spinoff companies to, in the end, support Twente's regional economy (Groenman, 2001). One of the most successful emerging supportive programs was the TOPprogram (founded in 1984), initiated by the university (4) and financially supported by the Dutch national government (5) (Eijkel, Zomer, 2007). The TOP-program proved to be successful in both the quantity and quality of spinoffs (idem). The municipality of Enschede (5) was actively involved in this process by offering of a location and stimulants in cooperation with the university. The organization for the development of Overijssel (OOM, later renamed to Oost NV) (5) contributed financially. However, throughout the 1980's, the capacity of the regional industries to interact, absorb and valorize knowledge generated at the UT was still a problem (Benneworth, Hospers, 2006), crippling the use of regional related and supportive industries (3) as research project partners in the build-up of the technological specializations. The most notable survivors of the industrial downfall, Royal Ten Cate and Thales, remained unconnected to the university for a long time, for different reasons.

One of the research areas in which the TOP-program lead to several spinoff companies was nanotechnology. Starting in the late 80s, the UT developed high level research centers in the areas of microfluidics, microfabrication and sensors and actuators (Robinson et al., 2007) (4) represented at the MESA (Microelectronics, Sensors and Acuators) and CMO (Center for Material Research) research institutes. The quality of research (4), the number and quality of spinoffs (both 4 and 3), the demand of nanotechnology laboratory (2) space and the demand on nanotechnology consultancy (2) lead the UT to believe that the prospect of nanotechnology was high (Eijkel, Zomer, 2007). The commercial use of both laboratories and knowledge was seen as an opportunity to let related private parties (3) share in the costs of new facilities for nanotechnology at the university (Benneworth, Hospers, 2006). The research centre MESA+ was founded in 1999 (Eijkel, Zomer, 2007). MESA+ was a merger of the before mentioned MESA and CMO and employed scientists of different research disciplines, such as chemistry, electrical engineering, applied physics, mathematics and biophysics (Eijkel, Zomer, 2007). At the start of nanotechnology research in the 1990's, there was a lack of industrial partners to cooperate with (Zomer, 2009). The research on nanotechnology proved to be too experimental and most industries were not

interested in taking over research of MESA+ (Zomer, 2009). As a result, MESA+ emphasized the creation of spinoffs to create research partners (3) and regional demand (2) (Eijkel, 2009). Newly organized commercialization efforts resulted in partnerships with several companies at the national level and newfound nanotechnology spinoffs at the regional level (3). MESA+ also established, in cooperation with the organization for the development of Overijssel (Oost NV) (5) and Twente's business and science park (BSP) (3) the 'Microsystems Technology Foundation' (MTF) to stimulate the development of a regional nanotechnology cluster. The forming of this cluster is, however, slowed down by the relatively low number of nano-technology spinoff companies, also severely limiting the beneficial effects of regional rivalry (1). Because of the multi-disciplinary nature of MESA+, the history of micro- and nanoresearch in Twente provides a showcase of the importance of overlapping and evolving research (Robinson et al., 2007).

The ICT specialization at Kennispark can also be described as a result of the high level of research (4) at the University of Twente. The ICT-sector of Twente is mainly focused on research and development (R&D) (Hulsink, Bouwman, Elfring, 2007) and has it origin in the 1960's at the faculty of mathematics. The specific 'informatica' educational program was founded in 1980 (University of Twente, 2009) and provided an important improvement in the factor conditions (4) required for the emerge of a ICT-cluster. The high level of research among different ICT-related disciplines at the UT resulted in the foundation of the CTIT institute in 1994, which is the largest ICT institute in The Netherlands (ECIU, 2006). The skilled workforce, as a result of many university ICT-related educational programs, and the high quality research provided by the CTIT institute (both benefitting the factor conditions (4)) also lead to the establishment of one of the branches of the Telematica institute in 1997 (Novay, 2009). The Telematica institute is a public-private cooperation between knowledge institutes and enterprises interested in ICT innovations (3) which was initialized by the Ministry of Economic affairs (5) to stimulate innovation (Ministry of ECS, 2008). Not only the University of Twente is involved but also the two other technical universities in Eindhoven and Delft and general universities like the universities of Leiden and Tilburg. Private partners include large companies like Philips, CMG, IBM, ING and KPN (Novay, 2009). The purpose of the Telematica institute is to aid the innovative and competitive position of the Dutch private sector and to improve the quality of life in general by fundamental and applied research on ICT subjects (Novay, 2009). In 2009, the Telematica institute was renamed to 'Novay' (relating to 'networked innovation') to support its change of course into a broader, more open-innovation centered institute. Similar to the development of nanotechnology, the ICT cluster has not benefitted from substantial regional demand (2) in the first phases after its foundation. However, during the high-times of ICT in the 1990's, the high quality of research in Twente was able to attract the large multinational Ericsson to establish a R&D department at Twente's Business and Science Park (BSP). Unfortunately, with the burst of the ICT bubble at the end of the millennium, Ericsson quickly disappeared again (Hulsink, Bouman and Elfing, 2007).

The third notable technical specialization of Twente is biomedical engineering. The BMTI research institute for biomedical engineering was found in 1992 (Benneworth, Hospers, 2006). The roots of research on biomedical technology date back to the early seventies, when an interest in medical appliances of technology was shared among several research institutes (BMTI, 2005). This provided the firm multidisciplinary foundation of research knowledge (4) required to establish the BMTI institute. After its establishment, it set out a number of main interests in cooperation with medical and industrial partners (3) (BMTI, 2005). BMTI has been the origin of a large number of spinoff companies in the field of biomedical engineering (Benneworth, Hospers, 2006) providing for both regional rivalry (1) and related industries (3). However, the university also tried to establish connections with related and supportive

industries (3) outside of the university premises. The availability of medical technological research (4) lead to connections with the regional rehabilitation clinic "t Roessingh' which eventually resulted in the formation of a separate 't Roessingh R&D unit in 1993 (De Weerd-Nederhof et al., 1997) with close ties to the university. Next, the university has been cooperating with the medical hospital of Enschede which is "*the largest non-academic hospital of the Netherlands*" (Benneworth, Hospers, 2006). This provided a second important research partner. Both 't Roessingh and the Enschede medical hospital also provided for the regional demand of the research and products of biomedical engineering (2). A let down is, however, the absence of an academic hospital in Twente which would enable a general medical school program which could further improve the conditions for the biomedical cluster by offering a higher quantity, and perhaps quality, of medical personnel (hereby improving the factor conditions (4)). This view was also confirmed in one of the interviews which shortly wandered off to this subject. However, taken together with the biomedical technology spinoffs in these research areas, the cooperation between the university, 't Roessingh and the Enschede medical hospital provide a firm foundation for a general 'Health Technology' cluster in Twente (Benneworth, Hospers, 2007).

6.6.3 Conclusions

The rise of the technological specializations of the Twente region was influenced by many different factors and actors. To assess the role of the different elements of Porters Diamond mode, I will summarize their influences.

Indicators (elements):

1. Regional firm strategy, structure and rivalry

The influences of regional firm strategy, structure and rivalry at Twente have been limited. This is mainly caused by the fact that most of Twente's industries perished before the technological specializations were established. These specializations were therefore forming newfound clusters which meant that, for example, firm rivalry was not instantly available.

2. Regional (historical) demand conditions

As with the regional firm strategy, structure and rivalry, the regional (historical) demand conditions did not play a major role at the establishment of the technological specializations as present at Kennispark today. When the nanotechnology and ICT specializations were established, the available local and regional demand for these developing clusters was very low. Both specializations had to create demand by creating products and technologies that would create demand on their own. However, this demand was often found outside the Twente region.

3. Regional related and supported industries

The search for related and supported industries by Twente's textile industrialists led to the foundation of the University of Twente. As the decline of Twente's industries was acknowledge, the textile industries searched for a useful technical research partner to turn the tide. This defines their attempts to be a search for related en supportive elements while battling the decay of Twente's industries. However, when the university was finally established, the industries were already in a profound state of decay.

In its turn, the downfall of Twente's industries resulted in the absence of relevant regional industrial partners in the 1980's which left the university to be somewhat of a lone pioneer in applied technological research. Both the nanotechnology and the ICT specializations were heavily influenced by the lack of these industries although the situation was different for biomedical engineering. While sharing the same

quality of research basis, related and supportive partners were already available in the form of a local rehabilitation clinic and Enschede's medical hospital at the start of the institute for biomedical engineering. Throughout the development of this specialization in Twente, there have been partnerships with both institutions.

In later stages of the development of the three specializations, all three institutes were able to build up partnerships with (regional) industrial partners (Van der Sijde et al., 2002) but it is important to note that these regional partners were often spinoff companies emerging from the same respective research institutes. MESA+ (nano-technology), for example, cooperates with and rents facilities to, industrial partners which are often spinoff companies of the same institute.

4. Regional factor conditions

Unsurprisingly, the emerge of the technological specializations of Twente was preceded by the improvements in Twente's factor conditions. The University of Twente (1961) proved to be a large contributor to the improvement of these conditions both by offering high quality research and by improving the education level of the Twente region. Successful programs like 'TOP' (sponsored by the national government were part of the 'Twente model' that emerged in the 1980's. However, the downfall of Twente's industries resulted in the absence of relevant regional industrial partners and local demand in the 1980's which left the university to be somewhat of a lone pioneer.

All three specializations share the dominant influence of the availability of high quality education and research in these areas, as part of the improved factor conditions. It is notable that this first effort that would prove to become the birth ground of the three specializations was a university effort, unsupported by regional industrial or governmental partners. When looking at the ICT specialization, the high level of research lead to the establishment of the national 'Telematica' institute in Enschede in cooperation with several high-profile Dutch and international companies. Concerning both ICT and nanotechnology, it appears that in a way, Twente's high level of research in ICT and nanotechnology was able to create (e.g. spinoffs) and attract new regional and national demand by itself, filling (at least partly) the before mentioned gap that was left by the decimated textile industries.

Indicators (external determinants):

5. The (historical) role of the government

It was only after the national government made clear that the next technical university would be established in Twente that the regional and local governmental institutions became more active. The city of Enschede was able to provide the best location for the university, offering the 'Drienerlo' domain, and the University of Twente was established. The regional government was therefore a bit slow to react, the textile industrialists were responsible for the lobby to win the university for the Twente region.

Although the new university was established to aid the regional industries, the downfall continued and as a result of this decay, the region declined into a European 'Objective 2' region. This resulted in both European programs and financial aid to redevelop the region. The programs defined the potential technological areas of success for Twente, which were all based on Twente's university research (Van der Sijde, 2002). The successes in several technical research areas lead to the establishment of a number of institutes that would prove to be the birthplace of the technological specializations of today.

6. Chance factors

With the university unable to stop the decay of Twente's industry, the purpose of the university itself became at stake. It was a clear example of what Porter describes as a 'chance event' that turned the tide: the right man, at the right place, at the right time. As Van den Kroonenburg moved in to become the next rector of the beset university, the course was changed from an 'old industries' supportive university to an 'entrepreneurial' university with a number of services and facilities to promote the emerge of new companies (spinoffs) in Twente.

Overview of events:

In conclusion, it appears that Twente suffered from a 'dead point' after the decisive downfall of its industries in the 1970's. The disappearance of most of the (textile) industries left Twente, and the University of Twente, with a lack of industrial partners to develop its technological specializations in the 1980's. This also lead to the absence of regional demand for ICT and nanotechnology in the founding years of these specializations. The industries that did survive the industrial downfall, most notable Royal Ten Cate and Thales, remained unconnected to the university for different reasons and for a long time. It was not until the establishment and development of the BMTI, CTIT and MESA+ research institutes that a connection to regional industries developed at least partly, aided by the results of the many spinoff companies in these research areas that emerged from the university. Biomedical engineering (BMTI) is a positive exception, finding both related industries and regional demand at "t Roesingh' and Enschede's medical hospital. An overview, as perceived by me and based on my research, is presented below.

Diamond element / cluster:	Regional firm strategy, structure and rivalry (1):	Regional demand conditions (2):	Regional related and supported industries (3):	Regional factor conditions (4):	The role of government (5):	The role of chance (6):
Information and Communication Technology	L	L	L	Н	М	L/M
Biomedical engineering	L	М	М	Н	М	L/M
Nano-technology	L	L	L	Н	М	L/M

Figure 13: The influence of the Diamond model elements on establishing the specializations, indicated by low (L), medium (M) and high (H)

6.7 Comparing the origin of the technological specializations of Hermia and Kennispark

6.7.1 Introduction

The rise of the technological specializations in Tampere and Twente show both similarities and distinctive differences. The historical path of the specializations in both regions has been analyzed by determining the influence of the elements of Porters Diamond model on the emerge of the specializations and when comparing the two regions, the developments can be divide in three different stages using the historical cause of events:

- The (start of the) industrial downfall
- The creation of the academic environment
- The emerge of the specific technical specializations

6.7.2 The (start of) the industrial downfall

After WWII, Tampere and Twente showed a very similar industrial landscape which was dominated by textile and related industries. Both regions found themselves in the same situation with the downfall of their traditional industries but the events that influenced this downfall show both similarities and differences. Both regions also experienced a number of events that were either meant to support the declining industries or had the potential to provide new opportunities. An overview of both the negative and the positive influences on the downfall of the traditional industries is presented below.

Negative influences (Tampere):	Negative influences (Twente):
- Substantial increase in industrial wages	- Substantial increase in industrial wages
- Need to import raw materials	- Need to import raw materials
- Loss of important markets (Eastern Europe, 1980's/1990's)	- Loss of important markets (Indonesia, 1949)
- Severely hit by oil crisis (1973)	- Loss of a cheap source of raw materials (Indonesia, 1949)
	- Loss of national protective legislations (1952)
	- Lack of national development support
	- Lack of a regional entrepreneurial culture
Desitive influences (Tempore):	Desitive influences (Twente)
Creation of a university (UTA 10(0)	Creation of a technical university (UT 10(1)
- Creation of a university (UTA, 1960)	- Creation of a technical university (U1, 1961)
- Creation of a technical university (TUT, 1972)	- Creation of the EEC union (1957)
	- Creation of the Benelux (1958)

Figure 14: Positive and negative events influencing the downfall of Tampere's and Twente's industries

An interesting note is that the decline of Twente's industry started both earlier and continued at a much faster rate than the decline of Tampere's industries. In addition, Twente also lost near to all the industries while Tampere's mechanical engineering industry was able to hold on to their competitive position. This is probably caused by the fact that Twente had to overcome two major blows in a short period of time. In 1949, Twente lost their source of cheap raw materials and an important revenue market caused by the independence of Indonesia (formerly known as the Dutch East Indies). Additionally, the national protective legislation that allowed Twente's textile industry to grow 'lazy' was abolished in 1952, leaving the industries unable to cope with their rapidly declining competitive position as a result of a third factor: the lack of a regional entrepreneurial culture.

Although Tampere faced similar problems with the need to import raw materials and the increase in

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industrial wages, the final perdition of most of the industry was not met until Tampere's textile industries started to lose an important market: Eastern Europe. This was caused by the political changes in that region (most notably the process that lead to the collapse of the Soviet Union) during the 1980's and 1990's resulting in different spending priorities than Finnish textile products (Kositainen, Sotaratu, 2002).

The slower pace of Tampere's decline also gave the mechanical engineering industries more options to establish partnerships with the regional universities. There's something of a paradox here though, although the University of Twente (1961) was initiated by the regional industrialists and specifically meant as a technical university in support of these industries, it failed to make a significant impact on these industries in Twente. Tampere's universities (1960, 1972) were, in contrast, initiated by city officials and did not have this specific purpose but still these universities did make an impact and are widely credited to be responsible for the survival of the mechanical engineering industry in Tampere (Martinez-Vela, Viljamaa, 2004; Sjöberg, 1998; Kositainen, Sotaratu, 2002). The explanation for this probably lies in the same cause of events as mentioned before. The slower rate of decline of Tampere's industries gave the mechanical engineering industries the necessary time to establish partnerships with the university could not be exploited fully. The University of Twente was not able to halt the decline in its relatively short period of co-existence with the concerning industries.

6.7.3 The creation of the academic environment

For both regions, the establishment of a university proved to be very influential in the historical path to their technological specializations. The establishment of the first university in Tampere and Twente differs only one year, however, in Tampere this was a general university and in Twente a technical university. Next to the different initiators for both universities, the intentions were also different. The primary purpose of the University of Twente was to support the regional industries, the primary purpose of the University of Tampere was to stop the regional 'brain drain'.

However, in the creation of an academic environment in the 1960's and 1970's, Tampere's knowledge infrastructure extended clearly beyond the university premises. Tampere benefitted substantially from the establishment of the state-owned VTT research centers (the first center was established in 1974). The VTT research centers were intended both for research at VTT itself and to improve the connection between research and regional industries and organizations (VTT, 2009). A comparison between VTT and the Dutch TNO might stand but TNO did not nearly take as much interest in Twente as VTT did in Tampere. The high level of research lead VTT to establish two of its main research centers in Tampere, concerning 'medical and occupational safety' and textile research. The former proved to be important in the emerge of the 'health technology' cluster and both benefited the university-industry connections to form both partnerships and create a regional demand for university 'products'. Unfortunately for Twente, no institutions of a similar scale were founded in Twente during this era, possibly caused by the fact that at this time the region of Twente lacked the regional industries to connect the research with (a primary function of both VTT and TNO). This was caused by the industrial demise that, by the end of the 1970's, had stripped Twente of a major part of its industrial activities.

Another instance where, in comparison with Tampere, the initial absence of industrial partners in Twente is evident is the way in which the business and science park was established. In Tampere, this proved to be the result of an agreement in 1983 among universities, (local) government and regional industrial partners discussing the measures to ease the consequences of the industrial downfall for the region (Seppälä, 1998).

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The establishment of the business and science park of Twente was, however, the result of a cooperation between the university, the municipality of Enschede and the organization for the development of Overijssel (OOM, also governmental) (Hulsink, Bouwman, Elfring, 2007). Established in 1981, it again faced the absence of relevant industrial partners of a certain size in its foundation and development as compared to Tampere. It is also notable that in Twente, the eventual creation of the BSP was one of the results of a successful change of direction by the University of Twente. The UT also played the main role in the establishment of the BSP in Twente while in Tampere the initial plans originated from the council of the city of Tampere.

6.7.4 The rise of the technological specializations

In both Tampere and Twente, the universities can be credited as the supplier of the necessary foundation of education and research that eventually resulted in the specific technological specializations. The fact that Tampere and Twente share the ICT specialization makes it even more interesting to compare their emerge. However, as mentioned before, it should be clear that the Finnish government provides a number of financial and organizational aids which, relatively, greatly surpass the Dutch national efforts to stimulate technological innovations. The before mentioned work of Arnold et al. (Innovation and Research Governance in Finland, 2003) provides a clear overview of this stimulation programs which are also represented in Tampere, for example with the earlier mentioned 'Center of expertise' programs, 'Tekes' and the 'Academy of Finland'. The Finnish expenditure on R&D was 3.5% (€6.2 billion) of the GNP in 2007, of which 72% is accounted for by private funding (Finnish science and technology service, 2009). This means that the Finnish public spending on R&D is about 1% of the GNP, equal to $\notin 1.74$ billion in 2007. In comparison, the total expenditure on R&D in The Netherlands in 2007 was €9.6 billion which is only 1.7% of the national GPD and private parties are responsible for 60% (CBS, 2009) of the expenditure. This means that the Dutch national government invests about 0.68% (€5.76 billion) of the GNP in R&D. The relative difference in R&D spending is therefore almost 50% (0.68% vs. 1%) in public funding and close to a stunning 150% (1.02% vs. 2.5%) in private funding, both in favor of Finland (based on figures of 2007).

When looking at the ICT specialization, the emergence of the 'Telematica' institute in Twente and the 'Research Institute of Information Technology' in Tampere appear quite similar. Both the ICT research institutes concern the same research areas and were founded by a combined effort of the university (or universities in the case of Tampere), industries (regional, national or international) and governmental actors. Both institutes are also highly regarded in their similar research areas and even the research on 'informatica' started in both regions at the mid 1960's (Kurki-Suoni, 2005; Informatie, 2006) although it must be noted that the University of Tampere accomplished this by establishing a separate faculty while it was a part of the mathematics faculty in Twente. There are, however, two significant differences. First, Tampere's ICT research institute was founded as early as 1985, Twente did not establish theirs until 1998. Second, the cooperation in Tampere involved regional industries and regional governmental actors while Twente's research institute were established as a result of national governmental efforts and only national and international industries.

These differences are a result of a problem that has come up several times by now and that Twente had to overcome on its way to their regional specializations. Twente, in contrast to Tampere, faced a difficult situation during the 1980's and the beginning of the 1990's: as most of Twente's industries perished by the end of the 1970's, the region experienced a temporarily industrial 'knock-out' situation. The lack of existing regional industrial partners (of a certain size) with similar interests made it especially difficult for

Twente to set up partnerships and, as a result, institutions in need of industrial partners like the Telematica institute were founded both late and with a need for national and international actors. As Tampere was able to find these actors within its own region, it was likely to come to an agreement more easily and therefore quite fast (Seppälä, 1998). Tampere benefitted, with the development of the ICT specialization, from the fact that both related & supportive industries and regional demand were available right from the start. This was mainly provided by the surviving mechanical engineering industries of Tampere which used the knowledge of both Tampere's universities to greatly improve their competitive position by forming continuing partnerships to create new innovations. In Twente, the biomedical engineering research was, in fact, the only specialization that had existing regional partners available right from the start ('t Roessingh and the medical hospital of Enschede). Both the nanotechnology and ICT specializations were required to create (regional) demand and related and supportive industries by themselves, as a result of the quality of research that was created at the University of Twente. In most cases, the first step proved to be the creation of spinoff companies to provide both regional partners and a cluster including regional rivalry as promoted by Porter (1998). As a result, Twente had somewhat of a 'false start' compared to Tampere when comparing the establishment of their specializations.

7. The public-private partnership (PPP) constructs of the Hermia and Kennispark organizations

The public-private partnership constructs of Hermia and Kennispark are analyzed using the principles of Etzkowitz' Triple Helix model (2002). The mutual cooperation in a consensus space between government, industry and university is set as a standard in which tri-lateral network organizations will be able to develop (Etzkowitz, 2001). In this research, the business and science park organizations of Hermia and Kennispark will be assessed as examples of these tri-lateral network organizations in different important aspects of a business and science park: the formal organization, the financial contributions and finally the organization as it is perceived by actors within the different helices of the model.

7.1 The public-private partnership construct of the Hermia organization

7.1.1 A short history of Hermia Tampere

The Hermia business and science park was initiated in 1986 as a technology center next to the premises of the technical university of Tampere (TUT) (Kostiainen, Sotarauta, 2002). After the foundation of the physical Hermia business and science park, the city of Tampere concluded that it would need a particular organization to maintain, support and promote the physical park because examples in other cities (for example the Finnish city Turku) showed that it was often hard to fill the premises with the desired high-tech companies (Kautonen, 2009). Subsequently, the city of Tampere established the Hermia organization in 1990 which could be considered as the business and science park tool of the city of Tampere.

In the early 1990's, the Hermia organization evolved from only supporting the physical park and its companies to a supplier of incubation, business development and regional development activities (Kankaala, 2009; Miettinen, 2009). These activities were (financially) supported by the city of Tampere in an attempt to ease the effects of Tampere's industrial demise. In 2001, the physical park was expanded to 100.000m2, including 145 companies located at its premises and offering jobs for 3.000 employees (Kautonen, 2009) and the total surface of the park is currently estimated at 120.000m2 (Räsänen, 2009).

However, the council of the city of Tampere changed their attitude towards the Hermia organization because of electoral shifts. Consequently, the Hermia organization was split in 2002 into three different legal forms:

- The original Hermia organization became focused on (regional) development projects and cluster development, both involving partners within and outside the business and science park (Miettinen, 2009).
- The business development and incubator activities of the Hermia organization were privatized to become "Hermia business development Ltd". These activities already formed a separate business unit before the split-up and the management bought the shares (Kolehmainen, 2009).
- The buildings of the business and science park were privatized and shortly afterwards taken over by Technopolis. Technopolis is the largest Finnish 'incubation company' and is a private stocklisted company which now re-rents the buildings to other companies and also offers incubation services. Therefore, Technopolis and Hermia business development Ltd. have become competitors (Jussila, 2009; Kolehmainen, 2009).

The orginal Hermia organization continued to focus on a large number of regional development projects over the years, including the management of the influential regional Centre of Expertise Programme (OSKE) which is funded by the national government and seeks to improve the development of regional clusters in a number of regions in Finland.

In the beginning of 2009, Hermia changed again. The city of Tampere decided to withdraw from a number of their non-core activities, including the Hermia organization. The city of Tampere believed that it was *'no longer required to take the driver's seat'* (Kankaala, 2009) at a regional development organization like Hermia, acknowledging that the technical university should be the dominant actor in the university-industry cooperation's forged by Hermia.

Additionally, the city of Tampere recognized that a university-dominated public company called Tamlink had become very similar to Hermia. This was a result of the removal of Hermia's business development, incubation and park-management activities in 2002. This resulted in a somewhat odd situation in which "there were two small companies in the same space, not knowing of each other and it has been my [Kari Kankaala] effort and the effort of the president of the technical university to bring them together for years" (idem). The city of Tampere considered Tamlink to be a good candidate for cooperation because it was profitable and also believed to be more efficient and more narrowly focused at creating university-industry connections than Hermia (Sotarauta, 2009). Both organizations were also roughly equal in assets (Kankaala, 2009). The activities of Hermia were transferred to Tamlink when both organizations formally merged in October 2009. The name 'Hermia' is however still used because of the strong connection with the physical business and science park. At the time of the merger, Hermia employed about 45 people and Tamlink about 10 (Miettinen, 2009), together creating a new public company of around 55 employees. The organization is focused on technology transfer, development projects and cluster development at the Hermia business and science park but also, at times, at a national or international level.

7.1.2 Mission of Hermia

Due to the recent nature of the merger, the new organization does not have a detailed strategic plan for the coming years. Representatives of the old Hermia organization indicated that the organization will be holding on to the mission of the 'old' organization until this situation changes. They indicated that the mission of Hermia used to be *"to develop new business activity and expertise in pivotal high-technology industries in the central Tampere Region. The company promotes the improvement of competitiveness in the region's key clusters"* (Hermia, 2009). According to the director of the former Hermia organization this means in practice that the company focuses on the development of new regional (project) concepts and also manages these regional projects (Miettinen, 2009).

The mission for the new Hermia organization is under review and not yet formally established. However, I had access to preliminary strategic documents where the new mission of Hermia was stated as: *"Hermia capitalizes business renewal, growth and internationalization by bringing together cutting edge scientific knowledge, business networks and research"* (Hermia, 2009). Hermia wants to be prominent, both regionally and (inter)nationally, as an intermediate organization between the university helix and the industrial helix based on the same means: the development of new (project) concepts and the management of projects. There is, however, a change visible in the scope of the organization. Hermia is no longer only focused on the regional development projects but extents its work field to the national and the international level. In a way, Hermia has separated itself from the physical business and science park (Räsänen, 2009).

7.1.3 The legal form and formal organization

Both the situations of the 'old' Hermia and the 'new' Hermia organizations will be discussed to create a full view on both the situation up to October 2009 and the situation afterwards.

The former Hermia organization

The legal form of the former Hermia organization was a typically Finnish 'public company' which is basically a normal private company with the ownership in the hands of shareholders. The difference is that a public company cannot aim for profit, which has to be confirmed in the statutes of the organization. This means that the shareholders rarely receive any dividend which makes it relatively uninteresting for private investors. In general, the shares of public companies are therefore in majority owned by public organizations such as local, regional and national governmental actors, public investment funds and other non-profit organizations. The Hermia organization, as it was till October 2009, clearly showed the strong influence of the city of Tampere which was also its sole founder (Kolehmainen, 2009; Jussila, 2009, Kankaala, 2009):

- The city of Tampere held no less than 97% of the shares in Hermia, giving it a near-total domination over the organization.
- The Tampere university of Technology (TUT) held approximately 1.5% of the shares.
- VTT, the national governmental institute for applied research, also held approximately 1.5% of the shares.

The domination of the organization by the city of Tampere was also visible in the board of directors of Hermia. This board consisted of representatives of the political parties of Tampere and was based on the result of the cities democratic elections every four years. The other shareholders, VTT and the technical university, had no real influence on the constitution of the board of directors because of their very limited shareholder positions. Next, the board of advisory of Hermia was appointed by the board of directors but it



Figure 15: The structure of the Hermia organization until October 2009

had a better understanding of the concept of business and science parks. It consisted of private industrial actors and representatives of the technical university and the Tampere chamber of commerce. The board

of advisory was, however, several times mentioned to be not very active (Kankaala, 2009; Räsänen, 2009). The board of directors also appointed the 'cluster managers', which were all responsible for one particular customer group of the ICT cluster at the Hermia park. The daily management of the public company was also officially in the hands of the board of directors.

When this formal structure is regarded in the perspective of Etzkowitz' three helices, the governmental helix held 98,5% of the shares in Hermia, since VTT is owned by the Finnish national government. The university helix held 1,5% of the shares and the industrial helix was without any formal shareholder influence. This formal division of power is shown in figure12 with the dark circle representing the Hermia organization. The fact that the Hermia organization was basically owned by the governmental helix, with little to no space for the university and the industrial helices raises some questions. This is reinforced by the fact that a number of interviewees were quick to agree that a better representation of the university and industrial helices would most likely result in better results (Sotarauta, 2009; Mattila-Nurmi, 2009; Kautonen, 2009).





However, the formal organization structure of Hermia appeared to be not so much of a well considered plan but mainly a heritage of the past. According to Etzkowitz, the governmental helix should be a supportive actor of the industry-university connections by involving these other helices in activities (Etzkowitz, 2000) but the Hermia organization was, when established, not meant as an organization to bring the helices closer together. This is caused by the fact that at the foundation of Hermia, the technical university already had their own tech-transfer company (Tamlink) and the Hermia organization was only established to manage the premises of the business and science park (Sotarauta, 2009). The incubation, regional development and business development activities were the result of an evolving Hermia organization but the ownership structure of the organization never changed along with these changes in its activities. It was therefore not a well-considered choice to not, or hardly, include the industrial and the university helix but it was a result of a rigid organizational structure that was not adjusted to the changing activities.

This formal structure also resulted in a board of directors that consisted only of elected officials of the city of Tampere, which lead to a situation in which the board of directors had no extensive specific knowledge about running a regional development organization. When Hermia was established, this was not such an obvious shortcoming because it was only supervising the physical business and science park. However, with the evolvement of its activities, there was also a need for more specialized leadership and more specific knowledge. This was lacking because the board of directors was not chosen because of their capabilities and relevant knowledge but as a result of a democratic and political process (Sotarauta, 2009). Lastly, the fact that the city of Tampere's representatives held almost all shares and also formed the board of directors created a very homogenous organizational top-level. The shareholders and the board of

directors were representatives of only one organization: the city of Tampere. This also explains why the board of directors was empowered to appoint the board of advisory, where normally this would be the job of the shareholders: they were actually representing the exact same entity.

As a result of this, it was claimed that the Hermia organization lacked a sense of direction (Miettinen, 2009). As the employees of Hermia were generally credited to know more about the activities than the board of directors, the board used a very loose control system in which the employees were granted a lot of own decision-making space: "it was closer to 'we can do whatever we want' than to the board directing what we should really do" (Miettinen, 2009). Although this was acknowledged to have its benefits, the employees itself complained about the fact that there was no consistent line or goal presented by the management of the organization. Next, the employees would like to be able to share and discuss their ideas and plans with a board that is competent to do so. As a manager of Hermia stated: "politically nominated directors are history, ..., they should have more knowledge about the actual business that the [public] company is in, there were no development experts or even business experts in the board." (Miettinen, 2009). Besides this, there was also a major general consensus that the formal inclusion of more university and industrial partners would benefit the organization because it would bring potential partners closer to each other in a structured organization. The organizational changes that a merger with Tamlink would bring were therefore hailed by the representatives of Hermia that were interviewed: "we'll get more direct instructions and that's good for the company, we can be more focused, ..., in a sense, we're hoping to be more controlled" (Miettinen, 2009).

The new Hermia organization

The merger has resulted in a situation where both the Hermia and the Tamlink organization still exist. Tamlink refused to add the Hermia activities to its own organization because it "did not know what it got with the Hermia organization" (Kolehmainen, 2009) and Hermia became a separate legal entity (Hermia Ltd.) with Tamlink as its sole shareholder. This is a result of the before mentioned unawareness of each other's organizations and activities. Together, they are now using the name 'Hermia' because of the well spread reputation of Hermia in Finland. The board of Tamlink is now also the board of Hermia Ltd. The structure of Tamlink itself has remained mostly the same but the constitution of the shareholders has changed because Tamlink paid for the Hermia activities with shares in Tamlink: "Tamlink basically bought the business areas of Hermia, ..., that way, we didn't need to meddle with the ownership structure of Tamlink" (Kankaala, 2009). In the new situation, the technical university of Tampere (TUT) is the majority shareholder with 60% of the shares and the city of Tampere holds only 25% of the shares. These shares are freely transferrable to other actors but the other current shareholders always hold the first right of buying them (Kankaala, 2009). However, because of the non-profit limitation for public companies, it was noted that it is (legally) easy to sell the shares but it is much harder to find a buyer for it. Altogether, the new shareholder constitution is a major change from the old Hermia constitution (Räsänen, 2009):

- The Technical University of Tampere (TUT) owns 60% of the shares, divided over two legal forms. The university itself and a university foundation both own 30% (Kankaala, 2009).
- The city of Tampere owns about 25% of the shares.
- The public investment company Finnvera owns about 8% of the shares.
- The Tampere society of technology (an association of engineers) owns 7% of the shares.

In the new situation, the board of advisory has disappeared. Adding a board of advisory is still a subject for discussion between the old Hermia and the old Tamlink but it might be added when the merger has

been fully finalized (Räsänen, 2009). The board of directors is installed by the shareholders and consists of a total of six members. The constitution of the board of directors is a direct result of the percentage of shares that an actor is holding. This means that, when compared to the shareholders constitution, this board provides a similar view on the division of the formal power. Three of the positions are filled by the TUT, being the major shareholder. The city of Tampere, Finnvera and the Tampere society of Technology (a local engineering organization) each hold one seat at this moment but as a result of the merge, the composition of the board is also subject to discussions.



Figure 17: The structure of the Hermia organization since October 2009

The CEO and the board of directors of Tamlink are in charge of one COO (Chief Operating Officer) at Tamlink and one COO at Hermia. These COO's are responsible for the daily management of the two separate organizations (Räsänen, 2009). This results in a situation where both organizations are independent on the organizational level although Hermia is fully owned by Tamlink. On the strategic level, the CEO and the board of directors of Tamlink are leading both organizations.

Most interestingly, the old Hermia organization has retained its legal form as a public company and is legally a public company controlled by a private company. This means that the entire new organization is a for-profit company while a part of it is non-profit. This construction appears somewhat strange because the financial results of Hermia will also influence the financial results of the entire organization, regardless of the for-profit or not-for-profit nature of the two separate identities.







An overview using Etzkowitz depiction based on only the formal organization of the new Hermia leads to a number of changes compared to the old Hermia organization (see figure 14). The constitution of the shareholders has changed quite a lot but a first conclusion is that all shares are still held by representatives of the public governmental and university helices. The university helix is now the leading helix with 60% of the shares as a result of the new position of the technical university of Tampere. The general university of Tampere is not represented and it has no strong tradition of university-industry cooperation The UTA had the reputation of being a 'red' university which added to the fact that cooperation with industries was considered to be a threatening private influence on the universities academical environment in the past (Kautonen, 2009). Also, the university is only well known for its strengths in social studies which offers substantially less opportunities for the emerge of high-tech companies. The fact that Hermia's ICT cluster mainly involves technological specializations results in a weak connection between Hermia and the general university (Kautonen, 2009; Sotarauta, 2009; Vitelli, 2009). The governmental helix now holds a total of 33% of the shares of Hermia as a result of the shares of the city of Tampere and Finnvera. This is a big step down from the 98,5% of the shares that the governmental helix used to own in the original Hermia organization. It is a clear representation of the cities changing policies: it is still willing to invest, facilitate and contribute to regional development companies but it is no longer willing to take the lead. The decrease of the governmental helix allowed the university helix to take a leading role and, for this moment, both helices seemed to be content with this change.

The decision making process at the new Hermia is based on the same principles as other companies. The shareholders have shareholder meetings were they are able to cast a vote on issues or raise issues themselves and force a voting procedure. This is based on a simple majority system where the percentage of the shares resembles the voting influence. It is therefore not necessary for all shareholders, or all helices, to agree upon a decision, a majority of the shares backing a proposition will be enough. However, voting propositions from the shareholders themselves are rare. One interviewee mentioned that in the three years that he has been active, only one shareholder of Hermia used this mean of power and only once. This is explained by the fact that most shareholders also have different ways of pressuring the organization. Since the technical university and the city of Tampere are both the main shareholders with holding back investments if a decision would be forced against their will (Kautonen, 2009; Kankaala, 2009). This would be mainly a course of action for the city of Tampere since the technical university of Tampere is able to stop any decision itself using their majority shareholder position. In the end, a consensus between the helices is not formally required to make a decision but in most cases an agreement will be sought.

The university helix consist of two universities: the social studies university of Tampere (UTA) and the technical university of Tampere (TUT). The role of the UTA in Hermia is limited and has always been limited because of two main reasons. First, the Hermia business and science park developed into a park aimed at Tampere's ICT cluster. Although the UTA was the very first founder of ICT research in Tampere (see chapter 6.1.3), the TUT quickly took over the research in this particular field and the TUT established quite a good reputation. Since then, the role of the UTA in ICT research has only been marginal. Second, the UTA was known to be a 'red university' with strong ties to the left of the Finnish political spectrum (Kautonen, 2009). This included the view that universities were not be mixed with corporate interests and university-industry cooperation at the UTA was therefore uncommon and far less well developed in comparison with the TUT (idem). This also contributed to the TUT's advantage in ICT research since the UTA was less able to work together and establish partnerships with regional partners. The TUT was named an 'industry university' by several interviewees. The new Hermia organization will, as requested by the governmental helix (Kankaala, 2009), also include research that is conducted at the UTA. However, the role of this university is expected to remain small because of the different fields of research but also because of the fact that the new Hermia has the technical university of Tampere as its main shareholder (Vitelli, 2009).

In both the old and the new organization, the industrial helix has no formal role. Industrial partners are very active in the projects of the new Hermia organization but they are not represented in the organization itself. Hermia would consider to include private parties in the organization, also as shareholders (Miettinen, 2009; Räsänen, 2009). This is mainly because of the important presence of Nokia at the Hermia business and science park. The Nokia research and development (R&D) unit at the business and science park is the largest R&D unit of Nokia in Europe and combined with the international reputation of Nokia this would result in a strong backing of the Hermia organization. The shareholders of Hermia (mainly the technical university and the city of Tampere) did not appear to be very keen on including industrial partners. One of the main reasons for this appeared to be the neutral position of Hermia (Räsänen, 2009). The current shareholders of Hermia would not like to see one or a number of companies included as a shareholder because it might send a negative signal to other companies.

7.1.4 Financial investments

The Hermia organization has seen a number of different financial constructs over the past two decades, mainly resulting from policy changes of the city of Tampere. Next to the organizational influence, Hermia has also been quite dependent on the city of Tampere for their financial means. In the first years of Hermia, the city of Tampere owned all land and premises of the Hermia business and science park and it allowed the Hermia organization to rent these to interested companies to generate income (Jussila, 2009). This granted Hermia a solid yearly rental income that was increasing as the Hermia business and science park established an increasingly good reputation.

However, when the Hermia organization was split-up in 2002, the city of Tampere decided to privatize most of their property at Hermia and the premises were sold to private parties (they are now owned by Technopolis). The Hermia organization lost its main source of income and this loss was not solved by the city of Tampere. The Hermia organization therefore lost its only structural source of income and the need to profit from their projects was created (Kolehmainen, 2009; Jussila, 2009). This was attempted by offering project coordination and consultancy services and by receiving payment for projects they managed or were involved in (Räsänen, 2009). These were mainly public projects in the 'innovation space' initiated or supported by the European Union, the Finnish national government (like OSKE) and the

regional government (both the regional council and the city of Tampere). Unfortunately, these projects proved to be inadequate to cover all organizational costs and the organization had financial shortages on a number of occasions (Kankaala, 2009). Losses were covered with the financial reserves of the organization and financial support by the city of Tampere.

Hermia then designed and established a system to generate a structural yearly income. The companies that are involved in Hermia's projects are able to buy themselves a membership to Hermia which will grant them access to the 'innovation network' of Hermia and allows them to take part in Hermia projects and use the network and connections of the organization. At this time, approximately 500 companies are part of Hermia's 'innovation network'. The yearly fee for companies is based on the services that Hermia provides and ranges from a few hundred euro's till several thousand euro's (Räsänen, 2009). For services which are not included in the 'membership deal', companies pay an extra fee. This means that the only structural funds that Hermia is receiving are coming from the industrial helix, although the university helix and the governmental helix are the main shareholders of the organization. However, even with the addition of this new construct, Hermia was still not able to work without financial losses.

For the city, this proved to be an additional reason to urge the merger with Tamlink (Kankaala, 2009). The city council did not believe that these two, quite similar, organizations could co-exist with both of them being profitable. Tamlink has a better financial record though, its activities in tech-transfer projects have enabled the organization to cover its costs in the past years. The revenue-creating activities of the new Hermia were described as the combination of the activities of both the old organizations: membership fees of the 'Hermia innovation network', project coordination for companies, groups of companies, the technical university and for governmental partners. However, the financial prospect of the new public company was often described to be "challenging", representatives of the different helices were not all too sure about the profitability of the new organization. Also, interviewees believed that the constant search for funding makes the organization more focused on survival than on their regional development goals (Jussila, 2009; Kolehmainen, 2009). When looking back, the Tamlink organization was always kept small on purpose. They were convinced that the only way that they could remain profitable would be if they would keep down the personnel expenses. Hermia had a lot more personnel and was loss-making and the influence of that on the new organization made interviewees worried about the future of the new Hermia organization.

On a projects base, Hermia seeks to involve parties from all helices to invest in projects they might have an interest in. Over the past years, an average of about 75% of the projects finances originated from public partners and the remaining 25% comes from private actors (Räsänen, 2009; Miettinen, 2009). The public investments are originating from the university helix and the governmental helix but the universities are investing a limited amount themselves. The universities are mostly passing on governmental money to the Hermia projects. The governmental helix is responsible for most of the public funding and this funding is provided by Tampere's regional government (the city and the regional council), the Finnish national government and European programs.

In respect to the Etzkowitz' Triple Helix model, this leads to an overview where only the industrial helix is structurally contributing to the Hermia organization. Both the university helix and the governmental helix are represented at the project-level but they do not invest in the organization itself and are also not investing on a structured basis. When looking at the project funding, close to 75% of the investments are governmental helix investments with very small financial role for the university and industrial partners

offering the remaining 25% of the project funds.



Figure 19: The financial investments in Hermia and its projects in a Triple Helix perspective. Structural financial contributors to the organization are represented by helices, a limitation to project financing is represented by a line connected to the black Hermia helix.

7.2 The Hermia PPP-construct as perceived by the involved actors

7.2.1 Introduction

The new Hermia is still seen by many interviewees as an organization dominated by the city of Tampere. This is a result of the fact that the old Hermia organization was clearly a tool of the city of Tampere although the city owns only 25% of the shares of the new Hermia. When assessing the PPP-construct as perceived by the involved actors, this often resulted in interviewees giving their opinion about the role of the city of Tampere in innovation efforts with Hermia as one of the results. It is notable that, during the interviews, many representatives had no precise knowledge about the formal structure of Hermia. When regarding the financial structure, even employees of Hermia made conflicting statements about the availability of structural funding for the organization. The constitution of the shareholders, the board of directors and the role of the three different helices in the organization were also quite unknown. Very often, referring to the names of key persons of the three different helices made the interviews easier to understand for the representatives. There are two main explanations for this observation.

A first characteristic of Tampere's innovation space is that it is highly fragmented. Next to the new Hermia organization there a number of other companies who offer the same, or similar, activities which makes the organization not the only one that is linked to the Hermia business and science park. There is the tendency in Tampere to organize everything into different organizations and those organizations often merge, split or change in other ways. An example of this is the split up of the Hermia organization in 2002 where the three different business units were changed into three different organizations while recently the organization has been merged again with another organization. In fact, only one of the three organizations of 2003 still exists. Also, when looking at Hermia's projects, all major and successful projects seem to end up as a new organization, often lead by people that are also in the board of some of the other organizations. Only at the Hermia business and science park itself, there are over five organizations who are involved in business development projects. This diversity is sometimes overwhelming and confusing, even for the Finns themselves (Kautonen, 2009; Kankaala, 2009).

Secondly, the workforce in Tampere appeared to be highly mobile. Several of the interviewees have been active in a high number of functions at different organizations. An example of this was Kari Kankaala,

currently responsible for the Hermia organization at the municipality of Tampere. He was in the board of no less than eight different tech-transfer companies and also worked for the university before becoming a manager of the city of Tampere, he was therefore active in all three helices concerning the same sort of organizations and activities. The high mobility of the workforce also creates extensive personal networks which was exemplified by Mika Kautonen who happened to know all the other interviewees personally. As one of the interviewees claimed: *"Tampere is still of the size where these strong personal connections often determine the cooperation's"*. This explains why interviewees often knew more about some key persons of the organizations than about the organizations themselves, the key persons often have, or had, an active career in different organizations.

7.2.2 The university helix

The technical university of Tampere is the majority shareholder in the Hermia organization. However, most of the interviewed involved actors do not yet see it as the major player in Hermia. This is connected to the fact that the formal organization and the constitution of the shareholders is not well known and to the very recent nature of the merger. Instead, the city of Tampere is still often regarded as the main player within the Hermia organization. It is also notable that the new mission of Hermia (which is still under review) does not hint at a major role for either one of the helices, it is formulated quite neutrally. The financial role of the university helix limited. It provides no structural funds for the Hermia organization and it also plays a very limited role at the project-level. This results in a situation where the technical university is the majority shareholder but the organization is highly dependent on the two other helices for the financial contributions.

Most involved actors are, however, positive about the new role of the university in the Hermia organization, *"it makes sense that the university will have a larger role in Hermia"* (Rasila, 2009). The former organizational structure, where the governmental helix held almost all formal power, was seen as inefficient and the interviewees hope that the organization will change because of the new constitution of shareholders. These positive expectations were also backed by the fact that Tamlink, the former university tech-transfer company, was profitable over the past few years. Representatives of the other helices and the employees of Hermia are therefore hoping that the new Hermia organization will be equally successful. The involved actors are also content that the CEO of the new Hermia will be the rector of the technical university, as the majority shareholder, sees an important role for Hermia. As the CEO of Hermia declared: *"it is very important for us that we have a know-how transfer company at our disposal, which is able to be a nationally known and internationally credible actor in our areas of strength"* (Kivikoski, 2009).

The universities reasons for becoming the leading actor in Hermia are perceived to be diverse. The interviewees indicated that the university believes that the new merged organization will be able to greatly benefit the universities knowledge valorization efforts. A second reason that was often heard is that it is a result of a change in the Finnish university laws. These laws, which were passed in 2009, dictate that it is one of the objectives of universities to aid the (regional) development of the Finnish society. The benefits for the Tampere region were considered by some interviewees to be the main reason for the university to be in the lead in the new Hermia organization (Kankaala, 2009; Räsänen, 2009) . The technical university of Tampere regards Hermia as a tool to exemplify the fact that they are complying with this new university objective.

The insignificant role of the social studies university of Tampere (UTA) is, by most interviewees, regarded as inevitable. The representative of the city of Tampere indicated that the new Hermia will seek to involve the UTA more but this was not confirmed by other interviewees. The fact that the research fields of UTA are only rarely connected to the ICT cluster and the fact that the technical university is now the majority shareholder of Hermia were mentioned as the main reasons for this skepticism.

7.2.3 The governmental helix

The role of the regional government in the innovation helix has always been a very strong one in Tampere, as is often the case in Finland (Arnold et al., 2003). For the past decades, the governmental helix has dominated the Hermia organization by holding 97% of the shares of the organization. Consequently, the board of directors of Hermia was also determined by the city of Tampere. This strong formal position for the governmental helix resulted in the conclusion that Hermia was a tool of the city to promote the Hermia business and science park (Mattila-Nurmi, 2009; Nokia, 2009). The representative of the city of Tampere was quite clear about their goal with the organization: *'from the city point of view, the whole idea was to make this region more attractive, for people and for companies.'* (Kankaala, 2009).

However, in recent years, the position of the city of Tampere has changed. As the connections between the technical university of Tampere and industrial partners are now considered to be even better developed, the city no longer feels the necessity to be the leading actor in Tampere's innovation space. This slow retreat is also visible when looking at the new Hermia organization. If the merger would have been a 'standard' merger, the city of Tampere would have become the majority shareholder since it held 25% of the shares in the old Tamlink and 97% of the shares in the old Hermia. The city representative however stated that 'having a city in the driver seat of a tech-transfer [public] company is totally nonsense, you should have the university there and the city only as a facilitator and provider' (Kankaala, 2009). Compared to the very active role in the Hermia organization in the past two decades, Tampere now sees itself more as a public investment fund in promising projects than as an actor active in the structure of the projects or active in the involved organizations. Looking at Hermia, the city of Tampere proved to be determined to decrease the formal influence of the governmental helix and emphasized their preference for the university helix to take over their role as the leading actor. The city is, however, willing to invest in regional development projects with Demola as one of the examples. The city does require the projects to reach a revenue that is at least a tenfold of what the city is investing in it to name it a success (Kankaala, 2009). These projects can be managed both by Hermia or another external organization although "Hermia enjoys a preference" (Kankaala, 2009).

However, many of the interviewees have not adapted yet to the new situation and still regard the city of Tampere as the main actor in Hermia. Although this is not correct when looking at the shareholder constitution, the fact that about 75% of Hermia's project funds originate from the governmental helix (Räsänen, 2009) plays a major role in this. Since Hermia establishes and coordinates these projects on a on-demand basis, the major investments by the city of Tampere give them a strong and very visible position within the organization. When looking at the change of the formal position of the city, representatives of the university helix seemed to have mixed feelings. The technical university of Tampere appeared to be glad with its strong position in the new Hermia but is also concerned about the declining involvement of the city in regional innovation efforts. Also, since the profitability of the new organization is questionable, the technical university is now the main responsible actor to address this issue which might also force them to cover for losses. Some interviewees expressed their surprise about this since the new Hermia has both a tech-transfer and a regional development function and a number of interviewees

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were of the opinion that the city should take the losses for granted when it benefits the regional development of Tampere.

The other regional governmental helix actor, the council of the Tampere region, never had more than a financial link to Hermia. The representatives of the three different helices did not see any use for their inclusion either. The council is the governmental organization that controls the budgets for the regional Cluster Development Programme (OSKE) for the Tampere region. The regional council has been involved with Hermia as the OSKE-program is managed by Hermia. Except for this role as a public financial investor and the channeling of the national public investment funds, the council has no role for the Hermia organization and also expressed no desire to be more active in the organization. The current involvement, only at times and at a project base, was not criticized by representatives of the other helices. Most interviewees did not see any benefits in including the regional council in the formal organization because the role and the own resources of the council are limited. It functions more as an office of the national government than as a leading regional organization (Mattila-Nurmi, 2009).

7.2.4 The industrial helix

The industrial helix did not have a formal position in the old Hermia organization and also does not have one in the new Hermia organization. When looking at the structural financial investments, the position of the industrial helix is very interesting. The industrial partners are the only structural providers of funds for Hermia although they have no formal position within the organization. This means that the university and the governmental helices are in charge but the industrial helix is providing the financial means. It is surprising to see that the companies that invest in Hermia do not pursue any formal power where a representation of Hermia's 'innovation network' would make sense. That way, they would be able to influence the organization and Hermia's projects. The 'innovation network' membership proved to be not very well known outside the Hermia organization. Not one interviewee, the Hermia employees excluded, knew that Hermia has a structural source of income next to the design and management of projects. The industrial helix was also rarely recognized to have an impact on the organization itself although the commitment to the Hermia's projects was widely acknowledged.

The university helix and the governmental helix were not that interested in a formal position for industrial partners in the new Hermia. The current shareholder constitution, without industrial partners, was seen as a better construction than the old Hermia but the inclusion of the industrial helix was not considered at the time of the merger. As mentioned before, the current shareholders (representatives of the university and governmental helices) expressed the concern that the inclusion of industrial partners might harm the neutral position of the organization which may lead to a smaller number of interested companies. Since Hermia's 'innovation network' member ship fee is Hermia's only structural source of income, this is a subject to handle with caution. Hermia's 'innovation network' also provides them with a steady pool of companies to take part in the projects. This membership construct brings Hermia both a structural source of income and a way to strengthen their relationship with the member companies.

Some employees of Hermia would, however, see the benefits of including, for example, Nokia. As one of the managers declared: "doors are always opening when I say that I am representing the Nokia ICT cluster" (Miettinen, 2009) and he would be happy to have Nokia as a shareholder in Hermia. Nokia is involved in many of the Hermia projects but it appears to be simply not interested in the organization itself. As a Nokia representative declared rather bluntly: "we don't need Hermia to get what we want". Nokia is such an important player for the Tampere region that local requirements of Nokia concerning the technical university or the city of Tampere are directly discussed with their representatives at a very high

level. Nokia also attracts other companies to Hermia, mainly partners and suppliers who want to settle in the vicinity of Nokia. Nokia is therefore a very important actor for Hermia and the Tampere region. The industrial helix, or in fact Nokia, therefore seems to have a very strong influence on the Hermia business and science park but it does not require a formal position in the Hermia organization to use this influence. Other regional industries like the mechanical engineering company Tamrock were said to be not interested and the spinoff companies at Hermia are in general too small to benefit from anything more than participation in specific projects of Hermia (Rassila, 2009). These companies are also not organized in any sort of an association which makes the representation of these smaller companies difficult. In the end, the response of the employees of the Hermia organization itself were mixed ("*Nokia is opening doors*" vs. *"losing the neutral position"*) and none of the three helices seemed to be interested to include industrial partners, including the industrial helix itself.

7.2.5 Conflicts

The emerge of certain conflicts mainly depends on what the city of Tampere and the technical university, as the two most committed parties, are expecting from Hermia. The cities highest goal with Hermia is the stimulation of the regional development of Tampere. The technical university is mainly interested in marketing its technologies and products. The new mission of Hermia, which is still under construction, is formulated in a way that allows both views. The city of Tampere is convinced that the interest of the city council and the interest of the technical university do not differ that much on the operational level (Kankaala, 2009). Since the old Hermia organization was dominated by the city of Tampere, conflicts with the other shareholders within the organization were very rare. The new Hermia construct seems to be too recent to produce any significant tension points.

As a result of the recent merger, there did appear to be a conflict about the organization structure itself. The city of Tampere currently holds one seat in Hermia's board of directors but their 25% of shares entitles them to have a second seat in the board. The board would then increase from six to seven members. However, the technical university is reluctant to accept this because the university currently holds three of the six seats in the board. This enables them to block decisions by preventing a majority in a voting. At the time of my research, both actors were still trying to get this problem solved but it was clear that this issue raised some tensions between the technical university and the city of Tampere.

7.2.6 Conclusions

The former Hermia organization was dominated by the city of Tampere and it was seen by many as a innovation tool of the city of Tampere. Although the shareholder constitution has changed, many interviewees still have a similar image of the Hermia organization. There is a difference between the formal structure of the new Hermia organization and the division of power as perceived by the involved actors. This is, however, dependent on the knowledge of the specific interviewees. Representative with more specific knowledge about Hermia know about the new situation and see the technical university as the new main actor but people without specific knowledge still see the city of Tampere as the most important actor. What contributes is the fact that the governmental helix still plays the major role at the project level. Approximately 75% of the investments in projects are provided by governmental actors and the city of Tampere is the most visible to the public, often also directing funding originating from the national level. This means that, although the city is no longer formally in control, it still has a tight grip on the projects. The technical university might have the majority of shares of Hermia but it needs the financial support of the governmental helix for its projects.

All interviewees were, however, aware of the fact that the technical university of Tampere also plays an important role in Hermia. The interviewees focused on the technical university because most of them know that the social studies university of Tampere has a very limited role in Hermia. The formal influence of the technical university is considerable. Next to the majority in shares, the university also holds three of the six seats in the board of directors. The fact that the CEO of Hermia is also the rector of the university indicates that the university regards Hermia as an important organization. Considering the investments in Hermia, the university helix is only a minor player. The technical university does not offer any structural funds to the Hermia organization and even investments at the project level are rare.

When picturing the Hermia organization in the Triple Helix perspective, the involved actor perceive the governmental helix the most influential, despite both the majority in shares by the university helix and holding three of the six seats in the board of directors. This can be explained by the situation in the former Hermia organization and the large role of the governmental helix as an investor in Hermia projects. The technical university is also recognized to be actively involved in Hermia, especially by interviewees who had a good understanding of the effects of the merger on the formal organization. The university is often named as the city's most important partner at Hermia which makes, of course, sense because the universities knowledge and technologies are required for the business and science park activities. The overall view that was presented by the interviewees was that of an active city of Tampere which tried to transfer its role in some of its innovation activities to the technical university. The industrial helix is not represented in the formal organization and the interviewees regard the industrial partners as connected at the project level but not active in the organization is mainly unknown by representatives of all helices.



Figure 20: The influence of the helices as perceived by the involved actors

In general, the new constitution of shareholders was met with agreement by all the three helices. The city of Tampere, as part of the governmental helix, is happy to take a step back. The city has budget issues and is trying to lose some activities that it does not regard to be its core business. The university helix seemed enthusiastic about the possibilities of the new organization and is able to use the organization to comply with renewed national university policies and the industrial helix seemed to have no desire to be included in the formal organization. When comparing the old Hermia to the new Hermia, the serious involvement of both the city of Tampere and the technical university might bring these two actors closer together. In fact, both the city of Tampere and the technical university are hoping and expecting this (Kankaala, 2009; Sotarauta, 2009; Pessa, 2009).

7.3 The public-private partnership construct of the Kennispark organization

7.3.1 A short history of Kennispark Twente

The business and science park (BSP) of Twente was founded in its original form in 1989 (Schaffer, 2001; Benneworth, Hospers, 2006) and is located directly next to the University of Twente. The park started as an extension for the services of the Business Technology Center (BTC), already located in the same area. The BTC was founded in 1982 to function as an incubator for spinoff companies of the University of Twente. As the spinoff companies at the BTC started to outgrow the original BTC premises, the municipality of Enschede, the University of Twente and the organization for the development of Overijssel (OOM) (De Koning, 2009) decided to develop the unused land around the BTC premises as a business and science park (the land was, and still is, owned by the city of Enschede). The University of Twente was very interested in the valorization of, in particular, their technological knowledge (Welman, 2009), the city of Enschede was interested in the creation of new jobs (Op de Hoek, 2009) and OOM was interested in the establishment of new companies in Twente (Bril, 2009). The province of Overijssel supported OOM and emphasized the establishment of new companies but was mainly active as investor (idem).

The newly developed 40ha location allowed both high-tech spinoffs and existing commercial enterprises to settle at the park (Welman, 2009). A BSP foundation was established and the board of advisory included representatives of the city of Enschede, the University of Twente and OOM. The mission of the original business and science park was to recruit new companies for the Twente region (Schaffer, 2001) but later on, the focus was narrowed down to a preference for more knowledge intensive companies (Bril, 2009). At the turn of the millennium, it became apparent that the number of high-tech companies on the BSP was not rising but in decline. As the 'internet bubble' was bursting, important high-tech companies (Logica CMG and Ericsson) decided to end their R&D activities in Twente in 2002 (Hulsink, Bouman, Elfing, 2007) and the available location sites at the BSP became dominated by low-tech 'normal' enterprises. In May 2000, only 40.6% of the companies at the BSP could be marked as part of the 'knowledge intensive sector' (Schaffer, 2001).

This lead the University of Twente and the municipality of Enschede to believe that it was time for a different approach. As a first step, the city of Enschede agreed to the university request of extending the BSP premises to a total of 120ha (Benneworth, Hospers, 2006) and in 2004, the municipality of Enschede (which also represented the other cities in Twente organized in 'Twente Netwerkstad'), the University of Twente and the province of 'Overijssel' agreed upon the establishment of Twente's 'Kennispark' (Knowledgepark). The concept of Kennispark was both rooted in the highly-regarded entrepreneurial experiences of the University of Twente and examples in other cities, most notable Leuven (Belgium) (Eijkel, 2009). Kennispark became the name for both the physical 120ha area and the additional organization that was subsequently founded. The Kennispark foundation also replaced the former BSP foundation which still exists but only as a dormant legal form (De Koning, 2009) and the University of Twente and the city of Enschede have withdrawn from the former BSP foundation (idem). At this time, the physical Kennispark consists of a wide variety of established companies, newly found spinoffs and also leisure (a large football stadium is also located in the Kennispark area).

The intentions for the different actors remained more or less the same as with the original BSP. The city of Enschede pursued the creation of jobs, the province of Overijssel was interested in both jobs and industrial improvements and the University of Twente was focused on knowledge valorization. It is, however, important to note that during the interviews, every helix was aware of the different reasons of the other

helices to take interest in Kennispark. Some interviewees also pointed out that the university helix, besides knowledge valorization, also has a secondary interest in both the creation of new companies and jobs. This is because of the potential of cost-sharing (Welman, 2009) and the fact that research institutes are interested in *'having small companies around them to cooperate with'* (Bante, 2009).

7.3.2 Mission of Kennispark

The mission of the Kennispark foundation, as stated in the foundations statutory, is 'to promote the development of the region Twente into a high-quality technological crossroad within Europe' (Eijkel, Welman, 2007). For the period between 2005 and 2015 (De Koning, 2009), Kennispark has set the goal to create 10.000 jobs for the Twente region by means of knowledge transfers, spinoff incubation and attracting external high-tech companies to establish themselves in Twente (Eijkel, 2009).

Kennispark does not claim to be one-on-one accountable for the created jobs but it tries to create a system and an environment that will facilitate the creation of new jobs. Its purpose is to create a system based on *'coordination, complementation and communication'* (Welman, 2009), consisting of:

- The Kennispark area (the physical location of the B&S park)
- 'Hardware' and 'Software' (for example: the availability of workspace and funding for startups)
- Environmental dynamics (stimulating an entrepreneurial culture, stimulating entrepreneurial university programs, training and guidance)

In the long-term, it was mentioned that the possible success of Kennispark could actually make the organization itself obsolete. The function as a builder of bridges between knowledge (the university helix) and companies (the industrial helix) would hopefully result in such good results that Kennispark is no longer required to function as an intermediate, based on the idea that scientists will consider the industrial interests themselves and that industries will be able to find the right research sources at the university. This would also remove the need for the governmental helix to contribute (Bril, 2009). Both the governmental organizations (the city of Enschede and the province of Overijssel) emphasized that they would like to see Kennispark as a first step, becoming obsolete after the accomplishment of a certain number of successful industry and university cooperation's. Another option, mentioned by the representative of the city of Enschede, would be that Kennispark would continue as a commercial organization that is able to support itself financially (Op de Hoek, 2009).

7.3.3 The legal form and formal organization

Kennispark has a very peculiar formal organization scheme. The legal form of Kennispark is a foundation ('stichting' in Dutch) but with a number of special constructs. This is caused by the fact that Dutch universities are not legally allowed to take part in commercial activities (Hulsink, Manuel, 2004). Also, the province of Overijssel was not able to take a formal place in a foundation. As an interviewee explained: "*a public officer is not allowed to take responsibility in another legal organization when the goals of this organization are overlapping with his public office goals*" (Welman, 2009). To avoid these problems, the initiators decided to place their legal position outside the foundation Kennispark. Statutory, the initiators (Enschede, Overijssel and the University of Twente) have no influence on the foundation but they are allowed to appoint the members of the Kennispark steering group which consists of three members. This steering group has no statutory power either but their role is anchored in the foundations regulation decisions of a certain importance must be discussed with the steering group before action can be taken. The steering group meets also regularly to discuss the progress of Kennispark in achieving its
goals (Eijkel, Welman, 2009). At the moment, the steering group consists of three different persons, all three representatives of the initiators of Kennispark which leads to the conclusion that the formal decision power is evenly divided between the municipality of Enschede, the province of Overijssel and the University of Twente.

The 'Kennispark' foundation itself is lead by a board, including a director, and has total of ten employees. This board is responsible for the everyday control of the foundation, for example human resources and supervising the projects within the foundation. This board of the foundation is appointed by a board of supervisors. It is the task of the board of supervisors to watch over the 'realization of the foundations mission'. This board consists of three regional experts with no specific need for a connection with one of the three initiators but with a strong informal tie to the steering group nonetheless. However, of the current supervisory board, one member is a university representative and one member is a representative of the municipality of Enschede. The third member is the director of a company that is located at the 'Kennispark' terrain.



Figure 21: the organizational structure of Kennispark Twente

As shown by the organizational scheme, all initiators are represented within Kennispark although in an indirect way. In respect to the Triple Helix model helices of Etzkowitz (2002), the first thing to notice is the total absence of representatives of the industry helix. When a representative of the industrial helix was asked about the formal role of the industry in Kennispark, the answer was plain and simple: "*there is none*" (De Koning, 2009). During the interviews, several actors voiced the opinion that a formal position for a representative of the industry might prove beneficial for the cooperation with businesses within the Kennispark. However, the main obstacle here proved to be the fact that the current formal partners are also the investors in Kennispark and industrial partners were not willing to invest in Kennispark at the start of the organization. An additional reason might be the experience that it is often harder for the industrial helix to form a concentrated organization because of the plurality of stakeholders. According to Etzkowitz

(2002), the industrial helix at a business and science park can be seen as the combination of spinoff companies and existing industries. This differences between these two groups, and the additional fact that the industrial helix often consists of numerous different companies, makes it harder to provide for a well organized industrial organization that is fit to be a partner within an organization like Kennispark. However, Twente's industries have a history of being well organized, partly as a heritage of the high-days of the (textile) industry and a relatively large number of associations are still present today. Twente's industrialists formed employers' associations as early as 1899 and the most significant of those has become the largest nationwide employers' association of The Netherlands today (VNO-NCW) (Benneworth, Hospers, 2007). Well organized industrial cooperation is also available at the local level. The companies located at the BSP united themselves in 1996 (OVBSP, 2009) in an entrepreneurial association which is still active at Kennispark today. This association was also named as a suitable partner by several interviewees. Therefore, it feels somewhat strange that the industrial helix is not currently represented in the Kennispark foundation. Questions about this subject in the interviews lead to the response that the industries wanted to wait and see what Kennispark would bring. However, interviewees of all helices concurred that the current cooperation with industry on project-base produced good results. As one of the interviewees put it: 'the organization is formed by public partners (the university, the province of Overijssel and the municipality of Enschede) and the projects of Kennispark are often partnerships between these public actors and interested industrials' (Welman, 2009). If either the regional or local industries are willing to come up with the required investments to enter the foundation remains to be seen.

However, not every actor proved to be a fan of *'mingling public and private interests'* (Bril, 2009) in the Kennispark organization. The interviews also revealed a different view on the potential formal role of the industry helix within Kennispark. Several interviewees declared that the absence of industries within Kennispark was an intentional choice with benefits for the regional development of Twente. This is caused by the fact that the inclusion of one or more industries within the Kennispark organization would lead to the loss of the 'neutral position' of Kennispark when acquiring industrial partners to back Kennispark projects. The inclusion of certain industries, most notably Royal Ten Cate or Thales, would lead other industries to be *'suspicious about the intentions of Kennispark, because all industries would try to accomplish their own goals within the organization and that might scare away other interested companies'* (Eijkel, 2009). Although this seems like a sensible argument, it would not explain why more



Figure 22: The formal division of power at Kennispark in a Triple Helix perspective

general bodies of industries could not be included, functioning like a neutral representative of the (involved) regional industries. A possible example of this might be an officer of Twente's chamber of commerce, a representative of the regional employers organization or the entrepreneurial association of the business and science park. The formal absence of the industrial helix also results in the fact that

Kennispark is not considered to be a commercial organization, since it is involves only public partners and foundation are legally prohibited to pursue profits. As the director of Kennispark noted: *'Kennispark is more of a regional development organization than a commercial organization'* (Eijkel, 2009).

The formal division of power, as depicted in figure 18, leads to the detachment of the industry helix. Industrial partners are still connected to Kennispark but the cooperation is only project-based. As a result of the absence of industry as a full partner, the industrial helix stands somewhat isolated from the other helices. Also, since there are two governmental organizations (municipality and province) present in Kennispark with equal power in the steering group, the size of the governmental helix is twice the size of the university helix. The governmental and university helices are also strongly overlapping because the university and government representatives work together intensively in both the steering group and the board of supervisors.

It is important to note that, with important issues or decisions, the three involved parties all have to get the approval of their specific organizations. An example of a recent major decision was the regional 'Master plan' that, among others, included the plans for the expansion of the Kennispark premises and a change in the local infrastructure. This master plan needed to be approved by the representative bodies of the involved organizations: the university council approved it, the Enschede city council approved it and council of the province of Overijssel did the same (Op de Hoek, 2009). It indicates that, although the three organizations are represented in Kennispark at a high level, they are nonetheless required to seek the approval of the organization they are representing.

The Kennispark foundation also holds strong formal ties with several other organizations. One of the most important of this organizations is "Innovationlab". The University of Twente has placed a number of its entrepreneurial activities and supportive programs within this separate legal form. Patenting policies, contracting support, general entrepreneurial support, the universities 'scienceshop' and most of the universities communication concerning knowledge valorization are part of the activities of Innovationlab (Eijkel, Welman, 2009). Since the official establishment of Kennispark, Innovationlab and Kennispark have shared the same director. The director is also responsible for streamlining the cooperation between Kennispark and Innovationlab. Also, because of the before mentioned legislation preventing universities to start commercial activities, the University of Twente has established a separate legal body: the 'Holding Technopolis Twente' (HTT). HTT is used by both the University of Twente and the Kennispark foundation to house commercial activities and interests. With spinoff companies, a percentage of shares of the companies is owned by HTT and direct investments into spinoff companies are also legally provided by HTT.

7.3.4 Financial investments

Kennispark currently relies on a number of different sources of income. These sources of income can also be divided in continuing or structural investments and incidental or project investments. Kennispark is currently depending on the following three main sources of income: (Eijkel, Welman, 2008):

- The University of Twente grants Kennispark a yearly fee of €500k. This fee is meant to cover the organizational costs of Kennispark, including the board , policy development, cooperation with university research institutes, legal costs, contracting support, patenting, student entrepreneurship, the 'Scienceshop' at the UT and (partially) secretarial costs. Besides Kennispark, the university also invests internally in research on knowledge valorization and entrepreneurship and the Holding Technopolis Twente (HTT).

- The initiators of Kennispark (municipality, province and university) provide Kennispark with a temporary support of €600k per year. This amount is provided for equally by the three stakeholders and is meant for the board and for the total Kennispark program with a focus on regional development and communication & acquisition.
- A broad spectrum of other incidental subsidiary programs that support the goals of Kennispark.

As a result, the total current structural income for Kennispark is €1.1m per year. Only a part of the Kennispark program can be funded with this which pressures the foundation to find other sources of income (Eijkel, 2009). This is often done by cooperation with other parties like industrial partners or local, regional, national or European government grants, often project-based. The investments in these Kennispark projects differ for every project based on the interests of the three helices in the specific project. Projects based on regional development are often heavily backed by the city of Enschede and academic projects like the TOP-program are heavily supported by the University of Twente (Op de Hoek, 2009). The €600k yearly support (the second main source) for Kennispark is the result of a cooperation between the university and the governmental helix and therefore these helices are somewhat overlapping.



Figure 23: The financial investments in Kennispark and its projects in a Triple Helix perspective. Structural financial contributors to the organization are represented by helices, a limitation to project financing is represented by a line connected to the black Kennispark helix

When looking at the separate helices, the University of Twente provides \in 700k and the governmental helix provides for \in 400k of the structural budget of Kennispark, resulting in a larger university helix. As mentioned before, the industry has not been (financially) active within Kennispark itself. However, companies within the industrial helix do support several of Kennispark's projects and aside from Kennispark a number of cooperation's with the local and regional government as well as the University of Twente. As one of the interviewees put it: "when it comes to projects, all of the sudden they are willing to invest" (Eijkel, 2009). When the issue was raised in an interview with a representative of the industrial helix, the reason appeared to be that companies are more willing to invest in projects with a clear goal that they can relate to than the more 'vague' investment in organizations. Next, the region also lacks companies with a long term strategy for Kennispark.

Industrial partners are not the only actors investing in Kennispark projects. The parties involved in the Kennispark organization (university, Enschede and Overijssel) also invest in a number of projects. The function of Kennispark here is that of a networking organization to bring these actors together in order to achieve the ultimate goals of the Kennispark itself: the development of the Twente region. Kennispark forms the arena where the three public actors can streamline their activities in the same area of interest. It has been described as a process in which "*three public partners are needed to hold each other's hands for a long time to make it a success*" (Eijkel, 2009). A threat to this process is, however, the fact that both city

and province officials are reelected every four years. It is therefore very important to sign both long lasting contracts and to keep the 'spirit' of Kennispark alive within the involved helices.

Kennispark and the University of Twente also protect their own investments in, for example, spinoff companies. This is a result of an incident in the past, concerning a successful university spinoff company that was bought out by a large external company without any returns for Kennispark or the University of Twente. Kennispark and the University of Twente use a shared legal organization to secure their interests: the Holding Technopolis Twente (HTT) because, as mentioned before, Dutch universities are not allowed to take part in commercial activities. Second, universities are also not allowed to let commercial parties use their patents for free (because of EU competitive market legislation). Most of the (technical) spinoff companies at Kennispark use a number of university patents but since most of them are still small, they are not able to directly pay for the use of it. The HTT organization therefore receives a certain percentage of shares in the spinoff companies, securing both the University and Kennispark investments and the financial cover for the use of the university patents. The percentage of shares differs, mostly depending on the number and type of patents that are used. With a high usage, the HTT holds a share percentage generally between 33-50% and with a low usage, it could be as low as 5% (Welman, 2009).

7.4 The Kennispark PPP-construct as perceived by the involved actors

7.4.1 Introduction

As mentioned in the theoretical framework (chapter 4.3), there is no normative prescription for the cooperation between the helices (Etzkowitz, 2005). Different constructions might lead to success in different settings. In contrast, a network organization, such as Kennispark, would benefit the most from a network that is as interwoven as possible because the functioning of Kennispark is mainly depending on the ability to get the three helices to work together. The ideal location for Kennispark is to be the 'spider in this web'.

A clear viewpoint, expressed by members of every helix, is that Kennispark cannot be seen separate from the goals of the individual helices that are represented in it. In short, the university wants 'Nobel prizes' and both the organizations representing the governmental helix want jobs for the Twente region. The city of Enschede is also interested in creating an appealing city area and the possible foundation of the 'successors of Twente's industrial age' by forming regional clusters at Kennispark. The university is prepared to help the development of the Twente region, but only as a second goal next to the academic performance, because it is clear that it will benefit the university as well. The creation of, for example, spinoff companies offers both knowledge valorization and cost-sharing (for example the nano-labs) opportunities for the university and jobs for the region of Twente and these kind of shared interests of the governmental actors and the university seem to form the basic foundation of Kennispark.

The extraordinary legal construction of Kennispark was hardly criticized but often praised by interviewees. The organization form with a relatively low number of involved persons representing the most important parties was named multiple times as an efficient small organization. The indirect connection between the initiators (also the financiers) and the Kennispark foundation has been mentioned several times as a good performance push for the foundation. This is because of the fact that the Kennispark foundation feels that it has to earn the policy and financial involvement of the steering group actors (city of Enschede, province of Overijssel and University of Twente) since it is a separate body and not a part of the organization to be counted on under any circumstances. However, it does include the risk

of the opposite: when the steering group or certain members of the steering group would decide to change their focus or would simply lose interest, the Kennispark foundation could be easily abandoned. Keeping the steering group happy and actively involved in the Kennispark activities is therefore a continuous challenge for the Kennispark foundation.

The interviewees were also asked about the quality and quantity of the connections between the helices. The cooperation between the different parties depended mainly on the subject; the university discusses regional development issues with the city of Enschede while innovation policy issues are usually discussed with the province of Overijssel. In quantitative measures, the later subject proved more dominant than the first. However, although perhaps unsurprisingly all interviewees emphasized the equality of the cooperation within the organization, the university was often named the central actor within Kennispark.

7.4.2 The university helix

The fact that the University of Twente is named as the primary initiator and the most influential partner within Kennispark seems reasonable when looking at the formal and financial involvement of the university and considering its important role in both. The fact that the university is also the most constant actor within Kennispark, as a result of the democratic nature of both the city of Enschede and the province of Overijssel, also strengthens its position. Representatives from Kennispark itself, the governmental helix and also the industrial helix confirmed the image of the university playing a leading role in Kennispark.

However, the fact that the university is credited to play the main role in Kennispark appears to be a bit of a surprise when looked upon the main goal of Kennispark until 2015: the generation of jobs for the region. As one interviewees stated: *"you cannot ask the university to pursue jobs as its highest goal"* (Welman, 2009). The apparently large influence of the governmental helix on the determination of this goal can be explained by the strong position of this helix outside the formal Kennispark organization. First, the land on which Kennispark is located is owned by the municipality of Enschede, providing them with a very influential say in Kennispark's decision making. Second, although the University of Twente may contribute the most to fund the Kennispark organization, a large number of additional investments and governmental involvement is required to fund the Kennispark projects. These projects are, at times, depending both on regional development plans of the city of Enschede and their ability to financially support these plans or projects.

An example of this is the current realization of the expansion of Kennispark's premises at the campus of the University of Twente and the combined traffic restructuring plan. Although the expansion might be achieved without the help of the city of Enschede, Kennispark still needs the city council to both adjust the traffic policies and to (partially) fund the construction changes it requires. The city of Enschede, in return, needs the academic knowledge of the university to establish high-tech companies or clusters within new Kennispark premises (the new premises are actually owned by the university too). This is exemplary for the highly interdependent relationships between the university and the city of Enschede when it comes to Kennispark, both within the organization itself and the projects it is supervising.

However, the connection of the university with Kennispark and the other helices cannot be seen as just the connection of one institution with another institution. It appeared that, for example, the different research institutes were quite able to connect with Kennispark and are able to benefit from this connection and the university board was also properly involved (Eijkel, 2009). Contrary, the university faculties were generally blamed not to have any clue about what is going on at Kennispark. Research institutes were also

claimed to be able to make considerable use of Kennispark in finding their way to the industrial helix, for example by shared funding of projects. Although considered quite successful, the universities research institutes also hold different views on the way to pursue innovation and connect with Kennispark. The NIKOS research institute, for example, covers the theoretical basis of innovation but, on the other hand, research institutes like CTIT are only interested in practical results like the number of spinoff companies (Bante, 2009). Next, there also appeared to be a difference between the different research specializations. In interviews, a representative of the ICT cluster indicated that according to him, ICT did not receive the attention and support of Kennispark that was given to nano-technology and biomedical engineering (Bante, 2009). As he perceived it, the historical success of Twente's ICT research in the past should have earned them more than that.

7.4.3. The governmental helix

Generally, the involved actors appeared to be quite pleased with the way that the governmental and university helices are working together. The current director of Kennispark, Kees Eijkel, is mainly credited for the creation of this atmohelix. However, there are also some points of criticism.

One is the fact that the city of Enschede has a double role within Kennispark. This is because of the fact that it is both representing itself and the other cities of Twente (Twente Netwerkstad) at the same time. This results in the risk that other cities in Twente will regard Kennispark to be a 'Enschede party' although it is meant to support the development of the entire Twente region, also attracting external companies outside to locations outside the Kennispark premises. This risk brings along an even bigger risk because the Province of Overijssel is financing Kennispark as a tool of Twente's regional development, not a tool of the development of Enschede. During the interviews, the representative of the Province of Overijssel expressed his concern about the current situation and emphasized the fact that Kennispark should developed itself in a broader, more regional way, eventually benefitting all of the East of The Netherlands. The director of Kennispark, Kees Eijkel, shared this view and it might prove to be an issue in the further development of Kennispark although several interviewees emphasized that it is highly dependent on the person that is representing both Enschede and Twente Netwerkstad. The current representative proved to be quite popular so the issue raised seemed more like a potential problem to return in the future. The representative of Overijssel also indicated that he was not completely satisfied with the current role of the province as mainly being an investor. The idea that the province is mainly a financial contributor to Kennispark was also repeated by representatives of the other helices but the province expressed their desire to add more to Kennispark's content. In general, representatives from the university and industrial helix were quite satisfied with the current roles of both the city of Enschede and the province of Overijssel. They were often credited for having a good understanding of the potential of Kennispark and their active involvement was often said to be crucial for the establishment, and possibly the success, of Kennispark.

However, this good understanding is largely depending on the public officials that are now in charge at both the city of Enschede and the province of Overijssel. The democratic nature of both actors, together forming the governmental helix, includes the risk that priorities could be switched because of political or electoral changes or gains. In this respect, the formal organization of Kennispark may prove to make this risk even more evident since it would be relatively easy to withdraw the organizational, policy or financial commitment from Kennispark given the fact that the initiators are 'loosely' connected to the Kennispark organizational structure as the steering group. The Kennispark organization and especially the university helix, as the other main contributor to Kennispark, are therefore vulnerable to internal changes in the governmental helix. Kennispark tries to counter this as much as possible by emphasizing the use of solid long-term contracts that ensure the commitment of the governmental actors. It is however an obvious weakness of the current legal form of Kennispark which leaves the Kennispark organization and the university helix somewhat cautious about the long-term governmental commitment, which was also expressed during the interviews.

It is also important to note that, regarding the physical aspects of Kennispark, it was said that "*in the end, the city of Enschede decides*" (De Koning, 2009). This is a natural result of the fact that the land is owned by the city of Enschede but at times this lead the university helix and the industrial helix to unite against plans of the city of Enschede (governmental helix). This happened, for example, when the city of Enschede the introduction of 'advertisement taxes' or changing the entire Kennispark area in a paid-for-parking area (idem). The powerful position of the city of Enschede means that it is important for both the industrial and the university helix to have close formal and informal ties with the city council of Enschede to be able to protect their interests. In the future, the strong control of the Kennispark premises by the city of Enschede might be, more or less, balanced after the expansion of the Kennispark premises is completed. This is caused by the fact that the new Kennispark premises will be located at land owned by the university and the premises will also remain the property of the University of Twente. Also interesting is the fact that the industrial helix is represented in this expansion as the incubator BTC will be involved in the exploitation of the new premises, again only as a partner and not as a contributor to the formal planning process.

7.4.4 The industrial helix

As noted, the industrial helix has no formal position within the Kennispark organization and does not contribute to the organization itself. Some representatives of the governmental and university helices expressed their desire to come to an inclusion of industrial partners but actually actors within the Kennispark organization itself were quite satisfied with the current situation. This is caused by the benefits of the before mentioned 'industrial neutrality' of Kennispark and the believe that the current connections with the industrial helix outside the formal organization are adequate. However, not everyone shares this positive view on the current situation. In contradiction to other actors, the province of Overijssel emphasized that it was always one of the goals to include industrial partners within the Kennispark organization, "*only at a later stage*" (Bril, 2009). The province thought it important to first establish a 'policy agreement' between the involved public partners (city, province and university) before any private industrial partners could be included. However, in the end, this policy agreement became the sole foundation for Kennispark, excluding the industrial partners at that time and still today. The province of Overijssel repeated a before mentioned argument: industrial partners might still become included in the Kennispark organization if they are willing to financially contribute to the organization.

Besides the lack of a formal connection, the director of BTC explained that informal connections between Kennispark and the companies located at the Kennispark premises are quite strong. In his opinion, Kennispark considers the entrepreneurial association to be a very important partner (De Koning, 2009). This is supported by the fact that the CEO of the business accelerator unit of Kennispark (BTC) is the chairman of the entrepreneurial organization of Kennispark and the managing director of Kennispark, Kees Eijkel, also has a seat in the board of this organization. Close connections are therefore formed outside the Kennispark organization but within another legal organization.

Also, representatives of the helices emphasized the fact that industrial partners are still involved in many Kennispark activities, for example in all sorts of 'networking activities', specific Kennispark projects and a

monthly informal gathering ('borrel') at the University of Twente including university and industry actors.

From the perspective of Kennispark as a 'spider in the web of the helices', Kennispark would probably benefit of the addition of a formal role for industrial partners in the Kennispark foundation. Although all representatives of the helices agreed that Kennispark has good connections with the (regional) industries, a formal role of these in the organization might improve this further. As a downside, this might compromise the neutral position of Kennispark concerning the industrial helix. The optional inclusion therefore depends on the willingness of industrial partners to invest, but also on the choice of Kennispark between its neutral position and a potentially improved connection to industrial partners. A possible solution to this would therefore be the inclusion of a neutral representative of the industrial helix with good connections to the involved companies.

7.4.5 Conflicts

Most of the internal conflicts of Kennispark seem to emerge around regional development issues. An example that came up more than a few times has been the extension of a nearby highway with an exit road crossing the university campus. A few decades ago, the university was unhappy with this discussion and silenced it rather ponderously by establishing a large new university building blocking the area where this road was supposed to be placed. In recent years, political parties active in the city council of Enschede have raised the subject again in an attempt to improve the connectivity of Enschede and the university and Kennispark premises, however hereby crossing swords again with the university.

Representatives of the different helices emphasized that Kennispark is a platform to reach consensus in issues like this because high-level officials of all parties are represented in the Kennispark steering group meetings. It provides for Etzkowitz organizational 'consensus space', however formally only for the university and governmental helices.

7.4.6 Conclusions

There appears to be a broad consensus on the influence of all different partners within Kennispark. The University of Twente is named as the primary initiator but also proves the be the most influential partner within Kennispark. This seems reasonable when looking at the formal and financial involvement of the university but it appears to be a bit of a surprise when looked upon the main goal of Kennispark: the generation of jobs for the region. As one interviewees stated: "the ultimate goal of every university is to win Nobel prizes" and "you cannot ask the university to pursue jobs as its highest goal" (Welman, 2009). This contrast can be explained by two different facts. First, the land on which Kennispark is located is owned by the municipality of Enschede, providing them with a strong position of power in negotiations. Second, although the University of Twente may contribute the most to fund the Kennispark organization, a large number of additional investments are required to fund the Kennispark projects. These projects are, at times, depending both on Enschede's development planning and their ability to financially support these projects. An example of this the current realization of the expansion of Kennispark's premises at the campus of the University of Twente and the combined traffic restructuring plan. Although the expansion might be achieved without the help of the city of Enschede, Kennispark still needs it to both adjust the traffic policies but also to fund the construction changes it requires. This is exemplary for the highly interdependent relationships between the university and the city of Enschede when it comes to Kennispark.

The position of Kennispark, as perceived by the involved actors, is therefore of an organization with a a leading role for the university helix but with university and governmental helices that are interdependent. To make Kennispark a success, it is recognized that the city of Enschede, the province of Overijssel and the university of Twente need each other. The interdependent relationship between the governmental and university helices forms the basis of the Kennispark foundation, both helices have goals to pursue and both understand that they will need the other helix if they want to pursue these goals using Kennispark. The university is the main initiator and is the most involved in the organization itself but the business and science park itself is owned by the city of Enschede. To fill the business and science park with high-tech companies, the city of Enschede, on its turn, needs the University of Twente.





However, in respect of the Triple Helix model, the formal absence of industrial representatives within Kennispark would seem sub-optimal. If this is really the case at Twente is doubtful, private parties seem to be well involved on a project-basis and including one of the smaller companies at the business and science park might compromise the neutral position of the Kennispark organization. Still, the chamber of commerce or the entrepreneurial organization of the business and science might be a useful formal partner in Kennispark. Unfortunately, Kennispark has build up some barriers for that themselves, the inclusion of private parties would require them to invest in the organization as did the university and the governmental helix. The chance that the chamber of commerce or the entrepreneurial organization would prefer this to occasionally supporting relevant Kennispark projects seems, at this time, unlikely.

7.5 Comparing the PPP-construct of Hermia and Kennispark

7.5.1 Introduction

The comparison between the PPP-constructs of the Hermia and Kennispark organizations will be based on these three different aspects:

- The formal organization
- The financial investments
- The PPP-construct as perceived by involved actors

The fact that the Hermia organization has been around for more than fifteen years puts some perspective in the comparison with Kennispark, founded just five years ago. Hermia has seen a number of organizational and financial changes in its history where Kennispark has been working continuously in the current organizational setting.

7.5.2 The formal organization

Kennispark is organized as a foundation where the new Hermia is a private company. Legally, Kennispark is therefore restricted from pursuing profit but the different legal forms also result in different decision making processes. The ownership structure of Hermia results in shareholders holding a certain percentage of the shares and achieving formal influence in accordance with their share percentages. The board of directors is also chosen by the shareholders and they have the formal possibility to organize voting's that are decided by a simple majority voting system. The transparency and clarity of this system is contrasting with the Kennispark organizational structure. At Kennispark, the initiators form a separate steering group outside the Kennispark foundation resulting in a situation where the main financers and policy actors are influencing Kennispark from outside the organization itself. The steering group, including the city of Enschede, the university of Twente and the province of Overijssel, functions independently from the Kennispark foundation. This is, however, heavily influenced by Dutch legal issues.





When comparing the current triple helix overview of both organizations, the situation is quite similar. The university helix owns 60% of the shares of the Hermia organization and the governmental helix 40%. At Kennispark, the governmental helix represents 66% of the formal influence and the university helix 33%. Both organizations allow room for both the university and the governmental actors but the leading helix differs: the university helix at Hermia and the governmental helix at Kennispark. For Hermia, this is a big change since the old Hermia. The former domination of the governmental helix seemed to have a large impact on the organizational structure of Hermia and its performance The new setting of the helices is expected to help the organization to overcome a number of the problems that influenced the old organization.

At Hermia, the board of directors is a representation of the shareholders. Therefore, shareholders are rarely voting to force their will since the board of directors is providing a similar platform. As a result of the merger, the board of advisory of Hermia has been dissolved so there is no other influence on the rather homogenous group of shareholders and directors. At Kennispark this is very different. The steering group is operating outside the Kennispark foundation and the board members are not representing the steering group actors. They do have an (informal) influence on the constitution of the board but the directors are better described as 'experienced professionals' than as representatives of the steering group. It is, however, notable that most of people that are active in the Kennispark foundation have a background at the University of Twente, which is connected to the fact that the university is seen as the main initiator of

Kennispark. Kennispark does have a board of advisory and the steering group has a strong vote in it. The two main actors of the steering group (the university of Twente and the city of Enschede) both have a representative here. The chairman is, however, an employee of a regional company to provide a more neutral position next to the two actor representatives.

Both organizations are lacking the formal presence of the industrial helix. This means that, in fact, the very name 'public-private partnership-construct' is incorrect. Both organizations only include representatives of public partners, most notably the universities and the city councils. The reason for the formal absence of the industrial helix is partly similar and partly different for both organizations. Hermia would consider including larger regional industrials, such as Nokia or Tamrock, but these companies are simply not interested in an organization like Hermia. Smaller companies at the Hermia business and science park were named to have nothing to gain from entering an organization like Hermia. At Kennispark, companies of Nokia's size are not available and the organization itself sees more negative sides about including small companies than positive ones. It is feared that the inclusion of regional small companies could harm its neutral position, a concern that is also present at Hermia. This results in a situation where, at the formal organizational level, both organizations show a double helix instead of a triple helix construct.

On the project level, the involvement of the helices usually depends on the origin of the project. Over the past years, all three helices have been represented in several projects, both at Kennispark and Hermia. Contrary to the formal organizations, projects are able to involve all three helices in their activities and form a better example of the Triple Helix than the organizations themselves.

7.5.3 The financial investments

Hermia and Kennispark are funded in very different ways. Both organizations have a source of structural income but the construct is very different. Kennispark receives annual fees from both the university helix and the governmental helix. These costs cover the organizational costs of Kennispark and enable the organization to focus on the Kennispark projects without concern for their own survival. In contrast, Hermia is not supported by the university or governmental helix and needs to cover its own costs. Its source of structural income is the industrial helix, companies can become a member of Hermia's 'innovation network' which grants them access to Hermia's projects. Since these membership fees are not sufficient to cover all organizational costs, Hermia is forced to continuously search for new funding and often goes *"where the money can be found"* (Jussila, 2009). The financial prospect of Hermia is unclear since the old Hermia organization used to record losses that were covered by its own reserves and interventions of the city of Tampere. The second part of the new Hermia, Tamlink, was profitable over the past few years. It is therefore interesting to see what the financial results over the next years will be. Kennispark's financial prospects are safe for the moment but it is unclear if the governmental and university helix investments will continue in the future. The provided structural funds are, at least partly, temporary.





The industries are more involved in Hermia because of their membership of Hermia's 'innovation network'. The membership guarantees companies that Hermia will organize and manage relevant projects for them but Hermia is also guaranteed of a structural financial contribution by these companies. Therefore, it seems to be a good construction for both the industrial helix and the Hermia organization itself and the governmental and university sphere are content because there is no need for additional public investments. However, the construct also forces Hermia to listen to the industrial wishes as they are the only source of structural funding. This might, at times, conflict with the shareholders of the organization which are all public partners. In the experience of Hermia over the past years, these differences were sometimes arising but relatively easy to settle.

At the project level, all three helices provide funds for the projects of the organizations. At Hermia, about 75% of the project investments are provided by public partners and the remaining 25% by private partners. Of the public investments, almost all is provided by the governmental sphere with the university usually redirecting national governmental funds to Hermia. The university is also occasionally contributing to projects themselves. At Kennispark, the project funding is mostly originating from public partners as well, although exact numbers are unknown. The university plays a larger role in innovation related projects (like the TOP-program) and the city of Enschede is contributing more to regional development projects. A difference is that Hermia is also creating income with their projects. Hermia receives a certain percentage for organizing and managing the projects where Kennispark provides this on a non-profit base. This might, however, change if a part of the temporary structural funding of Kennispark would be removed. In conclusion, the view on the financial investments is comparable to the view on the formal organization. At the organizational level, not all the helices are represented but when it comes to projects, all helices are contributing to a certain number of projects which are in their interest.

7.5.4 The PPP-construct as perceived by the involved actors

The involved actors in both regions name representatives of two different helices as the most important part of their organizations. For Hermia, the city of Tampere is considered to be the leading actor and for Kennispark the university of Twente.

The strong perceived position of the city of Tampere in Hermia is a result of two different factors. First, the former Hermia organization was dominated by the city of Tampere which held 97% of the shares in the organization. The city of Tampere was also the sole initiator of both the Hermia business and science park and the Hermia organization. This situation was still in the mind of a number of the involved actors

since the general knowledge about the organizational structure of Hermia was quite limited. Second, the city of Tampere is still providing a substantial amount of project funding for Hermia projects and this proved to be a well known fact among the interviewees.

At Kennispark, the university was the main initiator of Kennispark and it is also seen as the most influential actor. The university has a large role in the formal organization and in the financial investments next to the fact that the universities technologies and research are regarded as essential to the Kennispark organization and its projects. Most employees at Kennispark also have a history at the university of Twente.

In both cases, the main initiator of the organization is also perceived to be the most important actor in the current organization. This makes sense at Kennispark since the university is still very active in the Kennispark organization. At Hermia, however, the city of Tampere has switched its leading position with the technical university of Tampere although this did not prove to be public knowledge yet. In Twente, the broad involvement of both the university and the governmental helix is seen as essential for the success of Kennispark. The employees of Hermia also regard the organizational changes that include a more balanced involvement of the university and the governmental helices as very positive.



Figure 27: Overview of the PPP-constructs as perceived by the involved actors

It is interesting to see that at Twente, the perceived PPP-construct is quite similar to the PPP-construct of the formal organization. In Tampere, it is very different from the current formal PPP-construct. This different perception can be explained by the fact that the government has been the dominant actor in Hermia for decades. The university has recently taken over this position but the old image of the organization is apparently still dominant.

8. The performance of Hermia and Kennispark Twente

The performance of the Hermia and Kennispark business and science parks will be assessed in two ways. The first is the assessment of the quantitative performance of both organizations, measured by a number of predetermined indicators. The selected time span is 2005-2008 (because the Kennispark organization is fully functioning since 2006) and the objective indicators are:

- The number of generated spinoff companies
- The number of generated patents
- The number of generated knowledge intensive jobs
- The number of geographically facilitated firms

Second is a qualitative review of the organizational performance will be based on three different themes: the effect on the region, the effect on the cooperation between the different helices and the future potential for the region. The selected time span includes the history of both business and science parks and their organizations. The subjective indicators are:

- The visible effect on the region
- The strength of a multiplier effect on the region
- The effect of business and science park knowledge & technology on existing industries
- Other (external) positive effects on the region
- The increased knowledge of the involved helices, as a result of the cooperation
- The possible increase in cooperation between the three helices

Both sets of indicators will be used to come to an overview of both the business and science parks. The results of both parks will then be compared to assess the differences.

8.1 The performance of the Hermia business and science park

8.1.1 Introduction

The Hermia organization produces an annual report on the performance of the organization. However, this report is mainly a financial report which includes the annual revenue, balance sheets and prognoses for the years to come. Reports about the organizational performances are limited and were therefore often obtained from the interviews with key actors connected to the Hermia organization.

The fact that the Hermia organization lost its function as a park overseer in 2002 (as a result of the splitup) became quite clear in the process of (mostly the quantitative) data collection. There is no organization that is currently acting as a central coordinator for the business and science park. As a result, there is no single actor that is monitoring the performance of the entire business and science park. Most organizations, including the Hermia organization, are now focusing on the performance measurements of their own organizations. Therefore, obtaining quantitative data on the overall and combined performances of the Hermia business and science park proved to be challenging. In the end, a large number of sources were used to come to a reliable overview of the performances of the park.

Year / Jobs :	2006	2007	2008	Total:
Number of generated spinoff companies	8	8	10	+26
Patents generated	18	15	14	+47
nowledge intensive jobs enerated (approximately)	+100	+50	-125	+25
otal number of knowledge atensive jobs (approximately) x-1 = 4.100)	4.200	4.250	4.125	+25
otal number of companies	150	145	151	+1
Number of active student	unknown	unknown	unknown	unknow

8.1.2 Quantitative indicators of the performance of Hermia

companies

Figure 28: Annual developments at Hermia

(Hermia, 2009; Hermia Business Development, 2009; City of Tampere, 2009; Tampere Business, 2006 & 2008; Räsänen, 2009)

The quantitative data on the Hermia business and science park provides a positive view on the results over the past years. Overall, the park appears to perform well and all total numbers are positive. The number of spinoff companies has been quite stable over the past years. The interviewees were, however, not satisfied with the number of spinoff companies each year: "our goal is to get at least twenty spinoff companies every year" (Räsänen, 2009). To improve the number of spinoff companies, the Hermia organization sees a role for itself through their projects. One of the projects, Demola, is fairly new and resulted in two spinoffs in its first year. Interviewees of all helices were hoping that Demola could be influential in achieving a larger number of spinoff companies over the next years.

The number of patents is steadily declining. In 2006, 18 patents were registered but in 2008 only 14. Most of these patents are strongly connected to the research of the technical university of Tampere and the research and development performances of Nokia. Since the technical university and Nokia are often working together, the main supply of patents originates from these collaborations. During the interviews, the decline of the number of patents was reported to be a result of the fact that patenting has some increasing disadvantages (Pessa, 2009): Asian companies, in particular Chinese, are often not respecting patents and it is very hard to legally claim your rights due to the dodgy law systems of some of these countries. Second, filing the patent means publishing sensitive information which will make it easier for competitors to copy the idea. Last, a number of interviewees claimed that the technological developments are so fast that investing in patenting has no real use; the new technologies of today might be obsolete after two years and this will not cover for both the costs and the risks of registering patents.

When looking at the total number of jobs, roughly 2.800 of the 4.125 jobs are provided by Nokia. This underlines the very important position of Nokia for Tampere as the largest private employer of the region. Because of this strong position, the number of jobs at the Hermia park is strongly connected to the Nokia business plans. The sudden decline in the number of jobs in 2008 is mainly caused by Nokia. About175 employees were laid off after a first round of budget cuts to improve the profitability of the company. This was seen as necessary as the company became aware of the influences of the global economic crisis (Nokia, 2009). It is plain to see that the performances of the Hermia park are strongly connected to the

performances of Nokia. If Nokia would, for example, decide to move its research and development divisions elsewhere, the Hermia park would be half empty and the economy of the Tampere region in general would be hit hard.

The total number of companies has not changed much over the past few years. This means that, next to the new startups, approximately the same number of companies are quitting each year or moving to a location outside the Hermia park The total number of companies has not increased although the park has been expanding its premises. This is connected to the fact that Nokia has been demanding more and more office space which has even resulted in the relocation of companies which were located at premises that Nokia desired. The total number of 150 companies provide a total of 4.125 jobs which means that, on average, every company has 27.3 employees. This number is quite impressive considering the fact that business and science park was originally meant to facilitate the spinoff companies of the technical university. However, this average is heavily influenced by the presence of Nokia. When Nokia is left out, the average number of jobs drops to 8.8 per company. As a result, most companies at the business and science park are quite small with Nokia as a very large exception.

Unfortunately, no data sources made any distinction between the number of companies at the Hermia premises and the number of student companies among them. As not even the number of spinoff companies each year are documented, no trustworthy data on the number of student companies could be obtained. Interviewees were only able to provide very rough estimates and these estimates were also non-consistent.

8.2.3 Qualitative indicators of the performance of Hermia

The regional effect of Hermia

Hermia is a very visible and well known park in Tampere and it is by many considered to be one of the economic cornerstones of the region. This well established reputation is partly a result of the fact that it is considered to be the home of the Nokia research and development offices in Tampere. Next, one of the major bus lines in Tampere is also named the 'Hermia' line which was used by an interviewee to exemplify the well established position of Hermia in the region. The fact that the new merged Hermia-Tamlink organization is using the name 'Hermia' indicates that it has created a strong regional image and is well known among the people and companies within the region of Tampere. However, outside the Tampere region, the name of Hermia is not very widely spread, Hermia interviewees indicated that they would often use the name of Nokia instead of Hermia outside the Tampere region because Hermia was often unknown to national or international actors.

Companies at Hermia are willing to cooperate and the Innovation network of the Hermia organization is a clear example of this. However, companies located at Hermia are not only cooperating with the other companies at Hermia but are also active in partnerships with industries outside the business and science park. The traditionally well developed cooperation's between the technical university and the mechanical engineering industries have also been transferred to Hermia. This has lead to Hermia spinoff companies offering services to multiple companies outside Hermia, including the 'old' industries of Tampere. The partnerships are formed by direct connections between companies at Hermia and other industries but also by the projects that are managed by the Hermia organization. It is therefore clear that Hermia's companies and industries are not only linking themselves to other companies at the park but also form close connections to the 'outside world'. The effect of Hermia is therefore not limited to the park but extending

to the entire Tampere region. Examples of large regional industries that are connected to Hermia's companies are Tamrock, Metso and Sandvik (Räsänen, 2009).

As a result of the many connections of Hermia's companies with 'outside' companies, the multiplier effect of Hermia on the Tampere region is perceived to be quite strong by representatives of all three helices. Technologies, products and services created at Hermia are leaving the park and are used in all sorts of industries in the Tampere region. At times, it is just the small alternations offered by Hermia companies that provide a competitive advantage for regional industries compared to their competitors. As a result, it has often been claimed that without the technical university many of the regional industries would have vanished already but in the past twenty years, the Hermia organization has worked as an intermediary between these helices on a very regular base (Mattila Nurmi, 2009).

The effect on the cooperation between the helices

All interviewees claimed that the cooperation between the different helices is helped by both the business and science park Hermia and the Hermia organization. However, the Hermia organization is not really a creator of this environment as it is more of a result of it. At the time of the foundation of the Hermia organization, connections between industries, universities and the regional government were already well developed (Kautonen, 2009). In fact, the establishment of both the physical park and the Hermia organization were results of these good connections between the different helices. Hermia is also not the only regional development company that is operating as a connector of the helices. Tampere (and Finland in general) has a longer tradition of consensus between the different helices to benefit regional development. In this perspective, Hermia is not as remarkable as it used to be about twenty years ago because all technical universities in Finland have comparable business and science parks located nearby.

The effects on the cooperation between helices are influenced by the fact that both the physical park and the Hermia organization were dominated by the city of Tampere. The cooperation between the different helices was very marginal within Hermia itself, the projects are responsible for bringing these different actors closer together. Within the organization it was limited to the project level. The change in the ownership structure which marks the recent merger might change this as both the technical university and the city of Tampere will have a substantial number of shares in the 'new' Hermia organization.

Potential effects for the region

When the interviewees were asked about the potential effects of Hermia for the region, a remark about the PPP-construct of the old Hermia organization was often repeated. As mentioned before, the organization was blamed to have a lack of focus and direction. As a result, interviewees suggested that stronger leadership of the organization would, in the end, produce better results for both the organization itself and its regional development activities. Comparisons of the old Hermia with Tamlink were also often made with Tamlink often described as a leaner company that was more specialized in their activities than the more generally orientated and more sluggish Hermia organization. Contributing to the comparison was the fact that Tamlink has been able to cover its own organizational costs for the past few years where Hermia recorded several losses. However, since Tamlink only employed around 10 people and Hermia around 45, it will be interesting to see if this praised focus of Tamlink can be spread through the rest of the new organization. The human capital of the new organization has also not been without criticism, interviewees mentioned that the new organization might have an equal amount of 'hands' and 'brains' where more 'brains' might be required to make sure that the new Hermia will both be able to cover its own costs and will prove to be of significant value to the regional development of Tampere.

Another potential effect for region was mainly connected to Hermia's projects. The main opinion of many interviewees was that the Hermia organization should be looking more into new, low-developed areas with potential. Basically, interviewees were hoping that one of those projects might, in the end, provide another Nokia for the region. However, since Hermia has to cover its own costs, pioneering new projects is somewhat restricted to university-industry areas where the organization will be able to earn some income.

8.2 The performance of the Kennispark business and science park

8.2.1 Introduction

Kennispark Twente produces an annual report in which it indicates the performances of the organization. Most of the resulting quantitative measures are produced by a yearly review of the area by the IO consultancy group and information databases of the university's NIKOS research institute (Eijkel, 2009; Op de Hoek, 2009). Generally, it is hard to credit Kennispark alone for, for example, the number of spinoff companies, patents or regional jobs. Therefore, Kennispark mentions the instances of these in which it was, or is, involved.

8.2.2 Quantitative indicators of the performance of Kennispark

Year / Jobs:	2006	2007	2008	Total:
Number of generated spinoff companies	10	21	21	+52
Patents generated	24	20	14	+58
Knowledge intensive jobs generated (approximately)	10	400	130	+540
Total number of knowledge intensive jobs (approximately) (x-1 = 1.960)	1.970	2.370	2.500	+540
Total number of companies	302	324	355	+53
Number of active student companies	unknown	55	82	+27

Figure 29: Annual developments at Kennispark (IO consultancy, 2009; B&S park Enschede, 2009, City of Enschede, 2008)

When looking at the annual report of Kennispark, the goals of the organization indicate that the number of generated jobs for the Twente region is the most important performance measurement for Kennispark.

The annual report also presents results on the number of registered patents it was involved in and it shows an overview of the number of new spinoff companies at the park and the total number of facilitated companies. However, the number that is displayed in the annual report includes both knowledge intensive and 'business' jobs. The number of jobs generated shows a strong fluctuation. The low number of generated jobs in 2006 can be explained by the fact that Kennispark was still in a start-up phase and not yet involved in all the spinoff creation and company attracting activities at Kennispark and in the Twente region. The year 2007 shows the first solid number of additional knowledge intensive jobs but the total

number declined in 2008. Several actors explained this lower number by pointing at the worldwide economic crisis which was claimed to influence Twente's regional economy as well. Looking at the results over the past years, achieving the goal of 10.000 new jobs between 2005-2015 seems quite unlikely. Kennispark claimed to be connected to a total of 897 generated jobs in the 2006-2008 period, of which approximately 540 were considered to be knowledge intensive. This means that, with non-knowledge intensive jobs included, over 9.000 jobs are to be generated in the next six years to meet this goal. However, even in the best year, 2007, no more than 663 jobs were generated.

The goal of 10.000 jobs is also met with skepticism by several interviewees, including employees of Kennispark itself, indicating that *'this goal will not be achieved, giving the present growth rate'* (Eijkel, 2009). Kennispark itself claims that the economic setback is the main reason. However, other interviewees indicated that the companies, as located on Kennispark, are not suffering that much because most of them are quite small (<50 personnel). Larger companies are thought to be more affected because of their 'general' consumption products as compared to the more specific products of high-tech firms at the Kennispark area. This might indicate that the goal of additional jobs was not very realistic in the first place. The expectation is that, for the coming years, at least the level of 2007 should be achievable again. This is the result of a major expansion of the Kennispark premises which is currently under way, combined with hopes for a better economic tiding.

The number of registered patents (or 'octrooien' in Dutch) has been steadily declining over the past few years. The reason is, however, not quite clear. The authors of the 'Twente Index', which measures Twente's regional economical development, have not found a decisive influence to explain this development (TC Tubantia, 2009). University researchers have also made an attempt to explain the decline but they were also unable to find a decisive explanation (Twente Index, 2009). My interviews resulted in several different views on the decline. Most interviewees suggested that it might be connected to a lower confidence in the use of patents. For this development, two reasons were identified. First, patents are more difficult to protect due to the rise of new Asian manufacturers. Patents that are registered worldwide are, at times, still ignored in countries like China. Second, because of these manufacturers ignoring international patenting laws, researchers are less eager to register their technological patent because it will help other manufacturers to produce similar results. These two developments are both present at a global, worldwide level, however, the direct connection to the decline of Twente's patenting numbers is uncertain and would require additional research. Regional factors might have additional and more profound effects next to these global developments.

The University of Twente is trying to halt this decline by reforming the patent registration policies for patents that are based on university research. Since 2007, the researcher will also receive a percentage of the income that is generated by a patented technology or product that was registered while working as an employee of the university. However, when looking at the total number of patents in 2008, there appears to be no effect so far.

The total number of companies located at Kennispark is relatively easily assessed as this is reported annually by Kennispark. The table of figure 27 provides an overview of the total number of companies located at the physical park and, over the past years, the number has been increasing. The Kennispark organization is proud of this increase as it claims to have played a significant role in attracting companies and stimulating new startups at Kennispark. However, the number of companies alone is not that important. A large number of small companies could still provide less jobs and economic effects for the Twente region than a single large company. It is therefore important to combine the statistics on the

number of companies with the number of jobs at Kennispark over the past few years. When looking at the table, both the number of companies and the number of jobs have increased although the increase in companies has been stable in the 2005-2008 period and the increase in jobs shows strong fluctuations. On average, a company provided 7.04 jobs in 2008.

Last, Kennispark also publishes data on the number of newly generated spinoff companies that it has been connected to. The University of Twente has a long history of supporting students and staff to establish spinoff companies and the most notable supportive program is TOP (see 6.3.2, page 33). The number of TOP-positions granted is therefore a performance measurement for both the entrepreneurial performance of the university and the organizational performance of Kennispark Twente. In both 2007 and 2008, 21 new TOP-positions were granted but this does not mean that 21 new spinoff companies were started. TOP-grants are awarded to individuals and not to companies, which means that a number of individuals that start a company together might receive a number of TOP-grants. It is therefore better to look at the total number of active student companies and to compare the changes between different years. Unfortunately, data on the total number of active student companies was not available until 2007 which means that only 2007 and 2008 can be compared. This one year time span shows an impressive growth, 55 companies were present in 2007 and 82 in 2008. Interviewees came with many different explanations for this achievement. Kennispark interviewees were quick to emphasize the role of the Kennispark organization in the process but other interviewees also indicated that a number of new studies at the University of Twente (like Technical Medicine) have reached a more mature status and are now responsible for the creation of a number of spinoff companies every year.

8.2.3 Qualitative indicators of the performance of Kennispark

The regional effect of Kennispark

The main goal of Kennispark until 2015, the generation of jobs, proved to be well known among the interviewees. This resulted in many interviewees relating the regional effect of Kennispark to the performance in job generation. The quantitative performances, as mentioned in chapter 8.2, are therefore often mentioned when asked about the regional effect of Kennispark. Next to this, the city of Enschede also indicated that Kennispark is one of the 'stem picture' ('boegbeeld') projects of 'Twente Netwerkstad' (the association of cities in the Twente region) to both benefit the image of Twente and to underline the fact that it is an organization which should benefit not only Enschede but also the other cities in the Twente region. It is also noted that the current reviewing system of Kennispark's performances will be altered to get a clearer view on the effects of Kennispark on the Twente region.

The views on a possible multiplier effect for the Twente region caused by Kennispark companies were mixed and could basically be divided in two different groups: interviewees claiming that there is no real multiplier effect at this time but it is growing and interviewees claiming that it is already happening but only on a small scale. Both views lead to the conclusion that a strong regional multiplier effect is not present at this time but the influence might be growing. At the present, a number of companies located at Kennispark are cooperating with other companies at Kennispark but the effect on industries outside the Kennispark premises is still limited. Large regional industries like, for example, Thales and Royal Ten Cate are still not involved in Kennispark or its projects mainly because these companies (Op de Hoek, 2009). At the time of the interviews, Kennispark was in talks with a number of larger regional industries, to try to get them more involved in the Kennispark projects.

The effect on the cooperation between the helices

When looking at the effects of Kennispark on the cooperation between the different helices, Kennispark appears to have a very positive influence. During the start-up phase of Kennispark, representatives of the helices indicated that there were quite a number of issues blocking an initial cooperation between the university, the city of Enschede and the province of Overijssel to form Kennispark. Most of them appeared to be in some tensions in personal relations between the people involved (Op de Hoek, 2009) which was resolved by replacing a number of the involved officials. Also, the province of Overijssel was hesitant to become a partner in the foundation, which was eventually solved by creating the steering group outside of the legal foundation (Eijkel, 2009). Kennispark is, by both the university and the governmental helices, described as an excellent platform for coordination between these organizations at a relatively high level. Issues that involved all three actors during the development of the expansion of Kennispark were often discussed at Kennispark meetings and the resulting plan was an agreement between all three involved formal partners: the university, the city of Enschede and the province of Overijssel.

However, one of the most important objectives of Kennispark is to bring the industrial helix closer to the university helix, where the governmental helix appears to act more like a supporter providing both financial and policy support. Although Kennispark has only been active for a few years, most interviewees are confident that Kennispark has already made progress. I tend to agree with that but it depends on the scale. When looking at the physical park, more companies tend to be involved in cooperation's with university actors than before. Most of the new companies are also either attracted by the research of the university (like Boeing recently) or originating from the university itself as a spinoff company. However, industrial actors outside the physical business and science park are not that involved yet. The interviews produced an image of university-industry connections slowly evolving outside the park but major regional industries are, at this time, not strongly connected to the organization.

Potential effects for the region

At this time, Kennispark is not a well known name in the Twente region, on the national level or internationally. This is partly caused by the fact that it is a very new initiative and on the surface (buildings, areas) not much has changed so far. Physically, the Kennispark area has not changed much since it changed from the old business and science park into Kennispark although a large expansion of the premises is now on its way. Most of the Kennispark projects are also not very visible in the public domain but they consist of more internal cooperations between representatives of the different helices. It has been the experience of every helix that it is hard to make these kind of projects visible for a larger audience. The name and reputation of Kennispark is expected to improve when the 'Master plan' is realized and the Kennispark premises have been expanded into a large university building. This building ('the gallery') is bordering one of the main roads of Enschede which will increase the physical visibility of Kennispark. Some infrastructural changes, affecting both the connectivity and the visibility of the Kennispark area, will also add to the name of Kennispark but in general it is clear that Kennispark is still a very much developing concept.

Valorizing the university knowledge in cooperation with industrial partners, in every way possible, is considered to be the main benefit of Kennispark for the Twente region. There is a broad consensus that Kennispark has established a solid organization with the ability to run projects, function as an intermediate between university and business and attract established companies to the Twente region. It is also believed that this organization has the potential to become a significant player in boosting Twente's regional economy (Welman, 2009; Bril, 2009). The most heard Kennispark potential is therefore the creation of

more 'mass'. The environment is established but the challenge for Kennispark is to grow in all its activities, as summarized by one interviewee as *'more companies, more cooperation's and providing more opportunities'* (Op de Hoek, 2009). To achieve this, it is believed necessary to create more connections between the university and industrial helix in order to come to shared research interests and programs (Welman, 2009).

It is also hoped that Kennispark will be able to bring the Twente industries to a broader development. The entrepreneurial atmosphere of Twente was described as one in which every company is a bit of an island, sometimes not even knowing that some of their products are used in high-tech fabricates in other regions of The Netherlands (Op de Hoek, 2009). This might still be a remaining of the lacking innovative entrepreneurial culture in Twente during the downfall of its textile industries, as claimed by Lambooy (2005) Kennispark is believed to have the ability to not only connected knowledge with business but also to bring the regional businesses closer together. However, the difficulties that Kennispark is experiencing with getting companies like Thales to cooperate seem to indicate that there is still much work to do to accomplish such changes. Much of this potential therefore depends on the ability of Kennispark and the involved actors to create the connections between the different actors.

8.3 Comparing the performances of Hermia and Kennispark

8.3.1 Introduction

The comparison of the performances of the business and science parks of Hermia and Kennispark will be based on the quantitative and qualitative performances. Next to the separate performances of both business and science parks, it will provide an overview of the relative performances as compared to each other. It will also add the possibility of comparing trends and perhaps some of these trends can be explained by common factors.

8.3.2 The quantitative performances

When looking at the quantitative performances of both business and science parks, the first thing to notice is that both parks seem to be doing quite well. Over the 2006-2008 period, both parks achieved an increase in spinoff companies and jobs although Hermia showed a strong decline in jobs in 2008. The fact that both business and science park are producing positive results over the presented time span also indicate that business and science parks are still able to achieve progress, both in the located number of companies and the creation of jobs. However, the global economic crisis was not yet at its worst in 2008, data on 2009 and 2010 might therefore show a different trend. At both parks, the decline in the number of generated jobs is already visible in 2008 although other (internal) factors might have a strong influence on these numbers.

Hermia					Kennispark Twente				
Year / Jobs:	2006	2007	2008	Total:	Year / Jobs:	2006	2007	2008	Total:
Number of generated spinoff companies	8	8	10	+26	Number of generated spinoff companies	10	21	21	+52
Patents generated	18	15	14	+47	Patents generated	24	20	14	+58
Knowledge intensive jobs generated (approximately)	+100	+50	-125	+25	Knowledge intensive jobs generated (approximately)	10	400	130	+540
Total number of knowledge intensive jobs (approximately) ((x-1) = 4.100)	4.200	4.250	4.125	+25	Total number of knowledge intensive jobs (approximately) ((x-1) = 1.960)	1.970	2.370	2.500	+540
Total number of companies	150	145	151	+1	Total number of companies	302	324	355	+53
Number of active student companies	unknown	unknown	unknown	-	Number of active student companies	unknown	55	82	+27
The performances of Hermia (2006-2008) The performances of Kennispark (2006-2008)									

Figure 30: The quantitative (objective) performances of both business and science parks

When comparing the quantitative performances of Hermia and Kennispark, the increases at Kennispark are impressive. At Kennispark, a total of approximately 540 new knowledge intensive jobs were created in three years while Hermia only recorded an increase of 25 jobs. When looking at the total number of knowledge intensive jobs, Hermia is still way ahead of Kennispark as it provides over 1.500 jobs more. At Hermia, the generation of jobs and the total number of jobs are highly depending on the actions taken by Nokia. Nokia provides about 2.800 of the 4.125 jobs at Hermia and is of major importance to both the Hermia business and science park and the Tampere region.

When comparing the number of generated spinoff companies, Kennispark performs better. When combining this with the data on the total number of jobs and the total number of companies at both parks, the image rises of Hermia as a business and science park for larger, well established companies (e.g. Nokia) surrounded by a number of spinoff companies in their support. When looking at Kennispark, it appears to be more based on a relatively large number of new companies and university spinoffs with, on average, a much lower number of employees. Therefore, Kennispark appears to be more of a 'pioneering' business and science park where Hermia appears to be a more established park. This image is supported by the average number of employees per company at both business and science park. Even when Nokia is excluded, Hermia companies provide more jobs on average (8.8) than the Kennispark companies (7.04). When regarding the large number of smaller companies, the Twente region is hoping that one of these many small companies will grow to become a 'Nokia' with numerous benefits to the regional economy.

It is also interesting to see that the number of registered patents is declining at both the business and science parks. Although experts in Twente did not find any significant causes for this decline, Hermia experts noted that the position of technological patents is changing. Due to the rise of new Asian competitors, patents are less valuable because it is harder to claim your rights regarding patents. Next, filing a patent will make it publicly available which means that it will be easier to copy. Last, interviewees at Hermia noted that the technological advancements are quickly following each other up, today's new

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technology could be obsolete in two years. The efforts and costs of patenting would therefore often not pay off.

8.3.3 The qualitative performances

The qualitative assessment of the performance of both parks has been divided into three main subjects: the effect on the region, the effect on the cooperation between the helices and the potential effects for the Tampere and Twente regions.

Performance element:	Hermia:	Kennispark:
Effect on the region	 Considered to be a cornerstone of the regional economy. Home to Nokia's European research and development (R&D) efforts. Strong connections with regional companies outside the Hermia premises. Involved with the larger regional industries. Strongly perceived regional multiplier effect. 	 Considered to be a 'new kid in town' Does not include any larger company sites. Regional cooperation with companies outside the Kennispark premises is limited. Currently not involved with larger regional industries, attempting to do so. Small perceived regional multiplier effect.
Effect on the cooperation of the helices	 Was a result of existing connections between the helices. Connections have been slowed down for a long time due to the dominant position of the governmental helix. 	 Has mainly been a creator of connections between the helices. Involvement of university and governmental helices are benefitting their connections.
Potential effects for the region	 Primary potential: creation of more new innovative project concepts with hopes for the rise of a new 'Nokia'. Feeling that most has been achieved at Tampere, therefore looking to involve international partners. 	 Primary potential: the creation of more 'mass' (spinoffs, projects, attracting companies) Hoping that one of the small high- potential companies will eventually evolve into a large company.

Figure 31: The qualitative (subjective) performance of both business and science parks

When comparing the regional effects of both business and science parks, figure 29 presents a comparison on a number of core indicators. Overall, two different images arise which are coherent with the images that were presented in the quantitative comparison. Most indicators are better or broader developed at Hermia while Kennispark appears to be a relatively young pioneering concept and park. In Tampere, Hermia is considered one of the cornerstones of the regional economy and when asking around in Tampere, almost anyone would be able to tell you where to find the park. Kennispark is less known in the Twente region but it now appears to put some serious effort in getting the region acquainted with both the concept and the name Kennispark. Of course, the time span is relevant. Kennispark has been using the name Kennispark since four or five years, although the physical business and science park was established around the same time as Hermia was established. However, the name 'Hermia' was the original name of Tampere's business and science park and it has never changed.

The differences between the established Hermia park and the pioneering Kennispark park are also noticeable when looking at the other effects on the region. Hermia companies have established connections with companies located outside the Hermia park and also the larger regional industries have

found their way to the park. In this respect, Kennispark is lagging behind. Most companies at Kennispark are not involved yet with other regional industries and at this time, the larger regional industries (mainly Thales and Ten Cate) are not connected at all. Often, the companies at Kennispark are somewhat connected to national or international players but the regional level is fairly underdeveloped. The difference here appears to be the presence of the Hermia organization and the Kennispark organization. While the efforts of the Kennispark organization are relatively new, the Hermia organization has been along for over two decades. Since both organizations are attempting to improve the connections between the university helix and the industrial helix, the absence of the Kennispark organization over the past fifteen years might have been an influential factor.

It is therefore no surprise that the perceived multiplier effect in both regions was quite different. As interviewees in Twente noted that the current multiplier effect for the Twente region is very limited (although growing), interviewees in Tampere claimed that the effect on their region is vast. This is mainly caused by the fact that important regional industries (for example Tamrock) are often cooperation with companies located at Hermia which benefits the entire region and because of the major economical influence of the Nokia offices.

The effect on the cooperation between the helices also appears quite different. In the end, both business and science parks and their organizations have been working to bring the helices closer together but at Twente, the foundation of Kennispark was actually one of most influential efforts to bring the industry, government and university helices together. In contrast, Hermia (and the Hermia organization) was established as a practical result of existing well developed connections. Kennispark was the reason for the helices to come closer together while Hermia was a result of existing close relations. However, the original Hermia organization was far from perfect. The cooperation between the helices at Kennispark led to an organization in which multiple stakeholders (city, province, university) had a say. At Hermia, the organization was practically owned by the city of Tampere. As a result, the Kennispark organization is also a platform for discussions about a large variety of subjects between the involved partners. Hermia only offered this on a project level as the other helices had a minimal formal position within the organization itself. This situation has changed since the recent merger of Hermia and Tamlink, both the university helix and the governmental helix are now well represented.

Last, the potential effects for both regions. Again, the image of the established Hermia and the young Kennispark emerges. During the interviews, it appeared that the companies at Hermia believe that, on the regional level, most is already achieved. The regional connections are well developed and the cooperation between the industries and the university have benefitted the region substantially. The Hermia companies therefore looking for other options to market their products and technologies. A representative of the Hermia organization indicated that companies "*are now changing their focus from regional to mostly international, since Finland by itself is not a large market*" (Miettinen, 2009). However, Kennispark is still developing itself as a regional player. Representatives of the governmental helix indicated that the foundation for a successful has been established by creating a well considered and structured Kennispark organization and that it is now up to Kennispark to prove its worth. As result, Kennispark should show increases in, mostly quantitative, products: supporting the generation of spinoff companies, the creation of jobs and the efforts to attract new companies to Twente. In the end, Twente hopes that one of their promising small companies will end up to be something that Tampere already has: a 'Nokia'.

9. Conclusions

9.1 Introduction

In the past three chapters, the role of the three central variables (the technological specialization(s), the PPP-construct and the performances) have been assessed for the business and science parks of Tampere and Twente. The results of these assessments have provided answers, based on empirical research, to the following three sub questions:

- 1. What are the technological specializations of both business and science parks?
- 2. What are the PPP-constructs of both business and science park organizations?
- 3. What are the overall performances of both business and science parks?

The findings for these three sub questions can now be joined together to come to an answer to the main question of this master thesis:

Are the *technological specialization(s)* of the parks influencing the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations and are these *Public-Private-Partnership (PPP) constructs* influencing the *performances* of the parks?

To answer the main question, data on the specialization(s) will be compared to data on the PPP-construct to see if there is a possible link between them. Second, the same will be done with the PPP-construct and a possible link to the performances of the parks.

9.2 Are the *technological specialization(s)* of the parks influencing the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations?

9.2.1 Introduction

To come to an answer to the first part of the main research question, the effect of the specializations on the organizational structures of the business and science park organizations is assessed. If the specializations would have influenced the PPP-construct, there should be a noticeable effect of that on the PPP-construct of the business and science park organizations.

9.2.2 Hermia, Tampere



Figure 32: An overview of the two relevant variables at Hermia

At Hermia, one technological specialization was identified (although with several sub segments): Information and communication technology (ICT). When looking at the PPP-construct, the empirical research showed a diverse involvement of all helices although the industrial helix is mostly left out.

At Hermia, an influential representative of the Information and Communication Technology specialization is the major ICT-company Nokia. Because of its importance to the Tampere region, it appears to be able to influence the park's organization to its own purposes. However, Nokia is part of the industrial helix and when looking at the position of that helix within the PPP-construct, its power is very limited. The industrial helix is not a part of the old formal organization, the new formal organization or the organization structure as perceived by involved actors. It is represented at the financial level but only as one companie in a large network of companies. As mentioned in chapter 7, the reason for this is that Nokia uses its influence at a higher level than Hermia's business and science park organization. When the company requires a service from the governmental helix, a direct link is available with the city council. When it comes to influence, the Hermia organization is mostly below the level of Nokia.

But Hermia's PPP-construct has also been fairly restricted from external (ICT) influences in general. This was, at the former organization, caused by the very strong position of the city of Tampere within the formal organization structure. Its domination made sure that both the shareholders and the board of directors were mostly consisting out of Tampere city officials. As a result, the governmental helix was in control and it allowed no space for any specific university or industry ICT influences in the organization itself. A small exception was formed by the board of advisory of the former Hermia structure. This board was elected by the board of directors but consisted generally of experienced industrialist with a connection to Hermia. Since the main cluster of Hermia has always been ICT, these advisors were often linked to the ICT cluster, leading to a small influence of this specialization on the PPP-construct. This, however, has more to do with personal positions than with the PPP-construct since the formal organization and management structures shows no sign of any influence of the specific Hermia specialization. The governmental helix could just as easily replace these advisors. The PPP-construct of the Hermia organization was therefore very heavily influenced by the city of Tampere but not formally by any representation of Hermia's ICT cluster.

The new Hermia organization is no different in this respect, although the dominant helix is now the university helix. Since the merger is very recent, it iss hard to predict what might change in the future. However, the board of advisory no longer consists of external experienced industrialists. In fact, there is no longer a board of advisory at all. When looking at the new ownership and organizational structure, no sign can be found of any influences of Hermia's ICT specialization. The only thing to find within the organization that is linked with ICT is the fact that there is an ICT cluster manager present. He is, however, a normal employee of the organization with no formal influence on the PPP-construct. The absence of the ICT cluster in the construct would change if Hermia would be able to include Nokia as a formal partner within the organization.

To conclude, no traces of any influences of the ICT specialization on the PPP-construct have been found at Hermia. Both the old and the new organization structure appear neutral and Nokia, as the most powerful representative of the ICT cluster, has not used its influence to alter the neutral structure to its own advantage.



9.2.3 Kennispark Twente, Enschede

Figure 33: An overview of the two relevant variables at Kennispark Twente

At Kennispark, three technological specializations were identified: Information and Communication Technology (ICT), Biomedical engineering and Nano-technology. The PPP-construct shows, in all aspects, influential positions for both the university and the governmental helices; the industrial helix is often left out.

Three different specializations are present at Kennispark. As all three (developing) clusters are trying to draw the attention, the possible influences are more likely to be spread over more than one specialization. However, the influence of the companies that are active in these clusters is limited. Their industrial helix has a poor position within the PPP-construct which means that the companies that are related to the specific specializations have little formal influence. As opposed to Hermia, there are also no high-tech companies located with a size that would make them a potentially powerful actor at the business and science park. The university helix does have a strong position within the Kennispark PPP-construct but during the assessment of the organizational structures, no indicators of a favorable position for one, or more, of the specializations was observed. A representative of the ICT-cluster did claim that, in his opinion, his cluster did not receive the deserved attention but there is no observed difference in the formal position of all research area's at the PPP-construct of the Kennispark organization.

The Kennispark PPP-construct was a result of long negotiations between the University of Twente, the province of Overijssel and the city of Enschede and can therefore be seen as a policy agreement of three public partners. The setup of Kennispark was determined by these three parties and the specializations have not played a role in the establishment of Kennispark. The director of Kennispark has a history at the research institute for nano-technology (MESA+) but is no longer connected to this institute; his neutral position is perceived to be genuine.

To conclude, there's no indication or evidence that the technological specializations of Kennispark have influenced the PPP-construct of the Kennispark organization. The formal position of the industrial helix is weak which means that the companies that are part of one of the specializations have very limited possibilities to alter the organization. The university has shown no preference for any specialization in the process of the establishment of Kennispark and the resulting organizational PPP-construct can be described as neutral.

9.3 Are the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations influencing the *performances* of the parks?

9.3.1 Introduction

To come to an answer to the second part of the main reserach question, the effect of the PPP-construct on the performances of the business and science park organizations is assessed. If the PPP-construct would have influenced the performances, there should be a noticeable effect of that in the quantitative and qualitative performance indicators.

9.3.2 Hermia, Tampere



Figure 34: An overview of the two relevant variables at Hermia, Tampere

At Hermia, the PPP-construct is diverse which means that the constitution of the helices differs. However, the industrial helix is left out of all aspects except for one: the financial investments. The quantitative performances have been good overall although the number of jobs hit a sudden low in 2008. The qualitative performances are creating the image of a well establish business and science park with a strong regional function.

When looking at the influence of the PPP-construct on the quantitative performances, the influence is very limited. This is because of the fact that Hermia organization is actually not claiming a connection between some of the indicators and their own current activities as of 2002 (the time of the split-up). In fact, except for the creation of spinoffs, Hermia interviewees stated that they had no real influence on any of the other quantitative indicators. This statement can be seen in the light of the history of Hermia. As mentioned in

chapter 7, the Hermia organization used to include more activities than present today. Since the organization lost the business incubation activities and the management of the physical park in 2002, the organization feels far less connected to all the activities that are present at the Hermia business and science park. The Hermia organization was left with the management of (regional) development projects and considers its influence on other business and science park activities, at this time, quite limited. As a result, with the exception of spinoff companies, the selected quantitative indicators are not very relevant when the influence of the PPP-construct on the current quantitative performance of the Hermia business and science park since there is no strong connection between the quantitative business and science of the Hermia business and science park will play a smaller role than the qualitative performances when assessing the influence of the PPP-construct on the Hermia performances.

When looking at the old Hermia organization, one of the main frustrations with the PPP-construct proved to be the fact that the board of directors of the organization was the result of the city elections of Tampere. Directors were not chosen because of their capabilities or experience with organizations like Hermia but they became a director as the result of a political process and political agreements. This ment that the directors were only working at Hermia for a relatively short time, that they were a Hermia director next to other (political) activities and that they often had no specific knowledge about running a business and science park organization. As a result, employees of Hermia usually had a better understanding of the organization and its activities than the board of directors. This situation persisted until the recent merger in October 2009. The fact that this construction lead to a number of complaints from both Hermia employees and external involved actors indicates that they were not satisfied with the performances of this construction. The organization seemed to have lacked a sense of direction and a specific focus on activities as a result of the lack of qualified leadership. It is therefore likely that the PPP-construct of the former Hermia organization did have a negative effect on the overall performance of the park. It is, however, difficult to link this to one or a few performance indicators as it would have a more general influence.

The old PPP-construct did, however, influence another aspect of the performance of Hermia. One of the main objectives of a business and science park is to bring the different helices closer together. However, the domination of the city of Tampere led to an organization in which the board of directors was formed only by representatives of the governmental helix. As a result, the connections with other helices were formed less easily than would have been possible. The university and industrial helices had close to no formal position which made the organization a tool of the city instead of a organization in which the different helices were able to grow closer to each other. Therefore, the PPP-construct of the former Hermia organization is believed to have had a suboptimal influence on the cooperation of the helices, one of the qualitative performance indicators.

In turn, the slower progress of connecting the helices might have influenced all other performance indicators as well. Interviewees also agreed on the suggestion that granting the university and industrial helices a role in the organization would have improved the connections with these helices and would therefore have benefitted the organization and its projects. This is therefore a second aspect of the PPP-construct that is believed to have influenced the performance of the park.

The new Hermia organization might counter most of these negative influences. In the new structure, the technical university is the majority shareholder but the city of Tampere also owns 25% of the shares. This means that both helices are represented at an acceptable level and both helices will also be able to fill seats

in a potential new board of advisory of the new organization. The board of directors will become based on normal employment, where directors are chosen for their capabilities and for an undetermined duration. It is therefore no surprise that the changes in the ownership and organizational structures were welcomed by Hermia employees. However, in the new situation, the industrial helix is still left out of the formal organization. When looking at the fact that they are financing the organization, it might benefit Hermia when they would be included. A second advantage would be that it would result in closer connections to the industrial helix. This, in the end, might be very beneficial for the performances of Hermia. However, there is also a downside. The inclusion of, for example, Nokia might result in the loss of the neutral position of the Hermia organization. Other companies might feel that Nokia would endanger their company interests and that would lead difficulties on the project level. An interesting suggestion might therefore be the formal inclusion of a general representative of the industrial helix, for example Tampere's chamber of commerce. That way, the connections would be tighter but the neutral position of Hermia would not be harmed.

To conclude, there are two major aspects of the old Hermia PPP-construct organization that have influenced the performances. First, the politically influenced formal organization structure led to a board of directors without the required expertise. In turn, this led to a perceived lack of direction and no consistent strategy for the organization which influenced the general performances in a negative way. However, the future is looking better since the merger has brought in the university helix as a formal partner. Next, the monoculture that was caused by the domination of the governmental helix resulted in a slower development of the cooperation between the helices. The organization did not function as a platform to bring the helices together but as a private tool of the city of Tampere. This too is hoped to improve as a result of the new structure of the Hermia organization. Basically, the old Hermia organization was constructed in a political way instead of a practical way which, in my opinion, has resulted in negative influences on the performance of Hermia.

At the new Hermia, changing one aspect of the PPP-construct might improve the performances of Hermia. The formal inclusion of a general representative of the industrial helix would tighten the connection with this helix and it would allow the Hermia organization to keep its neutral position with regard to the companies it is working with.

When looking at the financial statements, the fact that both the old and the new Hermia are supposed to cover their own costs might also prove to be a strong incentive for good performances. Without the necessary successes, not only the projects that will benefit the performances of the park will fail but the organization itself might also be at stake. This provides the employees of Hermia with an additional reason to perform well.

9.3.3 Kennispark Twente, Enschede



Figure 35: An overview of the two relevant variables at Kennispark Twente, Enschede

At Kennispark, the PPP-construct shows a strong position for both the university and the governmental helices. However, the industrial helix is mostly left out. When looking at the performances, the quantitative indicators show strong increases. The qualitative performance shows the image of a developing business and science park with a, so far, limited influence on the region.

The PPP-construct of Kennispark is, regardless of its exotic ownership structure, believed to work well. The fact that the steering group, consisting of the initiators and main financers of Kennispark, is placed outside the Kennispark foundation itself was often praised. It was believed that the Kennispark organization had to perform well in order to keep the attention of the steering group because financial and policy support is not available within the foundation itself. The steering group therefore represents a constant with the Kennispark foundation as its dependable variable. For the initiators, it is easy to withdraw when they lose interest because they have no formal position in the Kennispark foundation. However, from the Kennispark foundation perspective, this is also a risk. The independent position of the steering group also provides the initiators an easy way to get out and leave the foundation abandoned. The foundation therefore faces a constant battle for the attention of the steering group which, however, might prove to have a positive influence on the performances of Kennispark because it provides them with a strong incentive to perform well. When looking at the possible influences of the PPP-construct on the quantitative performances, it is hard to find potential causal relations. The most striking aspect of the PPP-construct is the fact that the industrial helix is mostly missing but when looking at the quantitative performances, the results have been convincing over the past few years. Of course, one might argue that the performances could have been even better if the industrial helix would have had a stronger position but there's no evidence to link this expectation directly to the current quantitative output of the park. The only quantitative indicator that is showing declining performances is the number of registered patents. The reason for this appears to be external. As mentioned, the value and therefore the position of patenting appears to be changing under pressure of global developments. It is therefore unlikely that a difference in the PPP-construct would have prevented the decline of the number of patents.

When considering the influence of the PPP-construct on the qualitative performances, Kennispark's PPPconstruct is allowing both the university helix and the governmental helix to be influential. Next, the Kennispark organization is also used as a platform for consultation and negotiation for these two helices which enables them to benefit the cooperation of these helices. However, as with Hermia, the absence of the industrial helix in the PPP-construct is interesting. The inclusion of the industrial helix would be likely to improve the performances of Kennispark because it will most certainly benefit the cooperation with the other helices. However, the Kennispark organization uses the same argument as Hermia against including any companies: it might harm the neutral position of the organization in the eyes of other companies. This could lead to a lower general performance since other companies will be more hesitant to cooperate in projects. However, the risk of losing the neutral position could be removed by adding a general representative of the industrial helix instead. Adding a representative of Twente's chamber of commerce or the entrepreneurial association of Kennispark would make it easier to connect to the industrial helix. Although the director of Kennispark is connected to the entrepreneurial association in other ways, a formal position within the Kennispark organization could benefit the cooperation between the helices even more.

Additionally, when looking at other qualitative performance indicators, the connections with other regional industries outside the Kennispark premises are limited at this point. The inclusion of, for example, again the chamber of commerce of Twente might also have a positive effect on these links with Twente's existing industries. Unfortunately, the main reason that this has not happened yet appears to be financial. A high number of interviewees agreed that including the industrial helix would most likely benefit the performances but the current involved actors have all financially contributed to Kennispark. At this point, it appears unlikely that the chamber of commerce or the entrepreneurial association of the park would be willing to do the same to gain formal access to the organization.

To conclude, there is no valid evidence for a direct influence of the PPP-construct on the quantitative performances of Kennispark. However, when looking at the qualitative performances, a change of the PPP-construct would most likely benefit mainly two of the qualitative performance indicators: the cooperation between the helices and the connection to other regional industries outside the Kennispark premises. The inclusion of a general representative of the industrial helix would both tighten the connections of the helices and it would also improve the links to Twente's existing industries. This improvement to the PPP-construct would benefit the qualitative performance but it would, most likely, also affect the quantitative performances. Better connections between the helices and better connections to the regional industries could, in the end, benefit the number of knowledge intensive jobs, patents or spinoff companies. As the industrial helix is currently left out, the current PPP-construct appears to have an aspect that is affecting the performances of Kennispark in a negative way.

9.4 Comparing the outcomes for Hermia and Kennispark

9.4.1 Introduction

The main question of this thesis has been reviewed for Hermia and Kennispark using the empirical data that was obtained by assessing the previous sub questions. The results, for both Hermia and Kennispark, can now be summarized and compared. Figure 36 presents a summary of the research findings, based on the conceptualization of the thesis as presented in chapter 3.5.



Figure 36: A summary of the research findings

9.4.2 The influence of the *technological specialization(s)* of the parks on the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations

When comparing the influence of the specializations on the PPP-constructs of both B&S park organizations, the results are actually quite similar. When answering the first part of the main research question, the PPP-constructs of both parks were found to be free of any influences by any particular technological specialization(s). At both parks, there has been no indication that the PPP-construct was designed with any particular specialization in mind. When assessing the current structures, both the old and the new Hermia organization and the Kennispark organization showed no traces of treating certain specializations in a different way than others. Both PPP-constructs also did not include any particular representatives of any of the specializations. At the Kennispark organization, there was one representative of a cluster that was not satisfied with the position of his cluster. However, his argument is better described by saying that he would have liked to see more attention for his cluster based on the performance record of the cluster in the past. Therefore, it was my estimation that he would actually have preferred to have a stronger position for that particular cluster than the relatively equal treatment which is currently practiced.

A difference is that at Hermia, there is one representative of a specialization that would have the power to alter the PPP-construct. The position of Nokia in Tampere is of such importance that the company is able to influence many important actors including the technical university of Tampere and the city council of Tampere. It is my estimation that if Nokia would like to change the PPP-construct of the Hermia organization, for example by demanding a formal position for Nokia, that the other involved actors would be willing to comply. However, Nokia has not shown any particular interest in the structure of Hermia. It is satisfied with the projects of Hermia and when it wishes to discuss matters with representatives of the governmental or university helices, a direct connection is often available. When it comes to Nokia, the Hermia organization is often working at a level that is below Nokia's importance for the Tampere region.

During the interviews for both parks, I was also not able to find any indications that the helices favored one specialization over another. Of course, the importance of the clusters differed at both business and science parks but the interviewees seemed to understand that the clusters that are booming today could be declining tomorrow and specializations that are currently developing could become very important in the future. Therefore, the helices at both parks were concluded to have a neutral attitude to the different specializations.

9.4.3 The influence of the *Public-Private-Partnership (PPP) constructs* of the business and science park organizations on the *performances* of the parks

When assessing the influence of the PPP-construct of the business and science park organizations on the performances of both parks, both outcomes were concluded to be positive. The main difference between Hermia and Kennispark appears to be the degree of influence.

At both parks, it proved to be hard to connect the PPP-construct directly to quantitative performances, at Hermia this was mainly caused by the fact that the Hermia organization does not claim to be connected to many of the predetermined quantitative performance indicators. At Kennispark, it was caused by the fact that, although the industrial helix is missing, the results were still very positive. Including the industrial helix might have improved some of the indicators even more but there is no way to compare this possibility with the current setting as there is no way to create quantitative data for this hypothetical situation. However, qualitative performances will, eventually, also influence the quantitative performances
of both parks. A qualitative indicator like, for example, the cooperation between the helices will also benefit the willingness to work together in projects and would therefore also benefit the creation of knowledge intensive jobs or the number of spinoff companies.

When comparing the influence of the PPP-construct on the qualitative performances, the Hermia organization and the Kennispark organization are sharing one aspect: a limited role for the industrial helix. As the old Hermia organization was dominated by the city of Tampere, the PPP-construct was also dominated by the governmental helix. This left little (formal) room for the university and industrial helices which, in turn, affected the cooperation between the different helices. However, at Kennispark, only the industrial helix is missing which means that the negative influence on the cooperation of the helices is smaller than at Hermia. Where the PPP-construct of the Hermia organization used to be a governmental monoculture, Kennispark included balanced positions for the university and the governmental helix.

The absence of the industrial helix might, however, have influenced Kennispark more than Hermia. The connection to the regional industries and the regional multiplier effect of Hermia were perceived to be far more influential than at Kennispark. As concluded at Kennispark, these two poorly performing indicators are influenced by the degree of integration of the helices. A (formal) position for a general representative of the industrial helix would benefit the cooperation with the industrial helix and would therefore be a positive influence on the performances of Kennispark.

However, a more important difference between Hermia and Kennispark organizations is likely to have produced a far more profound influence on all the performance indicators of both parks. Although both parks were established during the same era, the Hermia organization and the Kennispark organization were not. The Hermia organization is roughly twenty years older than the Kennispark organization and has, naturally, had more time to make an impact on the region. This is, most likely, mainly affecting the qualitative performances of both parks as these are covering a longer term than the quantitative performances which are limited to the 2006-2008 period. When looking at indicators like the connection of the business and science parks with the regional industries and the perceived multiplier effect on both regions, Hermia produces far more impressive results. To me, the most logical explanation for these differences is related to the fact that the Hermia organization was established only a few years later than the Hermia park. In contrast, the Kennispark organization has been a very recent initiative which means that the Hermia organization was able to have a much larger impact on both the Hermia park and the Tampere region. The Hermia organization has been connecting the park with regional industries for twenty years while Twente's business and science park lacked such an organization. The foundation of the Hermia organization in 1990 was therefore a very intelligent move by the city officials of Tampere. I believe that, although the PPP-construct of the Hermia organization might have been flawed, it has still been a major influence on Hermia's profound regional accomplishments.

10. Reflection

In this master thesis, I've attempted to explore the organizational structure of public-private partnerships at business and science park organizations. As I have always been very interested in public-private partnerships, it provided me with a great opportunity to write about an interesting topic while located in a very interesting Northern European country for a few months.

The conclusions of this thesis are based on the empirical findings concerning two cases: Tampere and Twente. Based only these two cases, it is hard to come to a generalization to other business and science parks and business and science park organizations. However, when looking at the findings, it is interesting to see that, for example, the influence of the PPP-construct on the performance is present at both parks both in similar ways and in different ways. Both parks lack a solid position for the industrial helix within the formal organization and at both parks the inclusion of the industrial helix is expected to improve the performances. The fact that the Hermia organization merged during the time of my research came as a major surprise to me. Until the announcement, none of the interviewees mentioned, or was able to mention, the upcoming change in the organization. Therefore, I changed my research plan to be able to include the new situation at Hermia as well, as I was not willing to write a thesis that would already be partly obsolete by the time it was finished.

During my comparison of both regions, I noticed that Hermia appeared to more evoluated than Kennispark Twente. Therefore, I often felt that Kennispark was an organization which could eventually end up being similar to the Hermia of today. The Kennispark organization has recently established its activities in regional development, managing the premises and supporting spinoff companies where Hermia reached that stage about ten years ago. It made me wonder if, as with Hermia, these activities would be split up again in the future and if Kennispark Twente, like Hermia, would experience financial problems after the possible end of public funding for the organization. On the other hand, I felt a sense of 'coherence' during my interviews concerning Kennispark; all interviewees were interested in Kennispark while I experienced more of an 'every man/organization for himself' attitude concerning Hermia and its connected organizations.

In retrospect, there are also a number of things that I would have done differently; based on the knowledge and experiences of the last months. When I arrived in Finland, I noticed that my knowledge of the Finnish innovation system was insufficient. This slowed down my understanding of the environment in which Hermia was functioning in Tampere. It took me over a month to create a good overview of the situation and an overview of the most important actors for the business and science park. Also, as I started my interviews in Finland, I noticed that most of my questions were written from the Dutch perspective. Some of my questions proved to be unnecessary or illogical in the Finnish setting which resulted in the alteration of some of the basic interviewing questions.

This master thesis has given me the great opportunity to both dive into one of my main areas of interest (Public-Private Partnerships) and to spend a longer period in the North of Europe. My time in Finland has been great and very evenful. Next to my research, I have met a lot of new people (mostly international students) and traveled through the country to enjoy the beaches, forrests and even the long and cold winter in Lapland. It has been a great experience and studying or researching abroad for a number of months is something that I can highly recommend!

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Interviews

An overview of the interviewees is available in Appendix A (paragraph 12.1).

12 Appendices

12.1 Appendix A (overview of the interviewees in Tampere and Enschede):

Tampere (Finland):

Stakeholder:	Stakeholder organization:	Representative:	Function:
University	University of Tampere (UTA)	Jarmo Viteli	Head of the digital media department
University	Tampere University of Technology (TUT)	Markus Pessa	Head of the optoelectronics department
University	University of Tampere (UTA)	Marku Sotarauta	Head of the regional development department
Government	Municipality of Tampere	Kari Kankalaa	Director of City business and urban development
Government	Regional council of Tampere	Marja-Riitta Mattila Nurmi	Manager of regional development planning
Industry	Tampere chamber of commerce	Tommy Rasila	Managing director
Industry	Nokia Group	Anonymous	Anonymous
Industry	Hermia business development Ltd.	Jarno Kolehmainen	Development expert
Industry	Hermia business development Ltd.	Pekka Jussila	Managing director
General	Hermia Ltd.	Juha Miettinen	Chief Operating Officer (COO)
General	Hermia Ltd.	Petri Räsänen	Cluster manager (and director of the former Hermia organization)
General	Tampere research unit for Science, Technology and Innovation (TaSTI)	Mika Kautonen	Senior researcher

Twente (The Netherlands):

Stakeholder:	Stakeholder organization:	Representative:	Function:
University & Industry	University of Twente (UT)	Patrick Welman	Policy advisor of the University of Twente / Program manager at 'Kennispark Twente'
University	University of Twente (UT)	Iddo Bante	Director of the centre of Telematics and Information Technology
Government	Municipality of Enschede	Jantsje op de Hoek	Senior policy advisor - Economic affairs
Government	County of Overijssel	Gerrit Bril	Project manager Kennispark Twente
Industry	BTC Twente	Rob de Koning	Director of BTC Twente
Industry	Twente chamber of commerce	Ton ter Vergert	Manager regional economy
General	University of Twente: NIKOS	Aard Groen	Professor and Director of NIKOS
General	Kennispark Twente	Cees Eijkel	Director of Kennispark Twente
General	University of Twente: CHEPS	Paul Benneworth	Senior research associate

12.2 Appendix B (The Interview (Finland version))

Interviewing questions:

PPP-construct part 1: two introduction questions Descriptive

Question 1: Could you tell me something about the emerging of Hermia, the Hermia organization and the role of local government, industries and the universities regarding this?

(Information about the emerge of Hermia)

Points of interest:

- What was the reason for the foundation of Hermia?
- Who held the initiative with the foundation?
- What were the Hermia intentions for government, industry and universities?
- What is the reason for the three actors to contribute to Hermia?
- What is the legal form of Hermia? (legal form)?
- How are industry/government/university legally represented within Hermia?
- Is the cooperation within Hermia based on a certain example or model?
- How is Hermia administered/governed?
- Does the technological focus, as present at Hermia, influences the organization?
- What is the goal of Hermia? Is there an example to follow?

Vraag 2: Could you tell me something about the current role of government, universities and industry within Hermia?

(Information about the position of university/industry/government within the Triple Helix cooperation)

Points of interest:

- How are the three actors involved in decision-making within Hermia?
- What do the three actors invest into Hermia?
- How would you describe the cooperation within Hermia (informal)?
- What are the formal roles of university, government and industry within Hermia?
- What do you think about the position of the city of Tampere/regional province

within Hermia organization? and industries?

- Could you tell me something about the interests of the three actors?
- What is the added value to university/industry/government?
- Which actors (university, industry, government) have the most contact?
- What are the three actors financially investing in Hermia?

PPP-construct part 2: experiences with Hermia Evaluating

Vraag 3: Could you tell me something about the experiences of [organization] with Hermia? (targeted at cooperation and decision making)

(Reflection of [organization] experiences with Hermia)

Points of interest:

- Is every actor involved in all decisions within Hermia?

- How do you experience the cooperation with [two other actors]?
- Is the cooperation based on total equallity?
- What would you like to be improved concerning the Hermia cooperation?
- Do the technological specializations of Herma influence the PPP-construct of cooperation?
- How are spinoff companies accompanied by Hermia?
- What are returning points of tension concerning the cooperation within Hermia?
- When is Hermia a success? What are the criteria for success?

- Are there (at times), within Hermia, conflicts of interest? If so, which actors are usually involved and on what subjects?

Vraag 4: Could you tell me something about your experiences with the cooperation-construct of Hermia?

(Evaluation of the Triple Helix cooperation)

Points of interest:

- Could you describe the organizational form of Hermia? (informeel)
- Are u satisfied with the current organizational form of Hermia?
- Are u satisfied with the structure of the current organizational form?
- Would you like to change aspects of the current organization form of Hermia?

- Is the organizational form of Hermia sometimes slowing down or preventing actions? (for example when supporting spinoffs)

- Is there room for improvenent of the organizational form of Hermia?

Performance part 1: *Descriptive* (+ available numbers/data?)

Vraag 5: Could you tell me something about the effects of Hermia on the Tampere region?

(Information about the succes of Hermia for the region)

Aandachtspunten:

- What are the visible effects of Hermia for the Tampere region?
- What are potential effects of Hermia for the region?
- Does Hermia provide a multiplier effect in the region? (werken de'producten' van het
- Kennispark ook door in de overige lokale economie?) - What achieves Hermia what would not be possible without it?
- Are spinoff companies contributing to the regional economy, for example be

influencing/stimulating other companies/industries in the region?

- Does the technology as used at Hermia also affects the older (industrial) existing industries of Tampere?

- Does Hermia have any other positive influences on the regional economy?

- Does the organizational form of Hermia leads to better performances?

Performance part 2: Evaluating

Vraag 7: What do you think, could be improved at Hermia, for example when looking at the contribution to the regional economy?

(Trying to discover 'performance deficiencies') <u>Points of interest:</u>

- How is Hermia performing, in relation to the set goals?
- How are 'university', 'industry' and 'government' performing within Hermia?
- How could the performances of Hermia become even better?
- How could the three different actors, individually, contribute to a better Hermia performance?
- How could Hermia itself contribute to a better performance?

English documentation, numbers, data on Hermia?

12.3 Appendix C (The Interview (Netherlands version))

Interviewing questions:

PPP-construct deel 1: twee inleidende vragen Beschrijvend

Vraag 1: Kunt u iets vertellen over de totstandkoming van het Kennispark en de rol van de verschillende partijen hierbij?

(Informatie over onstaansgeschiedenis van het Kennispark)

Aandachtspunten:

- Wat is de aanleiding geweest voor de vorming van het Kennispark?
- Bij wie lag het initiatief voor de vorming van het Kennispark?
- Met welke intentie, vanuit de drie partijen, is het Kennispark opgestart?
- Wat is reden voor de verschillende partijen om deel te nemen aan het Kennispark?
- Hoe zit de bedrijfsvorm van het Kennispark in elkaar (legal form)?

- *Is er gebruik gemaakt van een bepaald model of voorbeeld bij de totstandkoming van het Kennispark?*

- Wat is de focus van het kennispark en bestond deze focus al voor het ontstaan van het Kennispark?

- Hoe wordt het Kennispark aangestuurd?

- Heeft u het gevoel dat de gekozen technische focus ook effect heeft op de organisatie van het Kennispark?

- Waar wil men met het Kennispark naar toe? Moet het ergens op lijken? Wat is het doel?

Vraag 2: Kunt u iets vertellen over de huidige rol van de drie betrokken partijen binnen het Kennispark?

(Informatie over de positie van de universiteit binnen de Triple Helix)

Aandachtspunten:

- Hoe zijn de verschillende partijen betrokken bij de overlegstructuur binnen het Kennispark?
- Wat brengen de verschillende partijen in voor het Kennispark?
- Hoe zou u de samenwerking binnen het Kennispark willen beschrijven?(informeel)

- Wat zijn de formele rollen van de universiteit, de overheid en het bedrijfsleven binnen het Kennispark?

- Positie(ervaring) van de verschillende partijen binnen het Kennispark?

- Wat vind u van de positie van de gemeente Enschede/Provincie Overijssel binnen het

Kennispark? En van BTC/het bedrijfsleven?

- Kunt u iets vertellen over de verschillende belangen die de drie betrokken partijen hebben?
- Toegevoegde waarde van het Kennispark voor de verschillende partijen?
- Welke partijen (universiteit, bedrijfsleven, overheid) hebben het meest contact met elkaar?
- Hoe dragen alle partijen bij aan de financiering van het Kennispark?

PPP-construct deel 2: ervaringen met het Kennispark Evaluerend

Vraag 3: Kunt u iets vertellen over de ervaringen van de universiteit met het Kennispark? (op gebied van samenwerking en besluitvorming)

(Reflectie van ervaringen van de universiteit met het Kennispark)

Aandachtspunten:

- Is elke partij betrokken bij alle besluitvorming binnen het Kennispark?

- Hoe wordt de samenwerking met de industriële en overheidspartners ervaren? Heeft u het idee dat dit goed loopt?

- Is de samenwerking tussen de partners op basis van vol. gelijkwaardigheid?

- Wat zou u graag verbeterd willen zien in de samenwerking binnen Kennispark?
- Hebben de gekozen technologische specialisaties invloed op de samenwerking?

- Hoe worden spinoffs binnen het Kennispark begeleidt?

- Wat zijn vaker voorkomende problemen bij de samenwerking binnen het Kennispark?

- Wanneer is het Kennispark een succes? Wat zijn de criteria voor succes?

- Is binnen het Kennispark wel eens sprake van tegenstrijdige belangen? Zo ja, om welke partijen gaat dit meestal? Over welke onderwerpen?

Vraag 4: Kunt u iets vertellen over uw ervaringen met de organisatievorm van het Kennispark?

(Evaluatie van Triple helix werking)

Aandachtspunten

- Zou u de organisatievorm van het Kennispark kunnen beschrijven? (informeel)

- Bent u tevreden over de huidige organisatievorm van het Kennispark?
- Bent u tevreden over de structuur van de huidige organisatievorm?
- Zou u bepaalde aspecten van de organisatievorm willen wijzigen?
- Werkt de organisatievorm van het Kennis soms ook remmend (bijvoorbeeld wat betreft de voorwaarden voor spinoffs)

- Wat zou er verbeterd kunnen worden aan de huidige organisatievorm van het Kennispark?

Performance deel 1: *Beschrijvend* (+ beschikbare cijfers/gegevens?)

Vraag 5: Kunt u iets vertellen over de effecten van het Kennispark op de regio Twente?

(Informatie over het succes van het Kennispark voor de region)

Aandachtspunten:

- Wat zijn de zichtbare effecten van het Kennispark voor de regio?
- Wat ziet u als potentiele effecten voor de regio?
- Zorgt het Kennispark voor een multiplier effect in de regio? (werken de'producten' van het Kennispark ook door in de overige lokale economie?)
- Wat bereikt het Kennispark in de regio wat zonder het Kennispark niet mogelijk zou zijn?

- Werken spin-off bedrijven door in de lokale economie, bijvoorbeeld door effecten op andere bedrijven of industriën?

- Heeft de technologie die uit het Kennispark voortkomt ook effect op de bestaande industrie in de regio?

- Heeft het Kennispark nog overige positieve effecten op de regionale economie?

- Leid de organisatievorm van het Kennispark tot betere prestaties dan zonder het Kennispark het geval zou zijn?

Performance deel 2: Evaluerend

Vraag 7: Wat denkt u dat er verbeterd zou kunnen worden bij het Kennispark, bijvoorbeeld met het oog op de bijdrage aan de regionale economie?

(Omweg om gebrekkige performance te ontdekken)

Aandachtspunten:

- Hoe presteert het Kennispark, in relatie met de gestelde doelen?
- Hoe presteren de 'universiteit', 'industrie' en de 'overheid' binnen het Kennispark?
- Hoe denkt u dat het Kennispark (nog) beter zou kunnen presteren?
- Hoe zouden de verschillende partijen kunnen bijdragen aan betere prestaties van het Kennispark?
- Hoe zou het Kennispark zelf kunnen bijdragen aan betere algemene prestaties?

<u>Heeft u uitgebreidere documentantie of cijfers over het Kennispark, de organisatie van het Kennispark en de prestaties?</u>