

The Valley of the Netherlands



COMPARATIVE RESEARCH ON IMPROVING THE BRAINPORT REGION EINDHOVEN

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"Coming together is a beginning; keeping together is progress; working together is success."
- Henry Ford

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Preface

Dear reader,

Before you lies my thesis which concludes the master programmes Business Law and International Business Law. After a fun and challenging period of six years, this thesis represents the end of my time at Tilburg University. The last two years I have got acquainted with the various aspects of Dutch, as well as international business law. While writing this thesis, I was very pleased to be able to combine both aspects and especially to look further than the pure legal elements.

In the first place I would like to express my appreciation towards professor Vermeulen for his instructive and entertaining lectures. Without his innovative topics, I probably would have written my thesis on a whole different subject. Secondly, I would like to thank mister Pereira Dias Nunes for providing me with challenging feedback and valuable insights.

However, my spree of thank-yous does not stop here. I also want to acknowledge my family and friends. Special appreciation goes to my mother and Gert-Jan. During my time as a student at Tilburg University, they have not only given me the financial support to learn and absorb theoretical knowledge, but especially, they have given me the time and space to develop myself during any of the extra-curricular activities. Thank you for always providing me with the courage to believe in myself. Finally, but most definitely not least, I would like to thank the rest of my family for being the best background support I could wish for.

Alissa Van Tongerloo

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Introduction

In the early '90, 21 municipalities in the region Southeast-Brabant, the Netherlands, decided to establish a collaboration. This collaboration was focused on reinforcing the economic and structural position of the region. The industry, government and research institutions joined their forces and formed the basis for a new 'innovation-ecosystem' in the South of the Netherlands, also known as the Brainport region Eindhoven.

As was stated by the economist Joseph Schumpeter in the 1950s, the only true source for economic growth is technological innovation. New technological developments need to replace the old ones and only this process can cause an increase in the prosperity of a country or region. Schumpeter certified this process with the term 'creative destruction'.¹ Therefore, in order to spur the economic growth of the Brainport region, continuous innovation is needed. Businesses started working together with the goal to achieve higher levels of innovation. Various initiatives were instituted to develop the Brainport region into a successful 'innovative cluster'.

The term 'innovative cluster' still receives a lot of attention, especially regarding the development of the U.S. cluster Silicon Valley, located in California. Silicon Valley is a classic example of a successful innovative cluster and therefore frequently discussed. The phenomenon of innovative clusters does not only occur in the U.S. and Europe, but nowadays countries like Israel and Singapore are extensively trying to develop clusters as successful as Silicon Valley. Up till now, no cluster has been able to achieve the same level of success as the Californian cluster. Researching the organization of Silicon Valley can however provide one with valuable insights in the unique selling points (usp's) of the cluster.

This thesis will be focused on the innovative development of the Brainport cluster, more specific on;

"How to improve the Brainport cluster and making the region as successful as the U.S. cluster, Silicon Valley"

In order to provide effective and valuable proposals, both the Silicon Valley and Brainport clusters will be extensively researched in *Chapters 1* and *2*. Characteristics of other innovative clusters around the world, more specific; Singapore, Israel and Boston-Route 128, will be elaborated in *Chapter 3*. Innovative development is furthermore related to the level of collaborations within a region. These collaborations in the new innovative industries require tailor-made mechanisms, since the creation of contracts is also subjected to changes in the industry. The evolution of contracting will therefore be discussed in *Chapter 4*. The role of lawyers in the Californian cluster will be further elaborated in this chapter. *Chapter 5* will entail a comparative research on the distinctive characteristics of the Brainport and Silicon Valley clusters. The characteristics of the clusters mentioned in *Chapter 3* will be involved in this comparative research. Finally, *Chapter 6* will include my personal recommendations on how to improve the Brainport cluster and making the region as successful as Silicon Valley.

¹ Reinert and Reinert 2006, p. 55-85.

Chapter 1 Silicon Valley and its USP's

One + one = three

Palo Alto (California, U.S.), 1938. Two graduates from Stanford University, William Hewlett and David Packard, start working together. Without having almost any finances, they produce their first prospering product, a precision audio oscillator. After a coin toss decided the order of their names, Hewlett-Packard was founded.² Both founders were not aware of the kick-off they gave to the most successful innovative industry in the world.

Nowadays, Silicon Valley is still a role model for other high technology industrial districts. However, no cluster has ever received the same credits. Why Silicon Valley was, and remains, so successful compared to other technology industries will be discussed in this chapter. One cannot give a clear definition for the reason of success for the Valley. This remains to be a combination of factors. Still, Silicon Valley has some unique selling point's (USP's) which can be an explanation for the region to be a total smasher.

1. Historical and cultural background

The unwritten rules which are based on the historical and cultural background of the Valley fill in the gaps that are not covered by the formal written laws. These norms form the basis for the behavior of the people living in Silicon Valley. They principally determine most of their actions.³ Therefore it is extremely important to keep these unwritten laws in mind when one is studying the Valley.

Friendly and fierce

One can look at Silicon Valley and see one big happy family. This jovial state of mind was caused by the fact that people actually experienced as if they were employed by the Valley.⁴ This friendly atmosphere was further of unknown value to the level of innovation in Silicon Valley.⁵ Malte 2011 has proved that a correlation exists between the way people get along with each other and the benefit of their output. He states that; "emotions are not ornament, they are the drivers of high engineering team performance".⁶ The origin of this collective identity was reinforced by the founders of the region. The founders were all white men with the same background. They all graduated from MIT or Stanford and none of them were locals. Most of the founders did thereby not have any industrial experience. They were not afraid to experiment with all kinds of organizational forms and technology.⁷ The attitude of these young founders would definitely be covered by the slogan 'living on the edge'.

Quasi-familial relationships arose between the entrepreneurs, engineers and even their spouses who were living in the Valley. This resulted in an environment in which information and influential individuals

² The birth of Silicon Valley (available at: www.npr.org).

³ Hwang and Horowitz 2012, p. 144.

⁴ The founder of LSI Logic, W. Corrigan, mentioned this in his interview with Saxenian; "There are a lot of people who come to work in the morning believing that they work for Silicon Valley." (Saxenian 1994, p. 37).

⁵ Rainforest Axiom #9 'Innovation and human emotion are intertwined' (Hwang and Horowitz 2012, p. 92).

⁶ Malte 2011, p. 87.

⁷ Saxenian 1994, p. 30-31.

were easy accessible.⁸ Nobody profited from hierarchy. HP, for example, removed every aspect which reflected the corporate hierarchy within the company, such as private offices and reserved parking spaces.⁹ Another phenomenon which contributed to the valuable exchange of information was the diversity that existed within the Valley. When people with different backgrounds (ethnicity, training, experience, et cetera) mingle, the output will be much more extensive.¹⁰ In line with the belief of Buddhists, people in Silicon Valley also believe that everything will, at a certain point, come back around. They are therefore convinced that one should 'pay it forward'.¹¹ People should help others without expecting something in return. They should exchange experience, ideas and contacts. One can say that intellectual property (hereinafter: IP) was regarded a common good.

By the end of the year 1970, the Valley counted around 6000, relatively small, electronics manufacturing and non-manufacturing firms. Although these companies were so dispersed, it did not have a negative effect on the competition, nor did it create economic feebleness. On the contrary, this situation was even beneficial for the economy of the Valley. Because of the fact that every firm was continually improving their innovations, one could not stay behind. If a firm wanted to compete with the others in the Valley, it needed to hop on the train of never-ending innovation. However, this continuous innovation required certain collaboration between the companies in the Valley.¹² The open-minded attitude caused rivals to exchange information and thereby spurring technological development. The economy of the Valley can therefore not be described as a simple free market.¹³ The result of this open and friendly atmosphere was an intensive collaboration between people living the Valley. These collaborations occurred in many different ways such as joint ventures, cross-licensing and second-sourcing agreements.¹⁴ The urge to innovate and create technological masterpieces brought people together.

Individualism did not play a major role in Silicon Valley since the urge to be part of the community was hundred times bigger.¹⁵ The common goal; to create the new next best thing, made people leave their origin behind.¹⁶ This can also be a reason for the fact that the career perspective of people living in the Valley was so different than the one of people for example living in the Netherlands. While almost every university graduate in the Netherlands is pursuing a career at a big international firm, jobseekers in the Valley preferred a function at a startup or another small company. The fact that small innovative technology companies were chosen above the large established firms became a rule of life for many engineers in the Valley's region.¹⁷

⁸ Hwang and Horowitz 2012, p. 172.

⁹ Saxenian 1994, p. 51.

¹⁰ Rainforest Axiom #10 'The greater the diversity in human specialization, the greater the potential value of exchanges in a system' (Hwang and Horowitz 2012, p. 102).

¹¹ Rules of the Rainforest #7 'Thou shalt pay it forward' (Hwang and Horowitz 2012, p. 172).

¹² Saxenian 1994 calls this the 'paradox of Silicon Valley' (Saxenian 1994, p. 46).

¹³ Saxenian 1994, p. 44.

¹⁴ Saxenian 1994, p. 45.

¹⁵ Hwang and Horowitz 2012, p. 155.

¹⁶ Hwang and Horowitz 2012, p. 117.

¹⁷ Saxenian 1994, p. 34.

The mentality of the Valley people was one of “err, fail and persist”.¹⁸ Entrepreneurs could not fail in starting a new company. The thought was that everybody was confronted with ups and downs. Failure was therefore socially accepted.¹⁹ The most important lesson was what you have learned from it. After crashing directly into a wall, it was not about the damage you left behind, but about the way you picked yourself up again.

Trust

To make these collaborations work, trust is an essential condition.²⁰ The initial problem with trust is that one party always needs to take the first step. However, it is necessary for parties to accept the fact that once in a while they will get deceived. The respondents of Hwang & Horowitz 2012 confirm this mentality by saying that one needs to trust everybody they are working with.²¹ Without mutual trust between parties, collaborations will eventually disappear. Furthermore, the American sociologist Fukuyama²² stated that the function of trust is to reduce transactions costs. Doing business in an environment where trust is missing can be very inefficient and expensive.²³ Because people in the Valley shared their ideas, a mutual relation of trust existed between the parties. Without this trust Silicon Valley would not have been so successful.

Connectors

Another factor that contributed to the success of these collaborations was the existence of, what Hwang & Horowitz 2012 call, ‘keystones’. Keystones are people living in the Valley who basically provide opportunities to cooperate. They bring people from totally different backgrounds together and create a stimulating environment. One can call them the ‘connectors’ of the Valley. According to Hwang and Horowitz 2012 keystones are people that are integrative, influential and impactful. They can bring people from different social origins together, while geographic distances do not really play a role. Further, they have the ability to make people do things they would normally not do. Steve Jobs for instance has built an organization culture within Apple that was driven by the goal to make excellent products. In this culture, innovation was the most important value. The employees of Apple were rewarded for experimenting, taking risks and expressing their creativity.²⁴ This culture caused the employees to create products they never thought they could produce, like for instance the iPhone as Steve Jobs describes; “[...] Nobody had ever thought about putting operating systems as sophisticated as OS X inside a phone, so that was a real question. We had a big debate inside the company whether we could do that or not. And that was one where I had to adjudicate it and just say, ‘We’re going to do it.

¹⁸ Rules of the Rainforest #6 ‘Thou shalt err, fail and persist’ (Hwang and Horowitz 2012, p. 170).

¹⁹ Saxenian 1994, p. 38.

²⁰ Rules of the Rainforest #3 ‘Thou shalt trust and be trusted’ (Hwang and Horowitz 2012, p. 162).

²¹ “Trust everybody that you work with. You’ll get screwed every once in a while, but ... people will want to do business with you” (M. Slaughter - former head of organization development at Marion Laboratories) and “The friction of getting deals done here is faster. You don’t lawyers everything to the nth degree.” (K. Fong - venture capitalist who has observed the role of trust in deal-making in Silicon Valley) (Hwang and Horowitz 2012, p. 162-163).

²² F. Fukuyama is a political scientist and political economist. He is also known as an author for writing, among others, *The End of History and the Last Man* (1992) (www.fukuyama.stanford.edu).

²³ Fukuyama 2001, p. 10-11.

²⁴ Wooten 2010, p. 8-9.

Let's try.' The smartest software guys were saying they can do it, so let's give them a shot. And they did."²⁵ However these connectors do not use any compelling methods, but they appeal to people's sense of responsibility in the long-run such as saving people's lives or changing the world. Finally, keystones are able to really achieve their goals. When a keystone possesses these three attributes he can function as the glue which connects totally diverged people. Also in cases where there is not a lot of trust, keystones can act as intermediaries of trust.²⁶ Without the presence of keystones in Silicon Valley, the region would probably not be a subject of this thesis.²⁷ Scientific evidence has also shown that the presence of keystones is related to the total innovate return of an economy.²⁸ Feldman & Zoller 2012 found in their study that in innovative regions such as Silicon Valley, the keystones are connected to each other "through common firm-actor ties in one primary inter-connected network". They suggest that the number of keystones active in a region is correlated to the level of regional entrepreneurship.²⁹

Government involvement

Not only had the free spirited and rebellious pioneers of Silicon Valley invoked the success of the cluster. The government definitely played a role in taking the Valley straight to the top. The U.S. Department of Defense played in the first place an important role. They provided military contracts to the startup companies. These contracts were crucial for these pioneering firms to get started and afterwards continue to grow.³⁰ The initiatives of the U.S. government were further essential in the development of the Silicon Valley venture capital industry. By launching various programs, the government tried to fill in the gaps of the venture capital cycle. Two different acts which were enacted in the '80 made it possible for early-stage technologies to become commercialized (the Bayh-Dole Act of 1980 and the Federal Technology Transfer Act of 1986). In order to attract venture capital and spur entrepreneurship within the Valley, the government also lowered the tax rate on capital gains, providing a favorable tax policy.³¹ Other programs which were created with the goal to finance innovations were for example the Small Business Innovative Research (SBIR) program and the Advanced Technology Programme (ATP). The first program is focused on the early-stage financing of innovations that have to potential to be commercialized. The program thereby motivates the small local businesses to take part in Federal Research/Research and Development.³² The second program is more focused on the later stage of financing innovation. The program helps the industry to invest in long-term research with high risks, but with a payoff that will be far more than a private profit.³³ Besides these initiatives, there were various other programs that were created to facilitate effective private investments by for example providing loans or expertise (appendix A).³⁴

²⁵ 'On the birth of the iPhone' (Steve Jobs speaks out - Fortune March 7, 2000).

²⁶ Hwang and Horowitz 2012, p. 67-73.

²⁷ Rainforest Axiom #7 'Rainforests depend on people who actively bridge social distances and connect disparate parties together' (Hwang and Horowitz 2012, p. 78).

²⁸ Feldman and Zoller 2012 use the term 'dealmaker' which is similar to the term 'keystone'.

²⁹ Feldman and Zoller 2012, p. 29-34.

³⁰ Lerner 2009, p. 32-35.

³¹ Wonglimpiyarat 2006, p. 1083.

³² www.sbir.gov.

³³ www.atp.nist.gov.

³⁴ Table 1: The US government programmes in financing innovations and Table 2: The actions of state government and private programmes (appendix A) (Wonglimpiyarat 2006, p. 1085 - derived from Etzkowitz et al. 2000).

The U.S. government further helped to create a solid relationship between the Silicon Valley area and Stanford University. The Stanford Research Institute (SRI) was created by Stanford with the attempt to bring the educational level closer to the industries of the Valley. After the institute failed to join the local established companies together with the academic researchers, the government started to provide sponsored contracts, especially in the defense related industry. Backed with the support of the government, the Stanford Research Institute was able to boost its reputation and subsequently attract funding provided by the industry.³⁵ In sum, one can conclude that the U.S. government definitely played a role in the development of the Silicon Valley cluster. Although it was not the main cause of its success, the interference of the government provided an important boost.³⁶

2. Geographic factors

Silicon Valley is located at the Southside of the San Francisco Bay in the American state California. The geographic factors of Silicon Valley prompted its development in becoming a successful industrial region. Initially, most of the companies were grounded close to Stanford University and the nearby situated industrial park in Palo Alto. Shortly after, other companies started to settle in the cities located in the south. Because of the natural frontiers formed by the peninsula San Francisco Bay and the Santa Cruz mountains all companies were located close together. This contributed to low-key and extensive communications between the companies.³⁷

The two big scientific and engineering research universities, Stanford and Berkeley, also played an important role. They contributed to the success of the Valley in several ways. Stanford provided extra possibilities for small companies to apply for their Honors Cooperative Program. These small companies were initially unable to offer their employees trainings and other education. With the support of Stanford, the small businesses were also able to attract new talented employees. During the 1960s and 1970s, Berkeley invested significantly in their engineering programs. Eventually, the university was training almost the equal number of electrical engineers as MIT and Stanford. Moreover, Berkeley developed itself into a major center of research with regard to computer science and semiconductors. Without the presence of these top universities, Silicon Valley would not have become such a unique technology industry.³⁸ However, the universities were not only of great importance. The California state university and communities colleges also played a role. The San Jose State University, for example, trained the same amount of engineers as Stanford or Berkeley. The different community colleges presented technical programs that belonged to the best programs in the nation. There also existed a valuable correlation between the community colleges and the local businesses. The community colleges provided private lessons for the employees of the local businesses. In return, the local businesses allowed the local schools to use their equipment. Some of them even donated money which was used to acquire, for example, computer equipment. Due to this localized industrial organization the number of branch plants and research labs increased significantly.³⁹

³⁵ Harayama 1998, p. 30.

³⁶ Lerner 2009, p. 41-42.

³⁷ Saxenian 1994, p. 30.

³⁸ Saxenian 1994, p. 41-42.

³⁹ Saxenian 1994, p. 42-43.

In addition, the venture capital industry benefited from the concentration of innovative companies. In contrast to the venture capitalist in New York, the venture capitalists in Silicon Valley were really involved in their investments. Besides providing financial support, the venture capitalist in Silicon Valley helped the entrepreneur to establish and create a company. Even in cases where problems arose, they intervened and tried to solve the issues. The geographic concentration contributed to the maintenance of these connections. It was possible for the venture capitalist to meet regularly and discuss possible deals, as far as rivalry did not prevent them from exchanging information.⁴⁰

The geographic proximity also contributed to the phenomenon of job-hopping in Silicon Valley. Because all companies were established so close together, changing jobs did not raise significant problems for an employee. The aspect of job-hopping will be further developed in the next paragraph.

3. Legal infrastructure

The information regarding the IP is transferred most efficiently by employees switching jobs. Employee mobility is therefore the crucial factor by which knowledge spillovers take place.⁴¹ However, the employer on the other hand wants to protect its IP. By inserting a non-compete clause in the employment contract, the employer may prevent the employee from starting at a competitive company or starting their own competitive firm. Nevertheless, the courts in Silicon Valley choose not to enforce the non-compete clause in most cases. This causes the creation of a legal infrastructure in California which is profitable for the innovative development of the region. Knowledge can be efficiently transferred between firms since the IP of a technology firm is for the greater part enclosed in the human capital of their employees. In order to protect its IP the employer can also insert a provision in the employment contract which prohibits the employee to use the IP after the termination of the employment contract for the duration of one to two years. If the employee transfers to another company, a contractual solution will have to be found between the employee, the original employer and the new employer. This solution will need to include an agreement on how the rights regarding the IP will be shared and dealt with. Some employers of the Valley tried to enforce employees to stay with the company by taking legal action. Since these attempts did not work, the employers accepted the fact that their employees were quickly interchangeable.⁴²

Trade secret law could provide another manner for employers to protect their IP. It is prohibited for employees to use trade secrets from their (former) employer, or exchange the knowledge that represents a trade secret. At first sight, this may seem an effective way to protect one's trade secrets, but unfortunately it is not. It is difficult for the employer to proof 'misappropriation of information' because of the vague definitions used in the Uniform Trade Secret Act (UTA). Litigation about a trade secret case is thereby considered to be costly and long lasting.⁴³ One can state that in California, trade secret law did not provide an adequate cause to bring a halt to high-velocity employment. It remains to

⁴⁰ Saxenian 1994, p. 39-40.

⁴¹ Gilson 1998, p. 25.

⁴² Saxenian 1994, p. 35.

⁴³ Gilson 1998, p. 28-32.

be difficult for a Californian employer to use trade secret law in order to force an employee to stay with the company or found a competitive startup.⁴⁴

The fact that the courts in California refused to enforce non-compete agreements plays a crucial role.⁴⁵ These 'post-employment covenants not to compete' prohibit an employee to start working at a rival or start their own competitive firm. The agreements are generally limited in time and geographic region. Employee mobility does obviously not benefit from non-compete agreements. Enforcement of such an agreement is namely a truism for a high velocity labor market. The fact that these agreements were non-enforceable in California therefore contributed to the high-velocity employment of the state. It provided Silicon Valley with the opportunity to develop a 'second stage agglomeration economy' through which it could start its product cycle once again.⁴⁶ Empirical evidence endorses these findings. Fallick, Fleischmann & Rebitzer 2005⁴⁷ researched the inter-firm mobility of college educated male employees in Silicon Valley's computer industry. They compared their results to similarly educated employees working in other computer clusters. The mobility rates of California are the highest compared to other computer industries. Their findings also contain the conclusion that non-enforceability of non-compete agreements under Californian state law spurs employee mobility and agglomeration in technology clusters.⁴⁸

Further is the socially accepted thought of job-hopping of great importance. Engineers in the Valley shifted so easily from employer that employee mobility became the norm. Several engineers talked about this phenomenon in the interviews held by Saxenian 1994. One said that since there is always a better opportunity waiting for the employees, they did not stay longer than two or three years with a company.⁴⁹ The management of the company of the leaving employee even gave the employee the possibility to return if things did not work out with the new employer. Changing jobs did thereby not withhold a great adjustment. Because all companies were situated so closely together one did not have to move and their children did not have to change schools.⁵⁰

A consequence of an environment in which employees move quickly is that companies are susceptible for external influences. Companies refrain from vertical integration since the smaller startups are able to offer products more efficiently and less costly. The startups can focus on producing one specific part and they do not need to produce the whole product.⁵¹ Anyway, even if firms would vertically integrate, this would not adequate protect their trade secrets. The number of employees that shift from employer is

⁴⁴ Hyde 1998, p. 30.

⁴⁵ Gilson 1998, p. 25.

⁴⁶ Gilson 1998, p. 35-36.

⁴⁷ It must be noted that this research only includes Silicon Valley's computer cluster.

⁴⁸ Fallick, Fleischmann and Rebitzer 2005, p. 11- 20.

⁴⁹ "Two or three years is about max (at a job) for the Valley because there's always something more interesting across the street." (Saxenian p. 35).

⁵⁰ Saxenian 1994, p. 34-35.

⁵¹ Saxenian 1994, p. 40.

too high. The valuable information about the original employer is transferred to the new one, who will in turn benefit from the information.⁵²

The “err, fail and persist” mentality of the Valley people, which was mentioned before, is similar to the way the U.S. deals with bankruptcies. Entrepreneurs that are declared bankrupt are not stigmatized as a bungler. They get a second change and a bankruptcy must be seen as a lesson.⁵³ An entrepreneur who has been declared bankrupt is an experienced entrepreneur. The U.S. bankruptcy laws are therefore considered to be ‘debtor-oriented’. Regarding personal bankruptcies, the U.S. provides a ‘fresh start’ under Chapter 7. A crucial element of this fresh start is the availability of a discharge. This discharge is an indication for a ‘forgiving’ personal bankruptcy law. Another factor that contributes to the level of forgivingness of the U.S. personal bankruptcy law is the minimal time it takes for a person to actually be discharged. Other elements which contribute to this indication are the generous exemptions regarding pre-bankruptcy assets and the possibility to make an agreement with creditors (appendix B).⁵⁴ The possibility for people who are declared bankrupt to make a fresh start has been proven beneficial for the development of entrepreneurship in the U.S. According to Armour & Cumming 2008 the availability of this fresh start indeed increased the number of self-employed persons with approximately 3.8 percent during 1990 and 2005.⁵⁵ Besides the personal bankruptcy laws, the corporate bankruptcy laws also indicate the entrepreneurship development of a country. More specific, the number of startups will increase according to lowering the risks regarding bankruptcies.⁵⁶ During 1990 and 2008 the average rate, compared to the total number of firms, of firms that settled in the U.S. was 0.10. Compared to the other countries Lee et al. 2010 researched this number is below average. The numbers of months that are spent on a bankruptcy in the U.S. are relatively high (on average 18 months). However, this is still below the average of 29 months it normally takes a firm to go through a bankruptcy procedure.⁵⁷ Another factor that is decisive is the cost of a bankruptcy. In the U.S., the average cost of a bankruptcy is 7 percent of the estate. The costs of a bankruptcy diverge significantly, from 36.0 percent of the estate in Thailand and 1.0 percent of the estate in Norway and Singapore (appendix C).⁵⁸ Overall, the most decisive factors, ‘costs of a bankruptcy’, ‘time spent on a bankruptcy’ and a ‘fresh start’ will promote entrepreneurship in the U.S. Armour & Cumming 2008⁵⁹ and Lee et al. 2010⁶⁰ show that bankruptcy laws are correlated with the levels of entrepreneurship in a country. Therefore it can be stated that the bankruptcy laws of the U.S. spur entrepreneurial activity. Still, one should keep in mind that the rates of

⁵² Gilson 1998, p. 20-21.

⁵³ This second change or fresh start is mainly covered by the Chapter 11 procedure of the U.S. Bankruptcy Code. Chapter 11 prescribes a reorganization for the debtor. This procedure is a useful way for reorganizing big companies. The debtor will keep in charge of his goods (‘debtor-in-possession’) and the creditors will not be able to enforce their rights (‘automatic stay’).

⁵⁴ Table 1 Summary statistics for Bankruptcy indices (appendix B) (Armour and Cumming 2008, p. 23).

⁵⁵ Armour and Cumming 2008, p. 18.

⁵⁶ Lee et al. 2010, p. 12.

⁵⁷ Lee et al. 2010, p. 13.

⁵⁸ Table 1 New firm entry rates (appendix C) (the ratio of new firms to the total number of firms) and bankruptcy law differences (Lee et al. 2010, p. 7).

⁵⁹ Armour and Cumming 2008, p. 18.

⁶⁰ Lee et al. 2010, p. 12.

entrepreneurship development in Silicon Valley are much higher than in other parts of the U.S.⁶¹ However, this is certainly not caused exclusively by the forgiving bankruptcy laws.

4. Investor friendliness

According to Kortum and Lerner 2000 venture capital has a significant influence on spurring technological innovation.⁶² It has also been proven that venture capital, as a form of equity financing, is generally used in innovative industries. It is thereby a suitable form of equity financing since venture capitalist are able to monitor and evaluate the companies they fund.⁶³ Small startups normally do not have the finances to develop their business. Instead, the value of a startup is imbedded in the human capital of the founder and their potential to become a successful company.⁶⁴

It needs to be mentioned that money was not the leading actor in Silicon Valley. In the venture capital model of the Valley, the venture is most important. Trust is thereby crucial. Without transparency and connectivity a venture capital model will not be able to be successful. The main issue is how money is distributed during the different stages of a firm's development. When an engineer has a great idea, he first needs finances to execute his research. Afterwards, he needs to be sponsored during the development of his prototype. Further he will need money to determine the feasibility of the market, acquire assets, et cetera. Especially during the seed-stage a little amount of cash can make a huge difference.⁶⁵ However, the total funding into seed-stage firms decreased with 31 percent in 2011 to 2012. In 2012, US\$725 million of seed-stage funding went to 274 companies. This is a decrease of 38 percent and the lowest annual seed dollars since the year 2003 (appendix D).⁶⁶ Looking at the distribution of venture capital in the U.S., one can see that most of it is in Silicon Valley. During 2011 to 2012 Silicon Valley received 41 percent of the total venture capital dollars and 31 percent of the total deals in the U.S. (appendix E).⁶⁷

The reason for the finance gap in the early-stages of a company is the transaction costs that are involved. Venture capitalists believe it costs too much time and money to work with emerging firms. They therefore prefer to invest in the later stages. Another reason can be the difficulty of organizing a fund. It takes a while before a venture capitalist is able to collect all funds. Since putting together a fund is so labor intensive, it often does not offset the benefits of such small deals. It is further dangerous for a venture capitalist to own more stock than the entrepreneur considers 'fair' as the entrepreneurial team may get demotivated. All parties will be worse off if this occurs. High risk investments in early-stage firms can simply not be treated the same as, for example, investing in a public stock.⁶⁸

⁶¹ Saxenian 1994, p. 2-3.

⁶² Kortum and Lerner 2000, p. 691.

⁶³ Carpenter and Petersen 2002, p. 69.

⁶⁴ Armour and Cumming 2006, p. 598.

⁶⁵ Hwang and Horowitz 2012, p. 220.

⁶⁶ PricewaterhouseCoopers National Venture Capital Association MoneyTree Report Q4 2012/Full-year 2012, p. 5 (appendix D).

⁶⁷ PricewaterhouseCoopers National Venture Capital Association MoneyTree Report Q4 2012/Full-year 2012, p. 9 (appendix E).

⁶⁸ Hwang & Horowitz 2012, p. 226-227.

The social environment of Silicon Valley overcame these pitfalls of seed-stage and early-stage venture capital investing. Because of the intensive relations of trust and social norms, the transaction costs related to these investments decreased. As was mentioned before, the geographic density caused venture capitalist to really be involved in their investments and even meet with other venture capitalists.⁶⁹ Silicon Valley's venture capitalists did not only provide money. They were also very active in different networks, both professional and social.⁷⁰ The law firms of the Valley also played an important role in nourishing these relationships of trust. The law firms brought people together and created new business relationships. Since the law firms knew all venture capitalist in the region they could easily set up a meeting with one of their clients if they needed funding.⁷¹ The positive effects of the presence of lawyers on the venture capital industry of Silicon Valley will be further discussed in Chapter 4 under point 2.

Another factor that contributed the flourishing venture capital activity in Silicon Valley are the liberal U.S. bankruptcy laws. According to Armour and Cumming 2006 entrepreneurialism is spurred by liberal bankruptcy laws and therefore increases the need for venture capital. According to the U.S. bankruptcy laws it takes little time for an entrepreneur to be discharged.⁷² This is regarded to be an aspect of a liberal bankruptcy law. Armour and Cumming 2006 also state that government involvement is a negative indicator for investor friendliness.⁷³ However, one should not forget that it was because of public subsidies Silicon Valley became what it is now. The reach of the Valley would not have been so extensive and it would not have created its distinctive character without the public involvement. The development of the venture capital industry of Silicon Valley is also influenced by government interference.⁷⁴ However, the government does not have a great role nowadays since it was a factor that spurred Silicon Valley in the beginning of its development.

Overall, the success of the Silicon Valley cluster can be attributed to various characteristics. Besides the formal aspects, the historical background and cultural mentality played a very important role in the development of the cluster. It was mainly because of the open-minded attitudes the region could maintain its levels of innovation and collaboration. The next chapter will focus on the characteristics of the Dutch cluster, Brainport and extensively describe the distinctive features of this region.

⁶⁹ Hwang & Horowitz 2012, p. 229.

⁷⁰ Saxenian 1994, p. 39.

⁷¹ Saxenian 1994, p. 41.

⁷² Table 1 Summary statistics for Bankruptcy indices (appendix B) (Armour and Cumming 2008, p. 23).

⁷³ Armour and Cumming 2006, p. 630.

⁷⁴ Lerner 2009, p. 41.

Chapter 2 Brainport

From Eindhoven with love

Eindhoven (the Netherlands), 1891. Anton and Gerard Philips founded the company 'Philips & Co.'. During the following years, the company became well known for its carbon-filament lamps. After the industrial revolution, Philips opened its first research laboratory and started to present innovations in the fields of x-ray and radio technology.⁷⁵ Nowadays, almost every family has a device manufactured by Philips in their homes. Philips contributed for a large share to the innovative technology industry of the Brainport region, awarded the 'smartest region of the world' in 2011.⁷⁶

1. Recent figures

People

In 2012, the region Southeast-Brabant counted around 740.000 and Eindhoven around 200.000 residents. The population of the cities Eindhoven and Helmond increased most in recent years compared to the other cities in the Southeast. There are also foreigners who migrate to the Brainport region. In 2010, 2.515 persons (net) moved to the region. This figure doubled compared to the figure of 2009. The number of people leaving the region keeps on decreasing. These numbers resemble the attractiveness of the region as a residence and thereby strengthen its dynamics and competitiveness. The region has an international character. The Asian population living in the region is the highest of the Netherlands. These people are considered to be knowledge workers and contribute to the diversity of the region. There are also a lot of American people active in the region.⁷⁷

Since 2000, the working population increased with 9.1 percent compared to an 8.8 percent increase nationwide. This increase indicates that the working potential of the region keeps improving since there are continuously more active people available. 34.1 percent of the working population is higher educated. This is a slight decrease compared to 2010, but still substantial more than in 2009. This figure is of great importance since it implicates the potential for the region to compete in a knowledge economy. Especially the number of beta students⁷⁸ is decisive for the creation of a high technology region. This figure is positive for the Brainport area since the number of beta students keeps on growing. The increase also includes 6 percent of foreign students studying at the TU/e, which is considerable since 2.9 percent of all the Dutch students study at the TU/e. Of all foreign students, 27 percent stays in

⁷⁵ www.philips.nl

⁷⁶ In 2011 Eindhoven was awarded the 'Intelligent Community of the Year' by the independent Intelligent Community Forum (www.intelligentcommunity.org).

⁷⁷ De kracht van de slimste, Brainport Monitor 2012, p. 11.

⁷⁸ A beta-student is a student who studies a science which is based on the laws and theories of nature, also known as the exact or positive sciences. Examples are; natural sciences, biology, chemistry and technical sciences (www.uu.nl/faculty/science.nl).

the Netherlands to work. This is a high percentage compared to other countries where 17 percent to 33 percent of the foreign students stay.⁷⁹

Technology

The Research & Development (hereinafter: R&D) capacity of the region is an important indicator for its potential to innovate. The region Southeast-Brabant spends annually €2.5 billion on R&D, or 9.3 percent of its gross regional product. In the Regional Innovation Scoreboard, the district North-Brabant stands in 16th place. This scoreboard contains the 20 most innovative regions. However, the expenses on R&D of the region Southeast-Brabant remain to be the same as two years ago.

Regarding the R&D expenses of companies, the region performs well. Four of the ten biggest investors in R&D are located in Southeast-Brabant. These companies are among others Philips, ASML and DAF Trucks. Other companies located in the region and represented in the top 30 are VDL, Sioux and Neways. The output of scientific knowledge is also an important indicator. 13.600 publications are released from the universities located in Southeast-Brabant. This is 13 percent of all the publications released nationwide. 46 percent of them were realized by international cooperation. Especially the TU/e and MU have a large share in these releases. The number of times a publication gets quoted is an indication for the quality of the publication. An average quotation-score of 'one' has been determined worldwide. The publications released from TU/e scored 1.4, publications released from MU scored 1.3 and from TiU 1.1.

Patents reflect the level of R&D activity of a region. They imply ideas and discoveries that have commercial potential. In 2007, most patents that were requested in Europe came from Southeast-Brabant. Moreover, of all patents requested in the Netherlands, 42 percent is coming from the region Brainport. However, the number of requested patents in the region as well as nationwide decreased previous years.

In order to achieve high levels of innovation, collaboration is crucial. Four out of ten innovative companies located in Southeast-Brabant work together. There are more collaborations occurring in Southeast-Brabant than in the remaining parts of the Netherlands. Still, between 2006 and 2008 the number of collaborations decreased. The number of international cooperation's is the highest in Southeast-Brabant. One out of four companies innovates in cooperation with an international partner. The turnover of companies in the region consists for 17 percent out of the sale of new or renewed products. Nationwide, the percentage for sales out of innovation is only 6 percent. This figure implicates the profitability of innovation for the firms in Southeast-Brabant.⁸⁰

Business

The gross regional product of Southeast-Brabant was in 2009 €25.2 billion, which is 4.4 percent of the Dutch total. Due to the financial crisis the gross regional product decreased substantially. Compared to 2008, the figure shrunk with 4.5 percent. This decline was considerably more than for the remaining parts of the Netherlands, which faced a decline of 3.9 percent.

⁷⁹ De kracht van de slimste, Brainport Monitor 2012, p. 74.

⁸⁰ De kracht van de slimste, Brainport Monitor 2012, p. 24-32.

In 2011 the economy of Southeast-Brabant expanded with 3.2 percent. The regional economy grew more than the overall economy of the Netherlands. However, during the financial crisis in 2009, the shrinkage of the economy of Southeast-Brabant was the largest compared to other regions in the Netherlands. This is because of the fact that most companies located in Brainport are very sensitive for the tendency of the market. Most companies in Brainport are active in volatile markets like the industry of automotive, semiconductors and machine manufacturing.⁸¹ In case of a bad economy, expenses in these industries can and will be postponed. Unlike for example the food producers or supermarket wholesale companies who are much less affected by a financial crisis, the high-tech companies in Southeast-Brabant are susceptible to the financial crisis. People will continue to buy food and beverage, but they will tend to postpone the purchase of a new car in cases of financial distress. Research has also proven that there are fewer investments in times of a fluctuation of the economy. This is also worrying since most innovative technology companies depend on external finances. The willingness of entrepreneurs to invest has also decreased since the beginning of 2007.⁸²

Southeast-Brabant is one of the three biggest export regions of the Netherlands. This is an indication of its international character. The region represents 6.1 percent of the total Dutch export. Although there was a significant decline in the export figures in 2009 (19 percent regional and 15 percent nationwide), the regional export figures increased above average in 2010 and 2011.

Startups create more jobs, goods and services and are therefore beneficial for a region. However, the number of startups that settled in Southeast-Brabant decreased substantial in the two previous years. Regarding the total number of companies in Southeast-Brabant, only 2.3 percent of them are startup companies. In comparison with the Southeast of the Netherlands (2.9 percent) and the Netherlands as a whole (3.1 percent) this is significantly lower. The percentage of entrepreneurs within the provinces North- and South-Holland is further significantly higher in 2011 than in the province North-Brabant (appendix F).⁸³ Although the number of self-employed people increased in recent years, it should be noted that this increase needs to be attributed to the people who started their own business, but did not hire any employees. It is thereby not expected that this group will employ anybody in the short run.⁸⁴ On the other hand, the companies that expanded the most are located in Southeast-Brabant. Quickly expanding companies have increased their employment with 60 percent within three years (minimal of 50 Full-Time Equivalent (FTE)). In 2011, there are 124 companies in Southeast-Brabant that can be considered a quickly expanding company. This is 11 percent of the total number of companies located in the region. Nationwide, only 8 percent of the firms can be considered to be quickly expanding.

Before 2011, the number of vacancies in the Brainport region was substantial lower than in the rest of the Netherlands. However, in 2011 the number of vacancies in Southeast-Brabant increased, while the

⁸¹ De kracht van de slimste, Brainport Monitor 2012, p. 4.

⁸² Trendstudie MKB en Ondernemerschap: Ontwikkelingen, vooruitblik en beleidssignalen, EIM/Panteia, March 2011, p. 119 and 121.

⁸³ The percentage of entrepreneurs is for North-Holland 19.5 percent and for South-Holland 18.6 percent, while the percentage for North-Brabant is 15.5 - Panteia datasets (available at: www.data.ondernemerschap.nl) (appendix F).

⁸⁴ CBS, Het Nederlandse ondernemingsklimaat in cijfers 2012, p. 7.

number declined nationwide. This figure indicates any shortages in the labor market, but also gives a good view of its tendency. Since 2001, the number of jobs in the region increased with 10.3 percent and nationwide with 7.1 percent. During the financial crisis the number of jobs stagnated on all levels. After 2009, the number first declined, but later increased in 2011. In 2011, the number increased more in Southeast-Brabant (1.7 percent) compared to the Southeast of the Netherlands (0.6 percent) and nationwide (0.3 percent). The regional economy can therefore be considered in good health.

With regard to the high-tech companies located in the region there also some interesting figures. In 2011, 6.3 percent of all medium and high-tech firms in the Netherlands are located in Southeast-Brabant. Compared to 2010, the number increased with 2.4 percent, which is less than the increase nationwide (4.3 percent). Most of the high-tech companies only have one employee (67 percent). The number of startups active in the high-tech industry is decreasing since 2009. In 2011 there were 137 high-tech startups founded (net). Of all the jobs in Southeast-Brabant, 13.5 percent of them are available in the medium and high-tech industry. Although this figure is highly subjected to the tendency of the market, there is a slight increase of the jobs in the high-tech industry in the region. Southeast-Brabant provides 8.2 percent of all high-tech jobs in the Netherlands.⁸⁵

2. Historical and cultural background

In response to the mass lay-offs of DAF and Philips in the early '90, 21 municipalities in the region of Southeast-Brabant decided to establish a collaboration. With the support of the European Union they created a fund, the 'Stimulusprogram', which would strengthen the economy of the region. The program appeared to be a success and formed the base for further collaborations between companies, governments and other institutions. This 'triple helix' formed the starting point of Brainport, a regional 'innovation-ecosystem'.⁸⁶

After DAF was sold in 1996 to the American company Paccar and Philips relocated its headquarters from Eindhoven to Amsterdam the self-confidence of the region was damaged. However the people living in Eindhoven did not despair. Without explicitly pronouncing the words 'Silicon Valley', they had the ambition to develop Eindhoven into a high-tech industry city and/or region.⁸⁷

The five industrial key industries of the region are; High Tech Systems & Materials, LifeTech, Automotive and Food & Design. These industries consist of interacting companies from geographical concentrations. They supply 16.1 percent of all jobs in Southeast-Brabant. They have thereby a spurring effect on the job creation in other industries.⁸⁸ The typical 'triple helix' collaboration establishes an extensive interaction between businesses, knowledge- and educational institutions and the government. This creates a profitable entrepreneurial environment for both small and medium enterprises (hereinafter: SMEs) as well as big international companies.

⁸⁵ De kracht van de slimste, Brainport Monitor 2012, p. 34-47.

⁸⁶ www.brainport.nl

⁸⁷ 'Eindhoven Valley: hoe een dorp de slimste regio ter wereld werd' (Fred Bakker - *Financieel Dagblad* April, 6 2013).

⁸⁸ De kracht van de slimste, Brainport Monitor 2012, p. 48.

The success of Brainport is the result of intensive collaboration, both on regional and international level. Scientists from all kind of disciplines are working together in the knowledge and manufacturing industry. Producers, designers and marketing professionals are constantly interacting. Even between the competitors in the region there is some level of cooperation. Regarding these collaborations there can however be some improvements made, since 'only' four out of ten innovative companies are working together. The intention of Brainport is to make and sell the products of tomorrow. It is constantly thinking ahead and trying to make a valuable contribution to the Dutch economy. Yet, it is sometimes difficult to bring the new innovations on the market and really commercialize them.⁸⁹ Nevertheless, together with the cities Amsterdam (airport) and Rotterdam (seaport), Brainport forms the fundament of the Dutch knowledge-intensive economy. The success of Brainport is therefore of great importance regarding the international competitiveness of the Netherlands.⁹⁰

Most people in Southeast-Brabant are more positive about entrepreneurship than nationwide. They consider an entrepreneur a successful person with high respectability.⁹¹ However, according to a report of the EIM the expectations of entrepreneurship are lower in Southeast-Brabant than in the Southeast of the Netherlands and in the Netherlands as a whole. This is remarkable since almost half of the respondents think they have what it takes to become an entrepreneur.⁹² Reason for this divergence is that the people living in Southeast-Brabant expect the least to start their own business within six months and in their own region because of the possible chances and possibilities that are present (40 percent). People living in the Southeast of the Netherlands and in the other parts of the Netherlands rate the possible chances and possibilities to start their own business within six month and in their own region from 43 to 44 percent. The fear to fail is also higher in Southeast-Brabant (20 percent) compared to the Southeast of the Netherlands (19 percent). In the other parts of the Netherlands the fear to fail is higher, namely 25 percent.

With regard to the Netherlands as whole there are some factors that may have a negative effect on the entrepreneurial activity within the country. In general, young Dutch people remain to have the presumption that experience is essential if one wants to establish its own business. They are often discouraged by other people and do not dare to take the jump. The hierarchy within Dutch companies contributes to these thoughts. Negative financial motives, like for example the loss of the study fee in case a student earns too much per year, will also influence the decision to become an entrepreneur.⁹³ Most entrepreneurs in the Netherlands are therefore older than 35 years (appendix G).⁹⁴ As a consequence, the career perspective of Dutch graduates mostly entails pursuing a career at a big international firm instead of starting at a small startup or start their own business. There are however some very inspiring

⁸⁹ 'Wat als ... Silicon Valley in Nederland ligt?' (Sjors Rodenburg - *Financieel Dagblad* November 21, 2012).

⁹⁰ www.brainport.nl

⁹¹ De kracht van de slimste, Brainport Monitor 2012, p. 80.

⁹² Ondernemerschap in Zuidoost-Brabant in perspectief, EIM/Panteia, 2012, p. 2-4.

⁹³ Dany Mekic at the conference 'Het een generatie denken!' on September 11, 2012 (available at: www.teeuwengroep.nl) and Danny Mekic in discussion with Ronnie Overgoor and Lars Sorensen at the Week of the Entrepreneur on April 11, 2013 (available at: www.ing.nl).

⁹⁴ In 2011, only 3.1 percent of the entrepreneurs is between the age of 15 and 25 and 14.9 percent of the entrepreneurs is between the age of 25 and 35 - Panteia datasets (available at: www.data.ondernemerschap.nl) (appendix G).

young Dutch entrepreneurs, like Danny Mekić⁹⁵ who try to encourage young people. Kickstartup⁹⁶, an initiative of young entrepreneurs, tries to connect other young entrepreneurs with each other. They have showed the documentary 'The Startup Kids' in cities throughout the Netherlands. By screening this documentary, which tells the story of the founders of, among others, Vimeo, Soundcloud and Dropbox, they hope to incentivize young people to think about entrepreneurship. Another project that aims to bring students and regional businesses together is the initiative Connection Innovators⁹⁷ which was launched in the week of 17 June this year. Unfortunately these initiatives remain the exception that proves the rule. KVK 18, a program of the Dutch Chamber of Commerce, could help young entrepreneurs in the development of their business. The program is especially focused on entrepreneurs younger than 18 and it tries to develop a platform for these young people by providing courses on how to start a business. Unfortunately, KVK 18 does not seem to be very active anymore.⁹⁸

Besides the young Dutch people who do not dare to take the jump and start their own business, there is another factor that may negatively influence the entrepreneurial development in the Netherlands, namely the fact that a bankruptcy is considered to be a real failure. If an entrepreneur does not succeed in successfully developing its startup, he is seen as a fool and loser. A bankruptcy in the Netherlands entails mostly a personal drama and the stigma of a defeat which is hard to erase.⁹⁹ The fear not to succeed can be an important reason for Dutch people not to elaborate their ideas and start their own company. Moreover, as was mentioned in Chapter 1, there is a correlation between the level of entrepreneurial activity and bankruptcy laws. This relation with regard to the Netherlands will be further developed in point 3 regarding the legal infrastructure of the Netherlands.

The fear of failure however, is in the Netherlands as a whole not disturbing or remarkable. In 2010, the Netherlands even ranked lowest in their fear of failure compared to the other innovation-driven economies such as Germany and Israel and even the U.S.¹⁰⁰ Yet, the gap between the Netherlands and the other countries in the innovation-driven economies remains very small compared to for example Greece where the fear of failure is the highest among all the other countries.¹⁰¹ In 2012, the fear of failure in the Netherlands was still low, although the figure increased a bit compared to the year 2010.¹⁰²

Another factor than can hinder the entrepreneurial development in the Netherlands is that most employees are comfortable working for an employer and not for themselves. There are thereby high opportunity costs involved if one wants to start their own business. Further is the need for achievement

⁹⁵ www.da.nny.nl

⁹⁶ www.kickstartup.nl

⁹⁷ www.connecting-innovators.nl and 'Connecting Innovators slaat brug tussen Tilburgse ondernemers en studenten' (*Brabants Dagblad* April, 26 2013).

⁹⁸ Their last posts on their website date back to June 2012 (www.kvk18.nl).

⁹⁹ Derksen and van der Pasch 2000, p. 3.

¹⁰⁰ GEM 2011, Global Entrepreneurship Monitor 2010 Global Report, p. 18.

¹⁰¹ In 2010, the fear of failure of the following jurisdictions was; the Netherlands 23.8, U.S. 26.7, Slovenia 27.5 and Switzerland 27.0 (GEM 2011, Global Entrepreneurship Monitor 2010 Global Report, p. 17 and 18).

¹⁰² Between 2010 and 2012, the figure increased from 23.8 to 30.0 (appendix H) (GEM 2012, Global Entrepreneurship Monitor 2012 Global Report, p. 21).

in the Netherland relatively low. Self-development often prevails over the need to perform above average.¹⁰³

3. Geographic factors

The region Brainport Eindhoven is an economic region with Eindhoven as its regional center. It is located in the Southeast of the Netherlands and considered an important top-technology region in Europe. The 21 municipalities¹⁰⁴ are united in the 'Alliance Region Eindhoven' (Samenwerkingsverband Regio Eindhoven (SRE)). In statistic data files the region is called Southeast-Brabant.¹⁰⁵ Located between three big airports, Schiphol Airport, Brussels Airport and Dusseldorf International Airport, the region is easy accessible. There are also two smaller airports situated nearby the region, Eindhoven Airport and Maastricht Aachen Airport. Public transport can take you directly further to the other cities in the Netherlands like Utrecht and Amsterdam. Other facilities, like patent bureaus and banks that are familiar with financing technology, are also present. The High Tech Campus Eindhoven, Philips Healthcare in Best and the High Tech Automotive Campus, located in Helmond, provide research facilities. Companies can share for example laboratories and equipment.¹⁰⁶

There are three big universities located in the region. The first one is the Eindhoven University of Technology (hereinafter: TU/e) which is known for its research in the automobile industry. The university has been rewarded number one in research with the industry. Compared to other universities worldwide, the TU/e has the most intensive collaboration with the industry. 15.6 percent of all released scientific publications are published with one or more co-authored industrial partner(s).¹⁰⁷ The second university is the University of Tilburg (hereinafter: TiU). This university is specialized in social and behavioral sciences, economics, law and business sciences. There are around 13.000 students studying at TiU. 8 percent of these students are international students.¹⁰⁸ Both in the fields of education and research is TiU well known. In the Top 100 Worldwide Economics Schools Research Ranking based on research contribution between 2008 and 2012, TiU is ranked 19th, just after the University of California (Los Angeles), but just before the University College London.¹⁰⁹ The last university is the youngest university of the Netherlands, Maastricht University (hereinafter: MU). MU distinguishes itself by its problem-based method of education. It is thereby the most international oriented university of the Netherlands. More than 50 percent of all master students are international students.¹¹⁰

¹⁰³ Stam et al. 2012, p. 7.

¹⁰⁴ The 'Alliance Region Eindhoven' was founded in 1993. It is an alliance of the following 21 municipalities in Southeast Brabant: Asten, Bergeijk, Best, Bladel, Cranendonck, Deurne, Eersel, Eindhoven, Geldrop-Mierlo, Gemert-Bakel, Heeze-Leende, Helmond, Laarbeek, Nuenen c.a., Oirschot, Reusel-De Mierden, Someren, Son en Breugel, Valkenswaard, Veldhoven en Waalre (www.sre.nl).

¹⁰⁵ De kracht van de slimste, Brainport Monitor 2012, p. 4.

¹⁰⁶ www.brainport.nl

¹⁰⁷ www.leidenranking.com

¹⁰⁸ www.tilburguniversity.edu

¹⁰⁹ TiU received a total score of 171 point, which is an increase of 24 points with regard to the previous period (www.econtop.uvt.nl).

¹¹⁰ www.maastrichtuniversity.nl

4. Legal infrastructure

Employment protection, including high costs regarding a discharge or liability, is considered to be burdensome to the employer.¹¹¹ This could negatively influence the entrepreneurial development of a country since high levels of employee protection will lower the percentage of the growth ambition of entrepreneurs.¹¹² With regard to the interests of the entrepreneur, a low standard of employment protection is therefore favored.¹¹³ The Dutch labor market is less flexible than in other countries. In the Netherlands, there is a higher level of employment protection compared to the other countries in the E.U. According to the 'difficulty of firing index' it is the hardest to fire an employee in the Netherlands. The compensation regarding a discharge is in the Netherlands however lower than in most E.U. member states. Larger countries, like the U.K. and Germany assign higher compensations in the case someone is fired. The high employment protection in the Netherlands is therefore moderated by lower dismissal compensations.¹¹⁴ The fact that it is so hard to fire an employee in the Netherlands will result in a lower level of employee mobility. This will subsequently cause less knowledge spillovers.¹¹⁵

The rules regarding the protection of IP can provide another manner for employers to retain the intellectual properties which were developed and created by the employees within the company. Employers could for example implement a provision in the employment contract including that the employer will have the right to the ownership of all the IP generated by the employee for the duration of one to two years. It is also possible to insert a non-compete clause which prohibits the employee to, after the termination of the employment contract, start working at a competitive firm or start his own competitive company. It is important that the competitive activities are precisely described in the non-compete clause to prevent misunderstandings from occurring. The employee needs to accept the non-compete clause by letter. This will most of the time occur by signing the employment contract. The employee further needs to be older than 18 years.¹¹⁶ If the clause brings along unreasonable negative consequences for the employee, taking into account the interest of the employer that need to be protected, the court can eliminate the non-compete clause or at least a part of it.¹¹⁷ If the employee does not comply with the clause, the employer can claim a periodic penalty payment. The Dutch IP law has an international character and is mainly based on international treaties and European regulations.¹¹⁸ One of the latest regulations is the one regarding the patent package. This legal initiative consists of two regulations and an international agreement, all with the intention to create a unitary patent protection in the E.U. The third and last aspect of this patent package is the creation of a Unified Patent Court which will support the formation of a specialized patent jurisdiction. This package will thereby create an extensive cooperation between the 25 member states that agreed on the patent package. It will further

¹¹¹ Wie wordt werkgever? De omvang en kenmerken van werkgelegenheidscreatie door zelfstandigen zonder personeel, EIM/Panteia, March 2013, p. 15.

¹¹² GEM 2011, Global Entrepreneurship Monitor 2010 Global Report, p. 20 and Stam et al. 2012, p. 12.

¹¹³ CBS, Het Nederlandse ondernemingsklimaat in cijfers 2008, p. 202.

¹¹⁴ CBS, Het Nederlandse ondernemingsklimaat in cijfers 2008, p. 202-204.

¹¹⁵ Gilson 1998, p. 25.

¹¹⁶ Art. 7:653 lid 1 Dutch Civil Code (Burgerlijk Wetboek (BW)).

¹¹⁷ Art. 7:653 lid 2 Dutch Civil Code (Burgerlijk Wetboek (BW)).

¹¹⁸ Kooij, van der and Mulder 2010, p. 8-9.

reduce the costs since one does not need to request a separate permission in each country, since the permission is considered equal in each of the 25 member states that signed the patent package.¹¹⁹

As was mentioned before, bankruptcy laws are related to the entrepreneurial activity of a region or country.¹²⁰ The availability of a fresh start is for example an indication that may increase the number of self-employed persons in a country.¹²¹ The Dutch bankruptcy law is however focused on the protection of the creditor and is therefore considered to be creditor-oriented. There are few possibilities for a bankrupt entrepreneur to reorganize its company. One of the insolvency mechanisms, the suspension of payment regulation ('surséance van betaling'), which was initially created to provide a reorganization possibility for insolvent companies, leads in most of the cases nevertheless to a bankruptcy.¹²² In response to the lack of an effective reorganization mechanism, several Dutch courts tend to more often institute a silent administrator in situations where a company is about to be declared bankrupt. This silent administrator is appointed to prepare a start true of the company in order to prevent unnecessarily losses of jobs and capital elimination. Such a 'pre-pack' is not yet codified in the Dutch bankruptcy laws and there are therefore some opponents who argue that they may not be used. However, the use of a pre-pack can be beneficial. The trustee Louis Deterink for example sold the company Prime Champ in his function as a silent administrator and 750 of the 900 employees of Prime Champ could therefore keep their job.¹²³ The proposal regarding the Dutch insolvency law which was conducted in 2007 contained a regulation concerning such pre-packages.¹²⁴ The proposal was however dismissed by the Minister of Justice, who stated that, taking into account all circumstances, it is not necessary to be making integral changes to the current insolvency law. Regarding personal bankruptcies, the Dutch government initiated the 'Law debt restructuring natural persons' ('Wet Schuldsanering Natuurlijke Personen' (WSNP)) in December 1998. This law provides a fresh start to individuals who, despite the fact that they were acting in good faith, have so many debts that they are unable to settle all their creditors. Conditions are that the individual debtor, during the course of three to five years, needs to behave appropriate and may not enter into any new excessive financial obligations. He is thereby obliged to work or actively search for an occupation. If the debtor is able to meet these conditions he will receive a clean slate and his debts will no longer be enforceable.¹²⁵ This clean slate is an indication for a forgiving personal bankruptcy law. According to Armour & Cumming 2008, such a fresh start is an indication that can increase the number of self-employed persons. It is therefore a positive element with regard to the entrepreneurial development of the Netherlands.¹²⁶ On the other side, the time for a

¹¹⁹ www.ec.europa.eu.

¹²⁰ Armour and Cumming 2008 and Lee et al. 2010.

¹²¹ Armour and Cumming 2008, p. 18.

¹²² Derksen and van der Pasch 2000, p. 3.

¹²³ 'Crisis dwingt rechter tot nieuwe aanpak bankroet' (Siem Eikelenboom, Joris Kooiman and Jan Verbeek - *Financieel Dagblad* June 14, 2013).

¹²⁴ Art. 7.1.7 Voorontwerp Insolventiewet, Commissie insolventierecht, November 2007 and Huizink 2009, p. 11.

¹²⁵ Title III Dutch Bankruptcy Law (art. 284-362), Wessels 2012, p. 79-117, 238-263 and 285-297 and www.wsnp.rvr.org.

¹²⁶ Armour and Cumming 2008, p. 18.

person to actually be discharged in the Netherland is very long (appendix B).¹²⁷ Furthermore, the number of months that are spent on a bankruptcy in the Netherland is slightly more than 12 months (appendix C). This is normal compared to the other countries and definitely less than the average of 29 months.¹²⁸ Elements which will negatively influence the favorability of the Dutch bankruptcy law are the negative exemptions regarding pre-bankruptcy assets (appendix B). On the other hand, the costs of a bankruptcy are on average 4 percent of the estate, which is acceptable. Another factor which can influence the favorability of a bankruptcy law is the minimum capital that is needed to form a private company. In October 2012, the Dutch government accepted the bill concerning the simplification of the law regarding private companies. Part of this bill was the elimination of the required minimum capital of €18.000.¹²⁹ This adaption will have a positive effect on the favorability of the Dutch bankruptcy law and subsequently on the entrepreneurship in the Netherlands.¹³⁰

Nevertheless, because of the lack of an effective reorganization mechanism and the long period until a discharge, the Dutch bankruptcy law cannot be considered to be forgiving and will therefore not have a real positive effect on the development of entrepreneurial activity within the country.¹³¹

5. Investor friendliness

Regarding the Netherlands, the level of invested risk capital¹³² in 2011 has decreased in comparison to the period between 2001 and 2005. The risk capital that was invested in the early-stages of the development of a company has however increased in 2011. Early-stage investments include the funding of the research and development activities that are conducted prior to the real establishment of the company. It seems to remain the trend that there is more invested from the Netherlands in countries abroad than vice versa.¹³³

Regarding SMEs, including most innovative startups, there are high risks involved and insufficient securities provided. It is hard for investors to identify the risks since there is a lot of information asymmetry involved and the related transaction costs are relatively high. Investing in a SME is therefore not always preferred by a venture capital fund.¹³⁴ The presence of intermediaries may reduce these information asymmetries and transaction costs.¹³⁵ An example of a connector located in the Brainport area that is able to foster business relationship is the exclusive meeting house, 'Boordhuys', located nearby the city Eindhoven. This unique concept is a perfect place for companies to hold business meetings and brainstorm sessions. The hostess who created this place is thereby able to make perfect

¹²⁷ The number of years until a typical discharge in the Netherlands is three years (appendix B) (Armour and Cumming 2008, p. 23).

¹²⁸ Lee et al. 2010, p. 13.

¹²⁹ Art. 2:178 Dutch Civil Code.

¹³⁰ Armour & Cumming 2008, p. 9 and 23.

¹³¹ Armour and Cumming 2008, p. 18 and Lee et al. 2010, p. 12.

¹³² Risk capital is used to invest in projects with high risks involved. These projects are most of the time also very innovative (CBS, Het Nederlandse ondernemingsklimaat in cijfers 2012, p. 25).

¹³³ CBS, Het Nederlandse ondernemingsklimaat in cijfers 2012, p. 58.

¹³⁴ EIM nieuwsbericht no. 11, October 2010, p. 3.

¹³⁵ Bernstein 1995, 245-248.

matches, whether these linkages need to be made between people or businesses.¹³⁶ Nevertheless, the beneficial effects of the present connectors in the Brainport cluster are far from similar to the effect they elicited in Silicon Valley. Unlike in the Californian cluster, there are not enough intermediaries, especially lawyers acting as intermediaries, present in the Brainport region that can foster such business relationships.¹³⁷ Moreover, the importance of such connectors needs to be emphasized since their presence is correlated with high startup rates.¹³⁸ The specific positive influences of lawyers, acting as intermediaries will be further developed in Chapter 4, The evolution of contracting.

Finally, the lack of intermediaries within the Brainport cluster is an important explanation for the lack of venture capital in the region Southeast-Brabant. There are however some venture capital funds present in the Brainport region, like the Stimulus Venture Capital Fund (SVCF) and the Eindhoven Venture Capital Fund (EVCF). The companies located in Brainport are thereby trying to attract American investors.¹³⁹ Nevertheless, it does not seem to provide enough finances. Moreover, the angel investors and the wealthy family businesses are not very willing to invest in the innovative high-tech companies, but they prefer to support stable and tradition businesses.¹⁴⁰

Overall, the Brainport region Eindhoven is successful in different fields such as its research and innovative achievements. There are however some pitfalls which can hinder a prosperous development of the innovative cluster. In order to get a clear insight in the phenomenon of innovative clusters, the next chapter will include a clarification of innovative clusters in general and also an elaboration of other innovative clusters around the world.

¹³⁶ www.boordhuys.nl

¹³⁷ McCahery and Vermeulen 2010, p. 484.

¹³⁸ Feldmand and Zoller 2012, p. 34-36.

¹³⁹ www.brainport.nl.

¹⁴⁰ 'Wat als ... Silicon Valley in Nederland ligt?' (Sjors Rodenburg - *Financieel Dagblad* November 21, 2012).

Chapter 3 Innovative clusters

From flop to hub

cluster /'klʌstə(r)/ • **noun** *a group of similar things growing closely together: clusters of creamy-white flowers.*

- *a group of people or similar things positioned or occurring close together: a cluster of antique shops.* ▪ **Astronomy** *a group of stars or galaxies forming a relatively close association.* ▪ **Linguistics (also consonant cluster)** *a group of consonants pronounced in immediate succession, as str in strong.*
- *a natural subgroup of a population, used for statistical sampling or analysis.* ▪ **Chemistry** *a group of atoms of the same element, typically a metal, bonded closely together in a molecule.*

innovative /'ɪnəʊveɪtɪv/ • **adjective** *(of a product, idea, etc.) featuring new methods; advanced and original:*

innovative designs | innovative ways to help unemployed people.

- *(of a person) introducing new ideas; original and creative in thinking: an innovative thinker.*

(The New Oxford Dictionary of English 1998)

1. General

Porter 1990 and 2001 states that collaborations of businesses within a cluster will support the innovative development.¹⁴¹ The presence of clusters and the phenomenon of innovation are therefore correlated. Clusters provide companies possibilities for continuous innovation. Companies located in a cluster can anticipate better and more quickly to the needs of the market. Interaction with other entities or even competitors ensures that the companies are constantly up to date in the fields of technology, marketing and service. The exchange of information between firms is easier in a cluster because of the concentration of companies and short distances between them. Local suppliers in a cluster are more involved in the development of innovations. They provide the sources a company needs to implement innovations. Firms in a cluster can thereby adapt more quickly to the customers' needs. The presence of local suppliers also reduces development costs. It is for example not necessary to enter into long-term commitments or worry about securing deliveries. Constant competition between the firms in a cluster ensures their sharp-mindedness and also spurs innovative development.¹⁴² According to the theory of transaction costs introduced by Coase in the 1930s¹⁴³, the creation of companies can be seen as a way for people to lower their costs by working together on a regular basis. The formation of clusters can subsequently be seen as an extension of this concept; the transaction costs will be lowered when people are working and living closely together in a cluster.¹⁴⁴ Nevertheless, some authors are of the opinion that innovative development can still occur without a cluster as its guardian angel.¹⁴⁵

Several components have been described of which an innovative cluster needs to consist. In the first place there needs to be a knowledge infrastructure. This infrastructure is formed by the presence of universities and R&D institutions and will provide the necessary skilled manpower. Secondly, there needs to be an extensive collaboration between the universities, R&D institutions and the industry, since

¹⁴¹ Porter 1990 and Porter 2001.

¹⁴² Porter 1998, p. 83.

¹⁴³ In his article 'The nature of the firm', Coase states that firms emerge when the transaction costs outweigh the benefits of trading through contracts (Coase 1988, p. 19-32).

¹⁴⁴ Hwang & Horowitz 2012, p. 46.

¹⁴⁵ Hwang & Horowitz 2012, p. 42.

it is important for the universities and R&D institutions to anticipate to the needs of the market. They need to produce developments that are relevant for the industry and train manpower in a way that they become an added value for the market. In the third place, the innovations need to be commercialized since there needs to be some money made. The prospect that innovations will become profitable in time is thereby the greatest incentive for players in the market to innovative. An incentive to innovate is created when one is given the promise of more money if one innovates. In the fourth place, supporting industries and services need to be present. One can think of the support of specific suppliers like for instance the companies Nedschroef (Helmond) and Fabory (Eindhoven and Helmond) who are supplying DAF with specific bolts and screws or the general support of for example lawyers.¹⁴⁶ In the last place, a supportive regulatory framework and business environment is required. A cluster can be seen as a sophisticated Swiss watch; if one radar is missing or not working appropriate, the cluster will not tick.

Most components seem very broad. It is therefore interesting to look at other innovative clusters, besides Silicon Valley and Brainport, to see in which way they gave substance to these components. The clusters of Singapore, Israel and Boston-Route 128 will be discussed successively.

2. Innovative clusters around the world

2.1 Singapore

According to Solidiance, a strategy consulting firm located in Asia, Singapore is the most innovative city in Asia-Pacific. Singapore was able to transform itself from a trading port into an innovative high-tech and financial cluster due to continuous and crucial improvement in the past 25 years. The city was also ranked 'the best place to do business' by the World Bank due to its stable environment. This structured environment was created due to strict government supervision and regulation. Other factors that contributed to the success of Singapore are the technological advancement, the availability of a well-developed education system and its ability to attract foreign talent. Between 2000 and 2012 the population of foreign people living in Singapore increased with 4 percent or 1.3 million people.¹⁴⁷

Biomedical Sciences Cluster

In Singapore, there are two clustered that can be discussed. The first one is the biomedical sciences (hereinafter: BMS) cluster which was created from the bottom-up. Initially, there was no activity with regard to the BMS cluster. However, the government of Singapore did not wanted to rely solely on electronics and IT manufacturing and the plan was therefore to put more emphasis on the development of BMS and technology. Besides the industries of electronics, engineering and chemicals, the industry of life sciences needed to become a fundamental aspect of the economy in Singapore. The final goal was to transform Singapore in the most sophisticated BMS hub of Asia. In order to achieve this goal, the government set up several initiatives like the setup of different research committees and advisory councils in the fields of BMS and bioengineering.¹⁴⁸ These research institutes were supported with a

¹⁴⁶ Other companies that supply DAF with specific parts are; Frist van Dijk (Nuenen) who provides tires, trailer parts, air pressure components and VDL who provides bus parts.

¹⁴⁷ Asia's most 'innovative city' is ... (By Ramy Inocencio, for CNN, March 11, 2013) (available at: www.cnn.com).

¹⁴⁸ Example of these committees is the Bioprocessing Technology Institute (BT) which was founded in 1995 with the goal to conduct research in the fields of, among others, stem cells and expression engineering (www.bti.a-

US\$1 billion trust fund to help develop new R&D discoveries by global pharmaceutical companies and also to help with the construction of a new life science complex, which was called, Biopolis. This complex was built in order to create a collaborative environment and also to serve as a 'visible' hub for life sciences. Biopolis was located nearby the National University of Singapore (NUS), the National University Hospital (NUH) and the Singapore's Science Parks.

A possible weakness in the innovative development of Singapore can be the lack of connection between several branches. In order to promote these linkages, the government also formed several consortia which needed to promote collaborations between sectors. These consortia are for example active in joint training and joint projects. They further created links between local and foreign institutes.¹⁴⁹ From 2000 and further, the initiatives seemed to be rewarding. Firstly, there was a significant expansion of the biomedical sector, of which the output of the pharmaceutical manufacturing increased between 2000 and 2006 by four times the original output. Secondly, the output of the medical technology sector increased to US\$2.1 billion in 2006, while it was only US\$31.4 million in 1980. Both the pharmaceutical and medical technology manufacturing industries, represented together as a whole in the BMS cluster, generated an output of US\$23.0 billion in 2006. This figure implicated that the BMS cluster has been growing every year, since 1980, with an annual rate of 17.9 percent. Figures representing its fastest growth have been measured since 2000. The government initiatives also had a positive effect on R&D. While the BMS R&D in 1993 was only US\$431 million, the expenses increased rapidly since 2000. In 2006, the R&D expenses in the field of BMS even exceeded US\$1 billion. However, compared to the expenses that are made by for example the U.S., the R&D growth in Singapore is still insignificant. While the U.S. is spending approximately US\$38 billion in 2002 on annual funding for biomedical R&D, Singapore's annual funds for biomedical R&D do not even reach US\$700 million.

The government institutions that were responsible for the creation of a new BMS hub in Singapore were the Agency for Science, Technology and Research (A*STAR) and the Economic Development Board (EDB). While the first institution was more focused on forming the right policies and resources, the second institution was responsible for attracting finances and creating a long-term economic value for the BMS industry. Since the BMS cluster needed to be developed from scratch, there were no high educated people in the fields of BMS. Singapore therefore needed to attract international talent to succeed in its BMS development. In order to attract this talent, the government was advised by some very established advisory bodies, like the International Advisory Council (IAC) and the Bioethics Advisory Committee (BAC). This last committee advised Singapore in the development of its regulatory environment, more specific the acceptance of stem cell research and the use of cloning. This gave Singapore an advantage compared to other countries in the fields of for example In Vitro Fertilization (IVF) treatment. Besides attracting the star scientists which were seated in these established advisory boards, the government also financially supported their top students by letting them study at leading research universities. The

star.edu.sg). An example of such an advisory committee is the Genetics Modification Advisory Committee (GMAC) which, among others, advises on the R&D, production, use and handling of genetically modified organisms. The committee thereby facilitates public education and creates awareness on genetic modification issues (www.gmac.gov.sg) (Wong, Ho and Singh 2009, p. 54).

¹⁴⁹ Examples of these consortia are the Singapore Cancer Syndicate or the Singapore Stem-Cell Consortium (Wong, Ho and Singh 2009, p. 19).

condition was, however that the students needed to return to Singapore after they received their degree in science or business education. Next to the role of foreign universities, the local universities were also of importance in the fields of R&D and education. Local educational institutions provided programs that focused on educating people in the fields related to the BMS cluster. The most ambitious initiative was the realization of a second medical school. The Economic Development Board (EDB) further attracted investments from established multinational corporations like GlaxoSmithKline¹⁵⁰, causing the BMS cluster in Singapore to be dominated by foreign firms. Encouraged by the Economic Development Board (EDB), these multinational corporations also founded several R&D and clinical research institutions within in the cluster.

The biomedical industry is very capital intensive and risky and therefore needs a well-developed venture capital industry. The venture capital industry in Singapore was undeveloped since there were no other high-tech companies that were making use of any venture capital. Therefore, the government took the lead in providing several funds that were related to life-sciences. The fund management Bio*One Capital became responsible for these funds and by 2009 it was managing about US\$1.2 billion. Bio*One Capital is a subsidiary of EDB Investments (EDBI), a leading strategic state-run investment firm. EDB Investments is the corporate investment arm of Singapore's Economic Development Board (EDB). Bio*One Capital is a private equity and venture capital firm which is specialized in investments in growth capital and late-stage private and public companies.¹⁵¹ The fund is public-funded and managed by experienced venture capitalist. The senior vice president, Lawrence Chin M.D. has for instance investment experience regarding startups, joint ventures and mergers and acquisitions in Singapore, but also in Australia and the U.S. Heng-Tong Choo, the senior vice president of investments of Bio*One Capital has thereby more than 12 years of experience in investments and industry development including international growth into new markets involving both multinationals and startup companies.¹⁵² These funds are used to support companies that are active in industries such as the medical technology industry and the drug discovery/development industry. Bio*One Capital also supports startups, including a number of local university spin-offs, and even convinced some companies to move a part of their operations to Singapore.¹⁵³

Singapore's Maritime Cluster

The second cluster which was formed in Singapore was the offshore marine engineering cluster. Due to its strategic location, the Singapore's Maritime Cluster (hereinafter: SMC) was already well developed and a very important shipping location worldwide. However, the goal of the government was to expand the SMC and to become the most dominant and established International Maritime Centre of Asia. In recent years, the SMC has grown extensively. While the generated value added in 2000 was only US\$8.104 billion, the generated value added in 2005 was US\$14.311 billion. This implicates an increase

¹⁵⁰ In 2005, Glaxo Wellcome Manufacturing Pte Ltd was the largest pharmaceutical company located in Singapore, representing US\$30419.6 million of the total sales of the six largest pharmaceutical companies located in the city (total sales was US\$3,388.1 million) (Wong, Ho and Singh 2009, p. 58).

¹⁵¹ www.edbi.com

¹⁵² Other key executives of Bio*One Capital are; Sarah Ho (director of finance), Laura Chang (legal counsel and associate director) and Eugene Khoo (senior director of corporate finance) (www.investing.businessweek.com).

¹⁵³ Wong, Ho and Singh 2010, p. 7-24.

of 2.3 percent in the share of Singapore's total GDP (5.1 percent for 2000 compared to 7.4 percent in 2005).¹⁵⁴ From 2000 until 2005 the SMC kept on growing with 12 percent annually and the employment rate increased almost every year with 7 percent. Besides the output the SMC generates in the maritime sector, it also has a substantial connection with regard to the rest of the economy of Singapore. In 2005, the return earned outside the maritime sectors was for instance very notable, namely US\$31.4 billion. In order to enhance the competitiveness and spur the growth of the SMC, the government wanted to improve the capacity of work and further increase the availability of knowledge. The Port of Singapore is a good example of a traditional aspect of the SMC which was subjected to fierce competition, but could resist due to extensive investments and improvements in ICT and automation. These investments resulted in a substantial increase of the Port's productivity and enabled the Port to attract more vessel traffic, compared to its competitors in Malaysia (Port Tanjung Pelapas) and China. Other improvements were made by Singapore's Ministry of Transport in order to create a successful International Maritime Centre (IMC), like the providence of for example maritime insurance and legal services. The Maritime & Port Authority (hereinafter: MPA) has thereby the intention to attract important players from all over the world, but also motivates local entities to participate.

Not only is the MPA focused on the traditional activities, but the authority also wanted to expand into constructions with regard to offshore oil and gas platforms and engineering activities. Nowadays, the two largest players in the offshore engineering construction branch, are located in Singapore, namely Keppel FELS and SembCorp Marine. Both are known as the largest oil-rig builders worldwide. This extension towards new markets creates possibilities regarding R&D and IT projects. However, the maritime sector was not always focused on R&D activities and patent creation. Only in recent years the government started to pay attention to spurring R&D activity by setting up different collaborations with higher educational institutions. Examples of these institutions were the Delft University of Technology (The Netherlands) and the Imperial College of the University of London (U.K). These collaborations also covered R&D projects with local companies. One of the universities in Singapore, the Nanyang Technological University (NTU) helped to increase the number of students educated in the fields of marine engineering by providing a graduate program. This program was financially supported by leading offshore and marine engineering firms. By providing consultations to SMEs, the Marine & Offshore Technology Centre of Innovation (COI (MOT)), helped enterprises with the realization of improvements regarding their technological capability. Further initiatives of the MPA was the signing of a Memorandum of Understanding with the Research Council of Norway (RCN), which included the creation of a framework consisting of both parties and several other research and academic institutions from Singapore and Norway. Goal of this framework was the collaboration of all parties with regard to multiple projects in the fields of maritime R&D, education and training. Moreover, the MPA provided a US\$100 million fund, the Maritime Innovation and Technology (MINT) Fund, to support various development projects.¹⁵⁵ This initiative was initiated by the government of Singapore in order to boost the maritime industry. The Maritime Innovation and Technology (MINT) Fund wants to motivate local and foreign firms with a local presence in Singapore to undertake maritime-related R&D.¹⁵⁶ In the

¹⁵⁴ Wong, Ho and Singh 2010, p. 66.

¹⁵⁵ Wong, Ho and Singh 2010, p. 24-44.

¹⁵⁶ www.mpa.gov.sg.

beginning of this year, the MPA announced that it will continue the Maritime Innovation and Technology (MINT) Fund. The government of Singapore, more specific the statutory board MPA under the Ministry of Transport, will provide an extra budget of US\$50 million during the next five years to spur the R&D activities within the cluster.¹⁵⁷

Overall, the extensive involvement of the government contributed for a large share to the success of Singapore as an innovative cluster.¹⁵⁸ More specific, the financial support of various government agencies was crucial for the creation of the R&D initiatives and collaboration with (foreign) educational institutions. The presence of several established institutions and companies in Singapore was also essential in order to improve the performances of both clusters.¹⁵⁹

2.2 Israel

In 2000, Israel was ranked the second largest and dominant high-tech center in the world, just after the Californian cluster, Silicon Valley. Israel shared its position with the innovative centers Route 128 in Boston and the Stockholm-Kista area. This ranking was based on the presence of several factors needed to create a new Silicon Valley, under which the ability of local universities and research facilities to train skilled workers or develop new technologies and the entrepreneurial drive of the population to start new ventures.¹⁶⁰ Israel got a total score of 15 points¹⁶¹. This was only one point less than the total score of Silicon Valley.¹⁶² Besides the fact that Israel's economy was already strong and well developed there are several other factors that contributed to its successful development. These factors will be discussed one by one in the following paragraphs.

Well-educated workforce

A first factor which contributed to the success of Israel was the presence of a well-educated workforce in the fields of science and engineering. Since the opening of the first university in Israel in 1924, the Technion in Haifa, the country had extensive human resources possessing a very broad professional, but also scientific knowledge. In the following years, the number of universities increased and by the early 1970s Israel counted six university-level institutions of education and research.¹⁶³ In response to the growing demand for high educated people in the fields of technology and sciences, degrees that were distributed by institutions accredited by the Ministry of Education were also recognized. Private colleges were in addition also allowed. Further was the public university system adapted to the needs of the industry, more specific the high-tech sector. The military also played a large role in the educational

¹⁵⁷ 'Singapore versterkt maritieme R&D' (Nieuwsbericht Nederlandse Ambassade in Singapore, May 27, 2013).

¹⁵⁸ Lerner 2009, p. 18-19.

¹⁵⁹ Wong, Ho and Singh 2010, p. 41-42.

¹⁶⁰ Other factors were the presence of established companies and multinationals to provide expertise and economic stability and the availability of venture capital to ensure that the ideas make it to the market (Hilner 2000).

¹⁶¹ This score of 15 consisted of; a 4/4 for the ability of area universities and research facilities, a 4/4 for the presence of established companies and multinationals, a 4/4 for the population's entrepreneurial drive to start new ventures and a 3/4 for the availability of venture capital.

¹⁶² The Silicon Valley cluster scored 4/4 on every factor.

¹⁶³ These university level centers of teaching and research were; the Technion in Haifa, the Weizman Institute in Rehovot, Hebrew University in Jerusalem, Ben Gurion University in Beer Sheba and the Universities of Haifa and Tel Aviv (Lopez-Claros and Mia 2006, p. 91).

process of Israel. People were selected at a very young age to serve in the military and engage in activities with regard to computing units. Due to the responsibilities related to these functions, the young Israeli workers learned to become very experienced programmers at a very young age. After these people left the military they were very valuable for other technological companies.¹⁶⁴

The influx of numerous top scientists that worked in the former Soviet Union also contributed for a large share to the extensive availability of technological human resources. Of the 6,000,000 residents Israel counts, 109,000 of them are an engineer or an architect. It has also been calculated that about 25 percent of the total number of employees in Israel is active in a technical sector or branch. Compared to other countries worldwide, this is the highest percentage.¹⁶⁵ Not only the people who used to live in the Soviet Union, but also Jews that used to live in different countries, returned to their home land. These motivated people also brought along various talents and capacities. This expansion of technological experienced manpower also motivated engineers and other technical educated people who used to live in Israel, but moved to the U.S. or Europe to return to their home country.¹⁶⁶

By looking at the number of times an article gets cited, one can determine the scientific productivity of a country. This scientific productivity is also an indication of a high-educated workforce. Surprisingly, it turned out that the prediction that was made on the basis of the GNP of Israel was five times less than the actual number of such citations.¹⁶⁷ After Switzerland, the U.S. and Sweden, Israel ranked fourth regarding the number of articles that were published within the country and that had more than 40 citations per 1,000,000 of population. The workforce in Israel is thereby very entrepreneurial-oriented. 5.4 percent of the adult population is engaged in a startup or another entrepreneurial activity. If a jurisdiction or cluster is providing facilitations that will spur entrepreneurship, this will result in a larger number of startups within the country or cluster. However, Israel cannot be considered as one of the greatest technological clusters compared to for instance the U.S. Reasons for this divergence is that a larger economy, such as the U.S., will also provide more opportunities for workers. Israel thereby has to face a lack of capital.¹⁶⁸

Culture

The Jewish population that returned to Israel was eager to succeed in their new homeland. They benefited from far reaching social networks and a great sense for social responsibility prevailed. Numerous setbacks and denials contributed to the determination and motivation of the Jews. Especially after the years of suppression, the right to speak and act fair and open was highly valued. Therefore, when the Jews rediscovered their freedom in Israel, an open culture arose where risk-taking and individualism was not a sin. This state of mind was also seen in businesses since managers preferred employees who were not afraid to speak what was on their mind, even if this meant disagreeing with

¹⁶⁴ Lopez-Claros and Mia 2006, p. 91-92.

¹⁶⁵ The number of immigrants from the former Soviet Union is estimated at about 1,000,000 immigrants (Kellerman 2002, p. 276).

¹⁶⁶ Lopez-Claros and Mia 2006, p. 92.

¹⁶⁷ The number of the predicted 40+ citations was 33.1, while the number of the actual 40+ citations was 169. This is almost five times more than the predicted figure (Cole and Phelan 1999, Table IV, p. 15).

¹⁶⁸ Kellerman 2002, p. 276-277.

their boss. The way people in Israel encountered a failure is similar to the way people living in Silicon Valley, California (U.S.) thought about a failure. It was not considered bad if the things did not work out the way they were supposed to. However, failure did harm the entrepreneur's reputation if he acted in a dishonest way.

Government support

Israel has been facing a lack of capital. This lack can be attributed to the fact that the economy of Israel is still small and it therefore cannot gather enough venture capital in order to satisfy the needs of its innovative employees. There are three sources within the country that provide finances and investments, namely the government of Israel, the Tel-Aviv stock market and private investments. Foreign finances are provided via foreign investments in the domestic stock market, investment companies, big corporations located in Israel and finally from Israeli securities that are traded on markets outside the country. The government of Israel instituted several interventions in order to attract domestic and foreign investments. A law that was adopted in 1959, the Law for the Encouragement of Capital Investment (LECI), needed to encourage private investors to invest their finances in Israeli companies. This law was focused on companies capable of creating a high added-value. Part of this law was the acknowledgement by the Israeli Investment Care, a section of the Ministry of Industry, of a company as an "Approved Enterprise" or "Beneficiary Enterprise". This admission gave the company the right to benefit from government subsidies and/or tax advantages. Another aspect of the market-friendly law was to support private investors by taking away a part of the risk related to the development or expansion of a company. In order to attract more multinationals, the Law for the Encouragement of Capital Investment (LECI) also introduced tax advantages for foreign investors. The goal was to motivate multinationals to come to Israel and bring along their knowledge and other skills. These government interventions seemed very valuable since there were several international investors, under which IBM and Motorola, which became active in Israel. Due to a reform of the capital market it became easier for these multinationals to develop their activities within the country. Administrative requirements and other regulations were eliminated. The reform also involved a mitigation of the obligations regarding the investments in government bonds. Large institutional investors, like pension funds, were initially obliged to invest in these government bonds. However, after the reform, they could invest a much larger share in other companies. Further, the reform included an expansion of the several financial instruments that could be offered to the public. Since these adoptions of the capital market made it easier for emerging companies to receive finances under more favorable conditions, they contributed for a large share to the development of the ICT branch.¹⁶⁹

Besides the interventions of the government to make Israel more attractive to (foreign) investors, its role extended to the providence of a regulatory framework, infrastructure, additional services and education.¹⁷⁰ Regarding the furthering of R&D in Israel, the government also played a major role. After the influx of immigrants and the interventions regarding private investors, the economy of Israel slowed down. In order to put a new focus on development, several R&D projects were instituted. The first project was the establishment of the Office of the Chief Scientist (OCS) which was charged with the task

¹⁶⁹ Lopez-Claros and Mia 2006, p. 94-95.

¹⁷⁰ Lopez-Claros and Mia 2006, p. 89.

to support businesses in their R&D activities. Another initiative was the creation of a legal framework regarding the governmental support in the fields of R&D. This framework was codified in the Law for the Encouragement of Industrial R&D (LEIRD) in 1984. The Chief Scientist of the Ministry of Industry and Trade also set up different programs in order to motivate the Israeli people to engage in entrepreneurial activities. Part of this strategy was the establishment of several incubators. These incubators supported new entrepreneurs in developing their business by for example finding strategic partners and raising finance, like venture capital. Especially for the scientist who came from the former Soviet Union it was extremely valuable to be advised by people who were experienced with commercial activities. By providing a government fund of US\$30 million, 24 technology incubators could start providing their advices and support people which had advanced and promising ideas. This incubator program is considered to be the number one producer of startup companies in Israel. Working with a 50 percent success rate, the incubators are for a large share responsible for the high density of high-tech startups in Israel.¹⁷¹

Venture capital

Although the venture capital industry in Israel is mainly constituted by government interventions, it definitely deserves a separate paragraph. The availability of venture capital is required to get startups through the first crucial phase of product development. In 2004, the technology companies located in Israel raised the highest amount of capital worldwide.¹⁷² Between 1995 and 2004, the venture capital investments boosted the employment rate with 15 percent, represented 50 percent of exports, provided 65 percent of the foreign investment and finally caused the GDP to increase with 40 percent. Even in the first quarter of 2013, 169 Israeli high-tech companies raised more than US\$470 million from domestic and foreign investors. US\$147 million of this total (31 percent) is raised by venture capital fund investments (appendix I).¹⁷³ Overall, one can say that there is a significant flow of venture capital in Israel. The question is however how the Israeli government succeeded in creating such a market-friendly venture capital industry.

In order to attract more finance for the technology industry the government encouraged venture capitalist to invest in high-tech startups. The Israeli government, more specifically the Office of the Chief Scientist (OCS), did this by introducing the Yozma program. US\$100 million was used to motivate international venture capitalist to invest in Israeli high-tech startups. These international venture capitalists were also invoked to share their experience and mentor domestic venture capital funds. Participating private investors could make use of the option to buy back Yozma's shares at a pre-agreed price and within five years. This program spurred the venture capital market in Israel and by 2000, Israel raised twenty times more venture capital per capita than Europe.¹⁷⁴ Several multinational companies also formed strategic partnerships, which besides establishing for example design centers, could eventually provide the venture capitalists with an exit by buying companies.¹⁷⁵

¹⁷¹ Lopez-Claros and Mia 2006, p. 98-99.

¹⁷² Lopez-Claros and Mia 2006, p. 100.

¹⁷³ Summary of Israeli High-Tech Capital Raising - Q1/2013 (appendix I) (available at: www.ivc-online.com).

¹⁷⁴ Lopez-Claros and Mia 2006, p. 99-100.

¹⁷⁵ Oron 2005, sheet 33.

Nowadays, the Israel Venture Association (IVA) is active on a worldwide basis by creating opportunities and gathering venture capital funds for companies located in Israel. Venture capital is attracted from the U.S., Europe and the Far East providing about 50 venture capital companies with more than US\$12 billion in funds. Between 2000 and 2004 there were 133 non-domestic venture capital companies that provided finances to more than one Israeli company.¹⁷⁶ The high-tech Israeli companies do therefore not only have to rely on domestic finances.¹⁷⁷ In 2012, the Israeli venture capital funds raised US\$607 million, of which US\$484 million was available for first investments. The leading funds, Sequoia V, Pitango VI and Magma III raised a total of US\$450 million in 2012, which is 74 percent of the total raised in 2012. Compared to 2011, the total amount raised decreased with 30 percent (appendix J).¹⁷⁸ Finally, the sector that is receiving the most investments in 2012 is the software sector. This sector gathered US\$136 million of investments for the first time in four years. In previous years, the sectors that received most of the investments were the internet and life sciences sectors (appendix K).¹⁷⁹

Israel's development needs to receive great respect for its venture capital industry, entrepreneurial atmosphere, skilled workforce and the related government policies. However, there are some concerns regarding the further development of the technology hub. Since the main sectors of Israel are subjected to a fierce competition it needs to be able to maintain the processes of continuous innovation. This is a great challenge for such a small country. It has also been argued that the high tax rates and lack of experienced top executives are reasons for Israeli companies to make the decision not to incorporate in Israel, but to emigrate to the U.S. and list there.¹⁸⁰ The everlasting Middle East conflict may also be an additional motive for companies to move their production activities outside Israel. The possible result is that Israel becomes a center of R&D activities and is regarded as just a provider of talent. This talent will eventually be attracted by other companies outside Israel and therefore end up elsewhere. If this talent moves out of Israel, it will no longer be able to enrich Israel. Since the revenues of a company only consist for 10 to 20 percent out of R&D activities, it is important for Israel to determine how it can retain its technological output and talent within the country.¹⁸¹

2.3 Boston-Route 128

The Route 128 cluster derived its name from the 16 kilometer-long State Highway in the state Massachusetts. This State Highway starts its route on the western side of Boston and ends in the north of the city. During the '60s, this Highway was the symbol of a growing high-tech industry. Various innovative technological companies settled nearby Route 128, like Polaroid and Lotus Development. The roots of the Route 128 area can be traced back to the presence of the local universities. Boston is a city with three universities, namely Harvard, Massachusetts Institute of Technology (hereinafter: MIT) and the Boston University. These universities contributed for a large share to the development of Route 128. Another factor that contributed to the growth of the Boston area was World War II and the Cold War. During these wars, the demand of defense innovations increased significantly. In order to develop new

¹⁷⁶ Lopez-Claros and Mia 2006, p. 100.

¹⁷⁷ Kellerman 2002, p. 285.

¹⁷⁸ Israeli Venture Capital Fund Raising 2012 (appendix J) (available at: www.ivc-online.com).

¹⁷⁹ Chart 2: Capital Raised by Sector Q1/2011 - Q1/2013 (percent) (appendix K) (available at: www.ivc-online.com).

¹⁸⁰ Kellerman 2002, p. 275 and Cunningham 2000.

¹⁸¹ Machlis 2000.

defense technologies, several finances were provided. Due to the presence of Vannevar Bush, MIT professor and head of the government funding agency, MIT received the most funding compared to other universities during World War II. This funding was for instance used to create the Radiation Laboratory. Also during the Cold War, funding was used to establish research institutions, like the formation of the Lincoln Lab at MIT in 1951. The formation of these research institutions was very valuable for the employment. Consequently, the concentration of such a high number of skilled engineers and scientists, around 5,000 in the mid-1960s, spurred the innovative and commercial developments. Scientists working at the Lincoln lab and the MIT Instrumentation Lab founded for example more than 100 companies.¹⁸²

The development of the industry cluster in Boston is extensively compared to the development of the innovative cluster located at the other side of the country, namely Silicon Valley in California. These comparisons are mainly focused on their different performances. In the early '60, the Route 128 area performed better regarding technology employment than the Californian region. However, by 1975, the employment in Silicon Valley increased significantly exceeding the total technology employment of Route 128 with 15 percent. The performance of Silicon Valley kept on improving and by 1990, the region exported twice the amount of electronic products than the area of Route 128. Between 1994 and 1995 the turnover of the export sales increased with 35 percent in Silicon Valley. This export rate of US\$29.3 billion by the city San Jose was the highest turnover reported throughout the U.S. The Route 128 area however could not keep up with the high export rates and was ranked eleventh with a total export rate of US\$8.7 billion.¹⁸³ The cultural aspects of the Boston area and New England are similar to the culture in Europe. This may be a reason for why the Californian cluster surpassed the cluster Route 128 in matter of a decade and will therefore be elaborated in the next paragraph.

Culture

The Route 128 culture can be categorized as the so-called 'East coast' culture which is much more aggressive and assertive than the 'West coast' adventurous culture of Silicon Valley. This coastal conflict can be traced back to the 19th and early 20th centuries when the early settlers of the frontier were moving away from the traditions of the East coast establishment and the politics of Washington.¹⁸⁴

Knowledge workers in the Route 128 area had a long term view regarding their occupation. They preferred to stay with one single employer instead of shifting between employers. There was no high velocity employment. Their ambition therefore was to climb up within the company and promote vertically.¹⁸⁵ Employees in Route 128 were risk-averse and had no wish to stand out from the crowd. They felt more comfortable working their whole life at the same company than constantly changing jobs. Consequence was that there were no experienced entrepreneurs since most of them had only one previous occupation.¹⁸⁶

¹⁸² Gilson 1998, p. 17-18.

¹⁸³ Gilson 1998, p. 15-16.

¹⁸⁴ 'Between minds: East coasters vs. West coasters' (Mindjet Jascha Kaykas-Wolff June 28, 2012)

¹⁸⁵ Gilson 1998, p. 21.

¹⁸⁶ Saxenian 1994, p. 64.

Companies that were incorporated in the Route 128 area copied the corporate structure of the traditional production corporations. Result was the formation of mainly vertically integrated companies. Knowledge was therefore not exchanged with parties outside the company, but remained inside the four walls of the firm.¹⁸⁷ The companies choose to be self-sufficient. Another result of this approach was that most of the managers and executives active in the Route 128 firms were in their fifties and sixties. Although they were very well capable of implementing traditional organization structures and operating procedures, they were not able to address issues from new and innovative perspectives. They were too rusted in their old habits and methods of working.¹⁸⁸

These cultural and human characteristics implicate the existence of a very conservative and socially hierarchic environment within the Route 128 area. These attitudes, which were also typical for New England, contributed to the thoughts regarding starting an own business, failure and employment. High values of stability and loyalty towards a company prevailed to taking risks and experimenting.¹⁸⁹

Legal infrastructure

Most crucial weakness of the Route 128 area was the lack of knowledge spillovers, due to the vertically integrated companies. The related second stage agglomeration economy could therefore not be realized. The phenomenon of employee mobility was very rare since companies preferred to be vertically integrated. There was therefore no exchange in information, nor in innovations. As a result, this process can lead to a dead end; if companies do not horizontally integrate, employees do not shift between companies and when employees do not shift between companies, there is no exchange of information, consequently no knowledge spillovers. The explanation for the absence of employee mobility in the Route 128 area can be found in its legal infrastructure.

The legal infrastructure of an innovative cluster needs to balance the tension that occurs between the protection of IP and the possibilities for employees to shift between companies. Although the lack of employee mobility cannot be totally attributed to the trade secret law of the state Massachusetts,¹⁹⁰ the law regarding the covenants not to compete does seem to provide a great barrier to employees changing jobs. When an employee signs a post-employment covenant not to compete it becomes prohibited for him to leave his original employer to start at a competitive firm or to form a competing startup. The reach of this covenant mostly applies to a specific geographical area and for the duration of one to two years. Under these covenants it is not possible for the departing employer to share or exchange any specific information concerning his former employer with his new one. The departing employer will only be allowed to bring general information and his own collected experiences he obtained while he was working in the specific industry. The information that could really be valuable for a new employer or startups needs to be kept a secret. There is therefore no knowledge or information that can be spilled over. As in the most states in the U.S., post-employment covenants not to compete are enforced in the state of Massachusetts. The formulation which is used in Massachusetts' covenant cases comes down to the situation that; "covenants not to compete would be enforced against a

¹⁸⁷ Gilson 1998, p. 21-22.

¹⁸⁸ Saxenian 1994, p. 69-70.

¹⁸⁹ Saxenian 1994, p. 62.

¹⁹⁰ Gilson 1998, p. 29 and 32.

departing employee if the covenant's duration and geographic coverage were no greater than necessary to protect an employer's legitimate business interest, and not otherwise contrary to the public interest".¹⁹¹ The covenants thereby implicate an additional protection in a way that it is very hard to determine whether the information and knowledge is obtained in a general situation or if the information and knowledge is to such a degree related to the former employer. Moreover, the probability that a covenant not to compete will be enforced is very large. In eight out of ten cases regarding a covenant not to compete between 1994 and 1996, the court decided to enforce the covenant. Since it is very likely that there will be an enforcement of a covenant not to compete, the employees will adapt their career strategy to this situation, more specific the employees will stay with their current employer. Visa versa, employers will be hesitant to hire employees who used to work at a competitor. Moreover, it is very difficult to prove in court that the specific information used in the development of a product was stolen or misused in violation with the non-compete covenant. Overall consequence for the Route 128 area was that the employees preferred a long-term career at the same company and that new innovations and developments remained mainly within the same company. Although the enforcement of covenants not to compete was the main reason that Route 128 could not reset its product economy, it should be noted that, as was mentioned before, the engineers and scientist active at the research labs in Boston were responsible for the establishment of more than 100 startups, under which Digital Equipment Corporation (DEC).¹⁹² Since these research labs and laboratories were non-profit organizations it was not necessary for them to oblige their employees to sign a covenant not to compete.¹⁹³

Venture capital

As was mentioned before, the electronics industry of the Route 128 area was mainly dominated by conservative thoughts. The organization of the venture capital industry in Boston was particularly the cause of this traditional culture. Although there were enough finances available in the Northeast of the U.S., most of the investments were made on the other side of the country, mainly in California.¹⁹⁴ Only

¹⁹¹ Gilson 1998, p. 37.

Restatement of Contracts 2D §188 (1981):

Ancillary Restraints on Competition

(1) A promise to refrain from competition that imposes a restraint that is ancillary to an otherwise valid transaction or relationship is unreasonably in restraint of trade if

(a) The restraint is greater than is needed to protect the promisee's legitimate interest, or

(b) The promisee's need is outweighed by the hardship to the promisor and the likely injury to the public.

(2) Promises imposing restraints that are ancillary to a valid transaction or relationship include the following:

(a) A promise by the seller of a business not to compete with the buyer in such a way as to injure the value of the business sold;

(b) A promise by an employee or other agent not to compete with his employer or other principal;

(c) A promise by a partner not to compete with the partnership.

¹⁹² From the 1960s to the 1990s, the Digital Equipment Corporation (DEC) was a very large American firm active in the computer industry. In 1998 DEC was bought by Compaq, which afterwards merged with HP. Some parts of DEC were acquired by Intel (www.columbia.edu and www.britannica.com).

¹⁹³ Gilson 1998, p. 35-40.

¹⁹⁴ During 1981, the total venture capital investments were US\$1.4 billion of which 38 percent was invested in companies located in California, while only 18 percent was invested in companies located in the Massachusetts area (Saxenian 1994, p. 184, note 12).

17 emerging startups were supported with venture capital finances, as opposed to 37 early-stage startups in the Californian cluster. Most of the venture capitalist active in Route 128 were common financiers and professional bankers. These persons extremely valued the traditions and values that were common in the financial community back in the 17th and 19th century. As Russell Adams in his book 'The Boston Money Tree' describes; "The upper reaches of the city's financial establishment had opened of necessity to talented and ambitious men from other parts of the country, but the old traditions had been little disturbed. Prudence and integrity [...] were still scrupulously maintained in Boston [...]". In contrast to the young enthusiastic venture capitalists in Silicon Valley, the venture capitalists in Route 128 were not at all casual or impulsive. Nor did they have any experience in the technology industry, unlike the venture capitalists in the Californian cluster who often used to manage an innovative company themselves. It was therefore also very hard for the venture capitalists in Route 128 to provide useful and practical monitoring and advice services to startups. Some even argue that there is no real 'venture capital industry' in Boston, like the former vice president of DEC, Gordon Bell, who mentioned in an interview with Saxenian 1994 that; "There is no real venture capital in Massachusetts. The venture capital community is a bunch of very conservative bankers [...]. Unless you've proven yourself a hundred times over, you'll never get any money". At last, the venture capitalists active in the Boston region did not have a real connection with the local technology industry. They did not feel really connected to the startups, nor did they experience any responsibility towards them. Emerging startups were no day to day topics.¹⁹⁵

Overall, it can be concluded that the Route 128 cluster in Boston had the potential to become as successful as Silicon Valley. It had a well-developed manpower and various resources coming from the three universities and several research institutions. However, its decline can be attributed to the conservative culture, low-velocity employment and lack of venture capital.

3. Preliminarily conclusion

The phenomenon of clusters has been broadly reviewed in various literatures. One has tried to create clusters simply by providing and gathering all the required ingredients like the presence of a high skilled manpower and university-trained human capital.¹⁹⁶ However the existence of clusters is not a chicken-and-egg debate. The presence of a cluster does not guarantee innovative development, nor does innovative activity ensure the creation of a cluster. A great number of highly educated people does thereby not necessarily bring along the benefits of innovation, neither the formation of an innovative cluster.¹⁹⁷ The cluster theory is therefore not an adequate clarification for the existence of innovation.¹⁹⁸ Putting together all the components, which were mentioned in the beginning of this chapter, will not result in a new Silicon Valley. Simply copying the unique selling points of the Californian cluster will not ensure the development of an equally successful cluster.¹⁹⁹ One thereby needs to take into consideration that Silicon Valley was 'realized' about 40 years ago. Initiatives that may have been successful at that time may be ineffective today. Moreover, the creation of a prosperous innovative

¹⁹⁵ Saxenian 1994, p. 64-66.

¹⁹⁶ Breschi and Malerba 2005, p. 8.

¹⁹⁷ Hwang & Horowitz 2012, p. 36.

¹⁹⁸ Hwang & Horowitz 2012, p. 20.

¹⁹⁹ Hwang & Horowitz 2012, p. 41.

cluster involves some kind of third dimension. A certain amount of luck and coincidence plays an important role and these are aspects which human beings simply cannot influence or enforce. Government involvement can however be a way to spur the development of a knowledge-based technology cluster.²⁰⁰

Another aspect which can enhance the development of an innovative cluster is the presence of intermediaries. This concept will be discussed in the next chapter, as well as the changing methods of contracting in innovative industries.

²⁰⁰ Public policies contributed for example to the successful development of Singapore's clusters (Wong, Ho and Singh 2009, p. 44).

Chapter 4 The evolution of contracting

Formal feat. informal

Investor: How do we know that you will do what you say?

Schindler: Because I said I would. Do you want a contract? To be upheld by what court? I said what I'll do, that's our contract.

(Schindler's List 1993)

1. Formal contracts

Role of formal contracts in innovative industries

In a research study which was conducted by Macaulay in 1963, 68 businessmen active in the manufacturing industry and lawyers were interviewed with regard to non-contractual relations in business. The outcome was that during the creation of exchange relationships one did not commonly rely on formal contracts or formal enforcement mechanisms. There was little time invested in the establishment of formal contracts and most problems that arose were solved by the businessmen themselves. Even when the exchange involved great risks and/or a large sum of money, the businessmen preferred to rely on "a man's word in a brief letter, a handshake or common honesty and decency".²⁰¹ The overall impression was that contract law did not matter as much as one thought it would. Businessmen did not always plan their transactions precisely, nor provided solutions for future unexpected circumstances. The thought was thereby that carefully written contracts could implicate a lack of trust and distort the business relationship. Enforcement of legal sanctions was also rare since businessmen believed that they could settle most of the disputes themselves. Moreover, the costs related to litigation discouraged companies to pursue a conviction. Written contracts largely consisted out of standard clauses, like boiler plate provisions drafted by an inside or outside lawyer or provisions drafted by a trade association.²⁰² Transactions were however precisely planned when it was expected that the advantages of this planning would outweigh its disadvantages and a potential legal conflict could occur.²⁰³

In the current economy, innovation is inevitable. Innovative industries need to cope with continuous uncertainty. Although the people that are active in these industries will mainly rely on informal enforcement mechanisms such as trust and reputation, a new research by Bozovic and Hadfield, conducted in 2012, has shown that the role of formal contracting is also important.²⁰⁴ This research makes a distinction between stable industries and industries characterized by uncertainty. Consistent with the research conducted in 1963, the first group of respondents does not make little use of formal contracts, nor do they appeal to clauses in their formal contracts to resolve problems. Their contracts are dominated by standard provisions and they create exchange relationships on the basis of verbal

²⁰¹ Macaulay 1963, p. 58.

²⁰² Macaulay 1963, p. 58.

²⁰³ Macaulay 1963, p. 62-65.

²⁰⁴ Bozovic and Hadfield 2012, p. 50-54.

agreements or email traffic. Similar to the respondents of the research in 1963, these companies prefer to draft their agreements without any legal advice and deal with their issues themselves, taking into account informal business norms and practices. They further prefer to avoid litigation since court judgments are not really considered an effective enforcement mechanism. Informal enforcement mechanisms like reputation, repeat business and trust are considered to be more appropriate. Companies that are part of this respondents group are active within the industry of manufacturing or sale of common products, like plastic bags and candies. These companies do not have to cope with a high level of uncertainty since there is little innovation concerned regarding their products, processes or organizational structure. It is not necessary for these companies to draft complex contracts because standard provisions are also suitable to govern their exchanges. The well-known industry norms provide sufficient relief in case of a dispute and are thereby, with regard to the cost-benefit analysis, the most efficient. Overall, companies that are active in these thick markets do not worry much about contract law.²⁰⁵

However, the results of Macaulay 1963 are not consistent with the outcome of Bozovic and Hadfield 2012 regarding their second group of respondents. This group of respondents considers themselves to be innovative or at least have an innovative approach. These companies develop specific assets and technologies and are subjected to a very dynamic environment. They constantly have to stay on top of their game in order to anticipate to the needs of the market. This includes; changing, adapting and improving their products. The scope of external relations is much more diverse in these businesses than in the businesses interviewed by Macaulay 1963, meaning that there are far less repeated transactions. Not only do they have essential relationships with their customers and suppliers, but also with competitors, venture capitalists, joint venture partners, consultants, et cetera. Consequently, the problems that arise regarding exchanges are rarely similar. Unlike the respondents of Macaulay 1963 and the first respondents group of Bozovic and Hadfield 2012, the respondents of the second group are putting a great emphasis on the formal aspects of a contract. A lawyer is always consulted when a formal contract needs to be generated in order to guarantee its preciseness and accuracy. There is a strict plan followed regarding the draft of the contract and every clause is negotiated. In order to keep up with the changes in the industry, these contracts need to be continuously updated. One of the main aspects of these contracts is the description of the mutual obligations of the parties that are related to the transaction. If the mutual obligations are clearly defined, they can help in the settlement of problems that arise with regard to the exchange. Although formal contracts and their function regarding problem solving are of importance within these innovative industries, the formal enforcement of these contracts is not. Litigation does not have a significant meaning in these industries, nor does the threat of litigation. Furthermore, litigation processes are so lengthy and time-consuming that they do not fit within the dynamic environment of innovative industries. Moreover, the potential remedies awarded by the court rarely outweigh the reputational harm which is related to a court trial. In line with the respondents of Macaulay 1963, the respondents of Bozovic and Hadfield 2012 that are active in the innovative industries tend to rely more on the informal enforcement mechanisms. If a party breaches a contract, he is punished by a possible reputational harm or the loss of an important business

²⁰⁵ Bozovic and Hadfield 2012, p. 12-20.

relationship. Within these industries such an informal enforcement mechanism can be very effective since all exchanges are made in a small community, where everybody knows each other. Negative information regarding the performance of a company is easily and quickly spread. The informal enforcement mechanisms therefore form a significant threat. By breaching a contract, a firm risks that also other business relationships do not want to work with him anymore.²⁰⁶ Consequence of this insignificant role of formal enforcement mechanisms in innovative industries is that the role of the generalist courts is also confined. In creating their contracts or adapting existing procedures, parties take into account the changes in the economic environment and other external influences. This makes the contracts or procedures more efficient with regard to the new situation. Since parties extensively describe the relationship they have entered into, it is not the task of the court to reexamine the contextualizing regime, unless they want to hinder the development of contractual innovation. It is therefore the task of the generalist courts to comply with the framework parties have chosen to govern their business relationship in order to facilitate contractual innovations.²⁰⁷

Overall, one can say that there is definitely a role played by formal contracts in innovative industries. Contract law helps to determine whether the complex conduct of a company can be classified as a breach or a performance.²⁰⁸ Bozovic and Hadfield 2012 call this function of formal contracting “scaffolding”.²⁰⁹

Open innovation

In relation to the important role played by formal contracting in innovative industries one can review the concept of open innovation introduced by Henry Chesbrough in 2003.²¹⁰ By the beginning of the 21st century, a lot of knowledge based clusters and industries arose. Knowledge became widely distributed and the open innovation paradigm therefore suggests that it is not wise for a company to solely rely on its own research. Besides the internal sources of a company, one should also make use of external sources that include innovative chances. The walls of companies have become more porous by which innovative knowledge is more easily transferred outside the company. Business models created in the early 20th century were however dominated by the paradigm of closed innovation. Most companies were self-sufficient and R&D activities were conducted within the company. Outsiders could therefore only guess what new technologies they were working on.²¹¹

According to Chesbrough 2006, the open innovation paradigm can be defined as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for

²⁰⁶ Bozovic and Hadfield 2012, p. 20-29.

²⁰⁷ Gilson, Sabel and Scott 2012, p. 5-7, 18-25 and 38-39

²⁰⁸ Bozovic and Hadfield 2012, p. 55-56.

²⁰⁹ “[...] If the contract’s specification does not match my private assessment of what I should do, I will think hard before I stay on my side of the gulf: with the scaffold’s plank in front of me, I will know that you know I could get over to your side if I wanted to. If I don’t cross over, I know you will conclude that I must not be interested in living in this structure with you any longer. If I don’t want to abandon the structure, I will walk my way across the plank to your side. Or I will call across to you and suggest we both invest the time and resources in filling in the gap ourselves” (Bozovic and Hadfield 2012, p. 56).

²¹⁰ Chesbrough 2003.

²¹¹ Chesbrough 2003, p. 24.

external use of innovation, respectively". The paradigm assumes that when parties want to develop their technologies, they should make use of not only internal ideas, but also of external ideas and external ways leading to the market. By suggesting that valuable ideas can also come from outside the firm, one considers the system of R&D development as an open source. External sources, like ideas or routes to the market, are aligned with the sources that come from within the company. Both internal and external ideas and paths to the market are considered to be of similar importance. According to the open innovation paradigm, valuable knowledge should be widely exchanged.²¹²

Several factors have contributed to the development towards the open innovation paradigm. The increase in the supply of a skilled workforce and their ability to quickly shift between companies is one of the first factors. This high-velocity employment in the U.S. caused knowledge to spill over. It was very difficult for employers to ensure that all business relevant information was retained within the firm.²¹³ A second factor that led to the open innovation paradigm was the U.S. venture capital market. Since 1980, the venture capital industry in the U.S. started to expand enormously. In 2001 there was more than US\$36 billion venture capital invested in the U.S., an enormous increase compared to the year 1980 when there was only US\$700 million venture capital invested. Further elements that influenced the development towards the open innovation paradigm were the situation where ideas that were left untouched by the development group of a company were taken outside the company and the fact that external suppliers became much more capable. Consequence of this erosion was that R&D development could not only be found within the company, but also with suppliers, consultants, universities, startups, et cetera. Knowledge could be found everywhere. Consequence of this widespread availability of knowledge was that ideas created by a company, which were later left untouched, could easily be picked up by an outside organization.²¹⁴

Most innovative industries and clusters are characterized by horizontal integration and information exchange. R&D activities are being conducted in diverse resources like, independent laboratories, universities, suppliers, et cetera. The government of Singapore for example created a lot of research institution in order to spur the BMS cluster.²¹⁵ Also in Silicon Valley knowledge is widely distributed. People even talk to their competitors.²¹⁶

The overall use of the open innovation paradigm caused a lot of new business relationship to evolve. Companies start to interact with other suppliers of knowledge regarding R&D development. These new business transactions require the guidance of a formal contract. Formal contracts can help the parties in their process of developing a sustainable business relationship, by preventing misunderstandings from occurring and making the parties aware of their mutual obligations.

²¹² Chesbrough et al. 2006, p. 1.

²¹³ Chesbrough 2003, p. 34-37.

²¹⁴ Chesbrough 2003, p. 37-41.

²¹⁵ Wong, Ho and Singh 2010, p. 7-24.

²¹⁶ Saxenian 1994, p. 33.

Generating trust

The function of formal contracting can be linked to the stimulation of trust within business relationships. As was stated in the article of Gilson, Sabel and Scott (hereinafter: GSS) 2010 regarding the interaction of formal and informal contracting, the phenomenon of trust develops together with the business relationship. Using both formal and informal strategies in innovative industries could create a complementary outcome. GSS 2010 call this “the braiding of the two strategies”, which in turn will make the level of trust internal to collaborative relationships. This reasoning expands the set of people and businesses one can cooperate with since it is not necessary anymore to know in advance that you can rely sufficiently on a potential business partner. Especially in innovative industries this can be valuable, since the set of potential trustworthy relationships will not be very large. By assuming that trust will be generated within the business relation, the set of possible business partners will therefore be expanded.

There are some available structures that can stimulate the development of trust. GSS 2010 indicates the role of formal contracts in a way that they are used to exchange information. Thereby, in order to generate formal contracts one needs to make precise decisions and provide in procedures to solve disputes. These prior negotiations regarding the formal contract will ensure a better and direct exchange of information between parties. Bozovic and Hadfield 2012 introduce another structure by which trust can be created internally by the “scaffolding” function of formal contracts. In dynamic and innovative industries the risk of getting involved in an honest misunderstanding or good faith divergence of opinions is significantly larger than in stable and traditional industries. When a party, in generating a formal contract, seems to repeatedly classify his actions as a ‘breach’, he will not be considered trustworthy by the other party. On the other hand, when a party consistently selects ‘performance’ to identify his action, he will receive more trust and there is subsequently a larger chance that the contract will persist. It is therefore possible for business relationships to generate trust, by proving that performance will prevail. The added value of formal contracts in this regard is that they contain a common definition of the classification of a breach or performance in a specific context. Whenever there is for example a misunderstanding, parties can refer to the formal contract in order to solve their dispute. If formal contracts are well drafted, they can reduce uncertainty between the contracting parties by providing clear definitions regarding for instance; a breach of contract, a material breach, liability, remedies, et cetera. The overall function of formal contracts in innovative industries is therefore to fill in the gaps of a specific situation by providing the parties with common definitions of the missing standards.²¹⁷ When parties do not formulate such definitions, all issues will need to be solved by the law and the interpretation of the judge. This will result in a great deal of uncertainty, which will consequently lead to parties not trusting each other and being hesitant to take risks.

2. Venture capital contracting in Silicon Valley

As was mentioned before in Chapter 1, the lawyers in Silicon Valley play an important role in nourishing business relationships. The lawyers of the Valley bring people together and they have a crucial role in transmitting information. If one of their clients has an innovative idea, the lawyers can easily set up a meeting with a venture capital fund since they know every venture capitalist in the region.²¹⁸ The law

²¹⁷ Gilson, Sabel and Scott 2010, p. 44-47 and 55-57.

²¹⁸ Saxenian 1994, p. 41.

firms in Silicon Valley have the admission to a large percentage of the venture capital flow in the Valley.²¹⁹ A relationship driven by mutual understanding and sympathy prevails between the venture capital funds, entrepreneurs and lawyers. Venture capitalists are aware of the fact that the lawyers have an important role in governing the whole deal, the entrepreneurs are aware of the advantages of working with an established law firm and the lawyers are aware of their role as matchmakers. If a client of a law firm is in search of new financing, the lawyers really try to find the venture capital fund that can conform to the characteristics and needs of the entrepreneur. In order to find these 'matches made in heaven', it is necessary for the lawyers to have access to various information sources like the business plan of the potential startup and the post-investment behavioral aspects of the venture capital fund. It is for instance important to know in which way the fund continues its monitoring activities of the startup and if these activities are adequate. There is also an advantage of a law firm conducting the investigation regarding the potential startup, in contrast to a venture capital fund gathering the information. If the law firm, after the investigation, decides that the potential startup is not a good investment for the fund, it can refer the investment to another fund, making use of its extensive network in the Valley. Visa versa, it would be very expensive for an entrepreneur to investigate every venture capital fund and determine which fund would suit them best. The law firms further serve as some kind of guarantee for the information that is provided by the entrepreneur. Law firms lend their reputation to the entrepreneur, since the latter is in most cases new in the market and cannot rely on earlier performances. This is why venture capital funds prefer to rely on the information that is provided by the lawyers, because the fund knows that a lawyer would not provide this information, not knowing that is accurate and solid. Supplying incorrect information can namely harm the reputation of the law firm. By lending its established reputation to a possible startup in order to obtain finances from a venture capital fund, the lawyer adds a value to the transaction. Without its warrant the transaction may not be established at all.²²⁰

In order for the law firm to hold such a function it is necessary that it has an important position in the market. Only in that way it can function as a "cost efficient broker". In the first place the lawyer will create value by increasing the level of decency of the information provided by the entrepreneur. In the second place, the costs related to the investigation which needs to be conducted prior to the transaction will be lowered, since it is more efficient for a law firm to conduct this research. As was mentioned before, the lawyers are really in the search of a perfect match of entrepreneur and venture capital fund. The chance that two parties are brought together with different expectations and behavioral norms is therefore much less likely. The added value of the presence of an established law firm in this regard is that they are able to unite parties with aligned values, norms, expectations, interests, et cetera. They act as some kind of guard who ensures that no unreliable and corrupt parties pass the gate. After the lawyer successfully played his role of matchmaker and gatekeeper he will further act as a counselor for both parties. When the entrepreneur and the fund have successfully been brought together the lawyer will support both parties by for example drafting their venture capital agreement. The law firm can represent both transaction parties and will provide services to both parties that are involved. This

²¹⁹ A law firm by itself controlled about 40 to 60 percent of the venture capital that was vacant (Bernstein 1995, p. 246).

²²⁰ Bernstein 1995, 245-248.

approach will ensure that transaction costs are saved. The conclusion of the transaction can also be more effectively achieved since the chance of a disagreement is much smaller if the transaction is organized by one law firm. The downside of this approach is that conflicts of interests can occur. The Dutch rules of conduct for lawyers state that a lawyer may not represent the interests of two or more parties if these interests are conflicted or if there is a possibility that the interests may become conflicted.²²¹ The codes of conduct for lawyers active within the E.U. and the U.S. state a similar provision.²²²

Most Silicon Valley law firms use agreements with boiler plate clauses. The advantage of these standard agreements is that there are no costs made regarding any negotiations conducted prior to the transaction. These negotiations are initially avoided since they do not contribute to the level of trust and could be harmful for the business relationship. Furthermore are these pre-transaction negotiations undesirable in these dynamic industries since they are so time consuming. Preventing any delays is especially valuable for the entrepreneur in a way that he cannot afford a canceling of the transaction. Another advantage of these standard contracts is that outsiders are immediately aware of the transactional norms that apply in Silicon Valley. They further prevent these outsiders from protecting themselves with additional clauses or provisions. The last valuable function of these standard agreements is that their use, in the long run, will help the lawyers in their attempt to construct more homogeneous expectations in the market.²²³ In line with this finding, Suchman 1995 states that standard contracts will support the lawyers, meaning that they help to “construct [...] the normative rules and the cognitive typifications [...] that make such transactions comprehensible, desirable, feasible and meaningful [...]”.²²⁴ In another article, Suchman 1996 states that the goal to formulate homogenous expectations is also fostered by the law firms acting as a “proselytizer” meaning that the lawyer is “[...] fostering and reinforcing community norms by promoting certain types of financing transactions over others [...]”.²²⁵

The several roles of the business lawyer can be explained by their linkage to one or more of the perfect market assumptions which form the basis of the Capital Asset Pricing Model (hereinafter: CAPM) theory.²²⁶ This theory was used by Gilson 1984 in answering the question regarding the added value of business lawyers in a transaction. Initially, the CAPM theory assumes that “capital assets will be priced correctly as a result of market forces” and consequently that law firms will not be able to increase the

²²¹ Rule 7 code of conduct for lawyers (available at: www.advocatenorde.nl).

²²² Rule 3.2 code of conduct of European lawyers (available at: www.advocatenorde.nl) and Rule 1.7 model rules of professional conduct American Bar Association (available at: www.americanbar.org).

²²³ Bernstein 1995, 248-251.

²²⁴ Suchman 1995, p. 264.

²²⁵ Suchman and Cahill 1996, p. 20.

²²⁶ The assumptions regarding the CAPM theory are:

- “(1) information about the asset and about the relevant markets is costlessly available to all transactors;
- (2) there are no transaction costs;
- (3) buyers and sellers have homogeneous expectations, that is, similar views about the risk and return associated with the relevant asset(s);
- (4) buyers and sellers have similar time horizons, that is, they are trying to maximize their returns over same relevant time period” (Bernstein 1995, p. 243).

value of a transaction. The presence of a lawyer, or any other intermediary, would therefore form a transaction cost which decreases the value of the transaction.²²⁷ However, markets will never be perfect. Gilson 1984 therefore states that there is way for lawyers to create value, namely by implementing aspects of the hypothetical world into the real world of a normal individual transaction.²²⁸ As long as the gains related to the innovation are higher than its costs, it is worthwhile to reduce the level of market failure by using private innovation mechanisms. In sum, Silicon Valley lawyers are considered very valuable by their clients since; “(1) information is often costly, unavailable or largely unverifiable, (2) entrepreneurs and venture capitalist often have very different expectations about the risk and return associated with particular companies, (3) the time horizons of venture capital funds and entrepreneurs may be different and (4) venture capital financing agreements are complicated and might require the parties to incur substantial transaction costs”.²²⁹ In this regard there is a possibility for business lawyers to create value, namely by bringing the transaction towards the hypothetical world of the perfect market.²³⁰ Moreover, the bigger the difference between the actual transaction and the world of the CAPM, the more possibilities there will be for the business lawyer to create value for its clients.

Nevertheless, it is one thing to indicate the mechanisms by which lawyers can create value, but it is even more important for the lawyers to obtain and refine the skills that are needed to add this value to a transaction. If the lawyer neglects to become an experienced transaction costs engineer, other market participants could easily replace them. In time, it could for example be possible for investment bankers to acquire these skills and eventually substitute the function of the lawyer. It is therefore important for the lawyer to continuously recognize the fact that they are not just legislation servants.²³¹ They need to be aware of their function as a transaction costs engineer, a function that entails so much more than applying countless laws.²³² Silicon Valley lawyers seem to do a very good job in extending their function as a legal advisor, by also providing their clients with an adequate business advice.²³³

To conclude, business lawyers can create value by filling in the imperfections of the transaction in the real world. The different functions that can be hold by a lawyer further contain several methods by which the Silicon Valley lawyer can create value in the venture capital market in general, but also by establishing individual venture capital financing agreements.²³⁴

Looking at the most established law firms located in Silicon Valley, one can already see that they anticipate to the needs of the market. Not only are they the patrons of trust within the Valley, they are besides advocates, also counselors and strategists. They are specialized in transactions within the vital industries of the Valley.²³⁵ Looking at the websites of the five main law firms in the Valley (WSGR²³⁶,

²²⁷ Gilson 1984, p. 251.

²²⁸ Gilson 1984, p. 300.

²²⁹ Bernstein 1995, p. 244.

²³⁰ Gilson 1984, p. 253.

²³¹ Bernstein 1995, p. 251-252.

²³² Gilson 1984, p. 302.

²³³ Suchman 1994, p. 100-101.

²³⁴ Bernstein 1995, p. 251.

²³⁵ Saxenian 1994, p. 41.

²³⁶ www.wsgr.com.

Cooley LLP²³⁷, Fenwick & West LLP²³⁸, DLA Piper²³⁹ and Latham & Watkins LLP²⁴⁰) one can see that they focus on the life science and technology industry. WSGR even calls itself “the premier provider of legal services to technology, life sciences, and growth enterprises worldwide”. These law firms do not only focus on rules and regulations, but are more business oriented. Cooley LLP for example entered into a partnership with Xconomy, a technology news and event site, with the aim to help launch the publication’s eighth branch Texas.

On the contrary, the glory days of the big established law firms in the Netherlands, also known as the ‘Zuidas’²⁴¹ offices, are history. Problems that arise are; finding clients, clients getting more sophisticated and fees that need to be negotiated in advance. Their monoculture is also threatened by the rise of the niche-law firms.²⁴² In his article ‘The death of big law’, Ribstein 2010 also emphasizes that the problems law firms have to deal with are not caused by economic distress. They are caused by a structural flaw in the mechanism of delivering legal services.²⁴³ One could say that the law firms, not only in the Netherlands, but all over the world, are becoming subject to the market force (‘marktwerking’).²⁴⁴ There are however some law firms in the Netherlands that are adapting to the needs of the market like the established Dutch law firm Stibbe. In 2012, Stibbe created the Caterpillar initiative which entails a program under which young and quickly expanding businesses are supported in establishing their company. The associates that are working at the law firm for the duration of three years will become responsible for the support of the young companies. During this process the associates will obtain various skills that include more than just providing adequate legal advice. They will learn how to establish a relationship with a client and further balance the commercial tradeoffs a company sometimes has to make. The Caterpillar initiative gives the associates of Stibbe the possibility to look beyond the pure legal aspects and provide a company with business-proof legally accurate advice.²⁴⁵

Although there are some law firms in the Netherlands that try to adapt to the needs of the market, it remains clear that the Dutch law definitely need to make some changes if they want to cope with the continuously developing innovative markets. Possible changes will be covered in Chapter 6 Recommendations. The next chapter, Chapter 6, will entail a comparative study on the innovative clusters that were discussed in the Chapters 1 (Silicon Valley), 2 (Brainport) and 3 (Singapore, Israel and Boston-Route 128).

²³⁷ www.cooley.com

²³⁸ www.fenwick.com

²³⁹ www.dlapiper.com

²⁴⁰ www.lw.com

²⁴¹ The ‘Zuidas’, located in the capital of the Netherlands, Amsterdam, is considered to be the financial and legal center of the country. Head offices of the banks ING Bank and ABN-Amro Bank are located in this business district, but also the big law firms, both Dutch and Anglo-Saxon, have offices in this area.

²⁴² ‘Zuidaskantoren moeten vaker concurreren met niche-advocaten’ (Jeroen Piersma - *Financieel Dagblad* May, 2 2013).

²⁴³ Ribstein 2010.

²⁴⁴ Susskind 2008, p. 272.

²⁴⁵ www.werkenbijstibbe.nl

Chapter 5 Comparative research

Comparing apples with oranges

“Comparing Apple to Netflix is like comparing apples to oranges, especially if the oranges made so many mistakes that people stopped eating oranges and just went back to Blockbuster.”

- Reed Hastings²⁴⁶

Although this quote may seem a bit drastic regarding the relation of Silicon Valley and Brainport, it does contain some truths. After all, there is still a long way ahead for the Brainport region Eindhoven if it wants to become as successful as Silicon Valley. The Brainport region is not necessarily making mistakes, but there are some pitfalls and weaknesses that may hinder a prosperous development. This chapter contains a comparison between the two innovative clusters on the basis of the distinctive characteristics described in Chapters 1 and 2. Furthermore, it needs to be mentioned that the intention of this chapter is not solely to determine the elements present in the Silicon Valley cluster, but absent in the Brainport cluster. The underlying goal is to find out what is missing in Brainport and subsequently using these findings in Chapter 6, Recommendations. After all, as was stated in the preliminary conclusion in Chapter 3, simply copying the unique selling points of Silicon Valley is too superficial and will not guarantee a successful development of the Brainport cluster. Additionally, there will also be some comparisons made between Brainport and the clusters mentioned in Chapter 3. At the end, some concrete points of improvement for the Brainport region will be formulated.

1. Brainport vs. Silicon Valley

Historical and cultural background

While Silicon Valley started its development from the bottom-up, Brainport first needed to reach the surface after the sale of DAF and the relocation of Philips' headquarters. Nowadays, the actions of the people in the Valley are characterized by a jovial state of mind and a collective identity. They are working together in intensive collaborations in order to achieve a common goal. The level of diversity and trust present in the Valley fosters these cooperations. On the other hand, the importance of self-development prevails over the need for achievement in the region of Southeast-Brabant. People living in the Brainport region do not necessarily want to stand out from the crowd, but they prefer to undertake actions which will contribute to their self-development. This is also a reason for the fact that the people living in Brainport prefer to be employed and therefore have a different career perspective than the people living in Silicon Valley. Another reason why people in Brainport prefer to be employed is that,

²⁴⁶ Wilmot Reed Hastings, Jr. is an entrepreneur. Besides his position on the board of Facebook, he is the CEO of Netflix. Netflix is an American provider of on-demand internet streaming movies. After some setbacks in 2011, Netflix's stock rating was downgraded by Wedbush to 'underperform' ('Analyst calls Netflix's business 'broken': Wedbush downgrades online movie provider to underperform' (Rex Crum – *Marketwatch* November 30, 2011)). Blockbuster is an American company that nowadays supplies online movies, but originally began with old school video rental shops (www.blockbuster.com and www.thestreet.com).

although they think they got what it takes to become an entrepreneur, they mostly do not see the appropriate opportunities or chances within their region to start their own business. This is also the case for the Dutch people compared to the people living in the U.S. The Dutch people grade the perceived opportunities within their country with 34 points, while the U.S. is graded with 43 points.²⁴⁷ Among these people who do see opportunities, the people in the U.S. graded the fear of failure with 32 points, while the Dutch people graded the fear of failure with 30 points.²⁴⁸ Although the fear of failure may be less in the Netherlands, the young people are discouraged regarding entrepreneurship because of negative financial incentives and the high opportunity costs. While the presence of a significant level of hierarchy in Dutch companies is thereby discouraging young people to develop their own ideas and express their thoughts, hierarchy is for the larger part banned in Silicon Valley. Overall, comparing the Netherlands and the U.S. as a whole, it is clear that there are far more young entrepreneurs in the U.S. (appendix L).²⁴⁹ The lower level of startups in Brainport can also be attributed to the negative thoughts regarding a bankruptcy, whereas a bankruptcy in Silicon Valley is considered to be positive, since it makes entrepreneurs more experienced.

The 'triple helix' collaborations in Brainport are thereby not at all as intensive as the ones in the Valley. 'Only' four out of ten innovative companies in the Brainport region are working together. The collaborations between the industry and the different universities; TU/e, TiU, and MU, and the external research institutions and laboratories are also not as intensive as within the Valley. The level of government involvement is not as high or effective in Brainport as in Silicon Valley and this can subsequently form an explanation for the undeveloped venture capital industry in the Dutch cluster. The lack of connectors and intermediaries in Brainport thereby contributes to this deficit.

Overall, the culture of Brainport is just not the same as the culture in Silicon Valley where people extensively talk to their competitors, share ideas, trust everyone, establish quasi-familial relationship, know each other, et cetera.

Geographic factors

The geographic area of Silicon Valley is characterized by its proximity and concentration. Initially, the size of the area where the development of Silicon Valley started covered just over 50 km².²⁵⁰ This area is significantly smaller than the one of Brainport. The 21 municipalities that established the collaborative network of Brainport are covering more than 1.400 km².²⁵¹ People working in the Brainport region can therefore not just visit a business relationship by foot like in the Valley. Both clusters do have similarities regarding the presence of universities, since both regions have the luxury of two to three established universities that are located in their area. In both clusters, there are also several research institutions

²⁴⁷ GEM 2011, Global Entrepreneurship Monitor 2010 Global Report, p. 21.

²⁴⁸ GEM 2011, Global Entrepreneurship Monitor 2010 Global Report, p. 21.

²⁴⁹ According to the Total Entrepreneurial Activity (TEA) index, the upcoming and young entrepreneurship in 2011 is for the U.S. is 12.3 and for the Netherlands only 8.2 (appendix L) (available at: www.statline.cbs.nl).

²⁵⁰ Urbanization and Global Change Group – Yale University School of Forestry & Environmental Studies (www.urban.yale.edu).

²⁵¹ The 21 municipalities are united in the 'Alliance Region Eindhoven' (Samenwerkingsverband Regio Eindhoven (SRE)) and their geographical reach is 1.457,81 km² (www.sre.nl).

and laboratories present like the industrial park Palo Alto for Silicon Valley and the Philips Healthcare center in Best for Brainport.

Legal infrastructure

The fact that most courts in Silicon Valley do not enforce the post-employment covenants not to compete is a distinctive advantage compared to the Netherlands. Due to this policy, high velocity employment can occur. The trade secret law does thereby not provide an adequate protection regarding the IP of a company since the definitions in the Uniform Trade Secret Act (UTA) are too vague. In the Netherlands, there is high employment protection. The overall employment protection is in the Netherlands graded 2.8 on a scale of zero to six, while the U.S. employment protection is graded 0.7 on a scale of zero to six (appendix M).²⁵² Non-compete clauses can be enforced by the Dutch court if the clause is drawn up in compliance with the Dutch Civil Code. The clause needs to be accepted by the employee by letter and needs to include a precise description of the competitive activities in order to prevent misunderstandings. The non-compete clause may further not bring along unreasonable negative consequences for the employee, taking into account the interests of the employer that need to be protected. If the non-compete clause does bring along unreasonable negative consequences, the court can eliminate the clause, or at least a part of it. The employer can claim a periodic penalty payment in case the employee does not comply with the clause. Finally, if the employee is a minor, the parents will need to give their approval.²⁵³

The main difference between the bankruptcy laws of the U.S. and the Netherlands is that the former seems to focus on protecting the debtor, while the latter favors the creditor. Both bankruptcy laws provide a fresh start in case of a personal bankruptcy. The actual time until an individual is discharged however varies between both jurisdictions. In the Netherlands it can take up to three years until a bankrupt individual is discharged, while this procedure will take less than a year in the U.S. Regarding the bankruptcy of a company, the U.S. law provides in an effective reorganization mechanism under Chapter 11 of the U.S. Bankruptcy Code. The reorganization mechanism that is available in the Netherlands is far from adequate or effective and does not really give the entrepreneur a second chance like in the U.S. The U.S. bankruptcy law can therefore be considered more forgiving than the Dutch bankruptcy law. These forgiving bankruptcy laws form a reason for why a bankruptcy is not considered as a real failure in the U.S. Another advantage of the U.S. bankruptcy law in comparison with the Dutch one is the generous exemption regarding the pre-bankruptcy assets. These exemptions are in the Netherlands considered to be negative since the property of for example the spousal can be pulled into the estate of the bankruptcy. Finally, there are some positive elements within the Dutch bankruptcy law compared to the U.S. one. The number of months that are spent on a Dutch bankruptcy are less compared to the number of months spend on an American bankruptcy (12 month in the Netherlands and 18 months in the U.S.). The costs of a bankruptcy are thereby significantly lower in the Netherlands than in the U.S. (4 percent of the estate in the Netherlands and 7 percent of the estate in the U.S).²⁵⁴

²⁵² Ondernemingsklimaat; marktwerking internationaal vergeleken (available at: www.statline.cbs.nl) (appendix M).

²⁵³ Art. 7:653 lid 1 and lid 2 Dutch Civil Code (Burgerlijk Wetboek (BW)).

²⁵⁴ Armour and Cumming 2008, p. 23.

Investor friendliness

The most important aspect regarding the investment activity of both clusters is the presence, or absence of venture capital funds. The venture capital industry in the Silicon Valley is well developed compared to the one in the Brainport region. Main elements that are missing in the Brainport area are in the first place venture capital funds that are not only providing finances, but also additional services like monitoring. The absence of skilled intermediaries like lawyers hinders a successful development of the venture capital industry in the Dutch cluster. As was mentioned in Chapter 4, point 2, the presence of such intermediaries nourishes business relationships and reduces transaction costs. Moreover, angel investors and wealthy family business in the Brainport region do not seem willing to invest in high-tech companies. Finally, the government played a great role in spurring Silicon Valley's venture capital industry in the early days. Up till now, there are little initiatives of the public institutions regarding the development of the venture capital industry in the Dutch cluster.

Table 1: Comparative overview regional clusters Silicon Valley and Brainport

	Silicon Valley	Brainport
1. Historical and cultural background	No hierarchy No individualism Connectors Bankruptcy is no failure Intensive collaborations (including government involvement) No real fear of failure	Hierarchy Individualism No connectors Bankruptcy is failure No obvious opportunities and chances Less startups No real fear of failure
2. Geographic factors	Universities Research facilities Concentration or proximity	Universities Research facilities No real concentration or proximity
3. Legal infrastructure	Non-enforcement covenants not to compete Debtor-oriented Forgiving bankruptcy laws; fresh start, fast discharge, effective reorganization mechanism, generous exemptions regarding pre-bankruptcy assets Long(er) and more expensive bankruptcy procedure	Enforcement covenants not to compete Creditor-oriented No real forgiving bankruptcy laws; fresh start (but long lasting), no effective reorganization mechanism, negative exemptions regarding pre-bankruptcy assets Short(er) and less expensive bankruptcy procedure High level employment protection
4. Investor friendliness	Well-developed venture capital industry Venture capitalists act as monitors Intermediaries Government involvement Relationships based on trust and social norms	Undeveloped venture capital industry Lack of intermediaries Lack of government involvement

2. Other clusters; Singapore, Israel and Boston-Route 128

With regard to the innovative clusters discussed in Chapter 3 there are some important differences and similarities to the Brainport cluster. Most important difference compared to the Singapore and Israel cluster is the lack of extensive government involvement in Brainport. The various institutions which were established in both clusters really supported the development of the Singapore and Israel cluster, under which the venture capital industry and the industry collaboration. All three clusters, Singapore, Israel and Brainport perform similar in attracting foreign talent and developing a well-educated workforce. However, the Israeli workforce is much more entrepreneurial and risk-adverse. The Israeli workforce thereby has the same thoughts regarding a bankruptcy as in Silicon Valley. Furthermore, the

activities of the Israeli people are for the larger part inspired by individual incentives just as the actions of the people living in the Brainport region. The people living in Brainport however prefer to be employed. Another similarity of both the Israeli and Brainport cluster is their lack of capital. The Israeli government seems only to be dealing with this issue in a more effective way, by for example the creation of the Yozma program and introducing laws which attract foreign investors and provide tax advantages. A last advantage of the Israeli cluster is the presence of the incubators who are functioning as some sort of intermediaries. Finally, the Brainport region does have some advantages compared to the Israeli cluster regarding its lower tax rates and the presence of experienced executives. These factors can convince companies to incorporate in the Netherlands. Since Israel is a small country it will be confronted with some limitations.

Both the employees active in the Boston-Route 128 cluster, as well in the Brainport cluster prefer to be employed. This preference is however inspired by different motives. The employees in Route 128 have a long-term view regarding their occupation. Hierarchic norms and loyalty are highly valued. Employees working in Brainport on the hand prefer to be employed because they do not see the appropriate chances and opportunities to start their own business and they are also more focused on self-development. Businesses in Route 128 are therefore vertically integrated and their business models are based on the closed innovation paradigm. This caused, together with the high probability of enforced covenants not to compete, a low level of employee mobility. These findings are very similar to the Brainport region since most companies in the region are generally vertically integrated and covenants not to compete are also enforceable. Regarding the venture capital industry, both clusters do not have a real development one. The venture capital industry in the Route 128 area seems however so rusted in traditional values that a turnaround would be very difficult. In contrast to the Route 128 cluster, there may be some possibilities in the Brainport cluster to spur the venture capital industry.

Table 2: Comparative overview regional clusters Singapore, Israel, Boston-Route 128 and Brainport

	Singapore	Israel	Boston-Route 128	Brainport
1. Historical and cultural background	Extensive government involvement Well-educated workforce	Extensive government involvement Well-educated workforce Entrepreneurial Risk-adverse No failure Individualism Lack of experienced executives	Well-educated workforce Hierarchic Vertically integrated businesses Loyalty Failure	No extensive government involvement Well-educated workforce Individualism Experienced executives
2. Geographic factors	Universities Research facilities	Universities Research facilities Small country (1.800 km ²)	Universities Research facilities	Universities Research facilities
3. Legal infrastructures	Nothing notable	Nothing notable	Enforcement non-compete clauses	Enforcement non-compete clauses
4. Investor friendliness	Government funding No real public initiatives to attract capital	Lack of capital, but effective public initiatives Incubators High tax rates	Traditional and conservative venture capital industry	Lack of capital No intermediaries Low tax rates

3. Points of improvement

Overall, the region Southeast-Brabant is successful in different fields. Its research and innovative achievements are belonging to the best of the world.²⁵⁵ The region's turnover out of innovation is substantial and the number of vacancies and jobs keeps increasing. However, the Brainport region Eindhoven lacks (young) entrepreneurs and the number of high-tech startups keeps on decreasing. The Netherlands as a whole is also performing on average regarding the creation of innovative or quickly growing young companies.²⁵⁶ It also needs to be taken into account that most (high-tech) startups have only one employee and do not have a real potential to become a 'real' company.²⁵⁷ Another pitfall is the lack of finances and venture capital funding.²⁵⁸ Angel investors and wealthy family businesses are not willing to invest in high-tech companies and there is no flourishing venture capital industry.²⁵⁹ Finally, other weaknesses can be the level of public and private collaboration nationwide²⁶⁰ and the level of innovative collaborations between companies in the Brainport region. In sum, the following deficits can be considered as a weakness of the Brainport region Eindhoven;

- (Young) entrepreneurs
- Startups
- Intermediaries
- Commercialization
- Developed venture capital industry
- Other finances; angel investors and wealthy family businesses
- Level of (international) collaboration
- Government involvement

Recommendations on how to possibly solve these issues will be covered in the next chapter.

²⁵⁵ De kracht van de slimste, Brainport Monitor 2012, p. 85.

²⁵⁶ Stam et al. 2012, p. 7.

²⁵⁷ CBS, Het Nederlandse ondernemingsklimaat in cijfers 2012, p. 63.

²⁵⁸ McCahery and Vermeulen 2010, p. 484.

²⁵⁹ Thaler and Sustain 2009, p. 58-59.

²⁶⁰ CBS, Het Nederlandse ondernemingsklimaat in cijfers 2012, p. 54.

Chapter 6 Recommendations

Rome was not built in a day

This chapter will contain my points of view regarding the Brainport region Eindhoven. I have tried to formulate various recommendations on how to improve the development of the Dutch cluster. Personally, I find that the public interventions instituted up till now are very fragmented. There is no real cohesion between the different programmes. In making these proposals my goal was therefore to formulate a structured action plan and provide several fundamental basics. I think it is important to centralize the interventions and try to establish solid linkages between the industry, universities, financiers, government, entrepreneurs and other related parties. The first set of recommendations will entail the ones that need to be executed at a regional level. The second set of proposals can only be instituted at a national level since they require a national competence.

1. Regional level

Concept 1 The first set of recommendations will be evolving around a centralized public institution, the *Generator Commission*. This commission will have different functions, but in the first place it needs to act as an overall connector of all related parties. In my opinion it is very valuable to establish a real 'visible' commission and not just some vague institution. By settling the commission in an actual building in the center of the cluster, I would propose in the center of Eindhoven, people will tend to relate more to the organization and the concept becomes really connected to the development of the Brainport cluster. The commission will consist of a variety of people, under which people from the universities and established companies within the region. Successful entrepreneurs, scientist, engineers, financing funds and intermediaries also need to be part of the commission to guarantee its diversity. Furthermore, the commission will consist of different sections, among which the acceptance, support and monitoring sections. The presence of such a visible center will improve the feeling of coherency. Meetings can be held there; it is a place for people to mingle or just randomly bump into each other. Several parties will be able to 'join' the commission if they meet certain requirements. In return they will receive various elements of support. All the parties that are related to the Generator Commission will be published on the website of the commission. Everyone can easily check if the party they are dealing with is accepted and approved by the commission. This fact can contribute to the trust relationship between parties and incentivize them to actually start working together. The presence of trust will furthermore cause a reduction in the transaction costs.²⁶¹

Concept 2 One of the first responsibilities of the commission will be the management of the *pool of problems* and the *talentpool*. When a company, located in the Brainport region, is dealing with a complex problem, which cannot be solved within the company due to a lack of capacity or knowledge, the company can assign its problem to the pool of problems. Opposite to the pool of problems, the commission will compose a talentpool. Scientists/engineers who are working at the several research

²⁶¹ Fukuyama 2001, p. 10-11.

institutions²⁶² and innovative startups can apply with the commission to become part of the talentpool. Their application will be examined regarding the level of their innovative thoughts, their added value for the high-tech industry, reliability and educational degree. After the scientist/engineer or startup is accepted in the talentpool they will get the opportunity to pitch their solutions on an issue that was assigned to the pool of problems. The commission will select three candidates who may pitch their action plan to the company. The commission will look at industry relevance, former experience and educational background in order to find real potentials that may be able to solve the issue of the company. It is also a good opportunity for the scientist/engineer or startup to learn how to enthusiastically pitch their ideas.²⁶³ After the company has chosen a party to dissolve their issue, the scientist/engineer or startup will begin to work on the problem. The scientist/engineer or startup will become some kind of freelance worker. During the working process, the startup will also be able to use the research facilities available in the region. The companies that are requiring help will receive a fund from the commission which will cover most of their expenses for the payment of the scientist/engineer or startup. The way the commission will obtain these finances in the first place will be discussed in concept 6.

Concept 3 If the scientist/engineer or startup does not have the adequate workforce to dissolve the assigned problem, it can appeal to the *hire a student* program. This program is a collaboration of the TU/e, TiU and MU with the goal to make students more acquainted with the practice. Students from the three universities can subscribe themselves to the program. Connecting both the student and the scientist/engineer or startup can occur online, but can also become the responsibility of a student board located at the university. Most of these assignments will be in the fields of science and technology and will therefore require a student of the TU/e. On the other hand, companies can also face problems in the fields of economics, marketing, law et cetera. In this case, the company or startup can appeal to a student of TiU or MU. This entails a second aspect of the hire a student program, but without the interference of a scientist/engineer. The students will be hired during the period the company, scientist/engineer or startup needs support. In this way, students can get acquainted with the business world and the company, scientist/engineer or startup can make use of a motivated and high-educated workforce. Hiring a fixed employee will thereby be more expensive. Most of the companies asking for support will probably be SMEs, since multinational companies will have the capacities and finances to solve the problem internally. In order to support these SMEs financially, the commission will provide a fund which will partially settle the fee of the scientist/engineer, startup or student. Concept 6 will describe in which way the commission will obtain these finances. In return, the commission will require that the company will guide and support the scientist/engineer, startup or student in the development of the solution and also with other business related issues. In this concept, the industry is linked with the scientist and educational level. When solid relationships arise between the engineer/scientist or startup and the industry, the first parties may be able to pitch their tailor made ideas with a company. If the startup has been working with a company for a while, it will know what the needs of this company are and it will be easier to anticipate to these needs. Overall, innovative development will be more

²⁶² Among others; The High Tech Campus Eindhoven, Philips Healthcare in Best and High Tech Automotive Campus, located in Helmond.

²⁶³ 'Wat als ... Silicon Valley in Nederland ligt?' (Sjors Rodenburg - *Financieel Dagblad* November 21, 2012).

effectively linked to the industry and will therefore have a large potential to become commercialized. This process will also trigger an increase of the R&D expenses.

Concept 4 Persons that really have the ambition to *start their own business* can also pitch their own ideas with the commission. The commission will subsequently test the idea on its feasibility and potential to become commercialized. Although they can never be sure that an idea has the potential to grow into a stable company, the commission really needs to thoroughly examine the business plan of the entrepreneur. If an idea is accepted, the commission will support the entrepreneur in providing a fund which will cover the crucial early-stages of the development process. The way the commission will obtain these finances in the first place will be discussed in concept 6. Furthermore, the commission will provide intense guidance and coaching. The commission will help the entrepreneur to further develop its business plan, find the right suppliers, keep its administration ordered et cetera. In this process, the entrepreneur can also apply to the hire a student program in order to get some additional support. Since most of the startups are companies with only one employee it will be valuable for them to make use of an additional and flexible workforce. It is also possible for him to make use of the research facilities. Providing such an intensive support will help the people living in the Brainport region to see more opportunities and chances to start their own business and in time increase the level of startups. When these startups grow out to fully-fledged companies they will need to give something back to the commission, in other words, the community. In the first place they will need to offer their support to the new startups that recently joined the commission. They are for example obliged to sit in the monitoring and supporting sections of the commission. These fully-fledged companies will also need to make a specific number of internships available for the students of TU/e, TiU and MU.

Concept 5 In order to increase the numbers of startups there need to be *enough entrepreneurs* in the first place. The TU/e, TiU and MU can play a big role in increasing the number of university entrepreneurs. Besides motivating students to do a PhD, lectures should also stimulate students to start their own business, instead of to go and work with an established company. The PhD of a technical student can thereby for instance be the basis for a new innovative, life sciences product, which he subsequently can bring to the market himself. There should be more possibilities for students to develop their own ideas and anticipate to the needs of the market. I once went to a seminar of the Brabant Center of Entrepreneurship (BCE)²⁶⁴ which was very inspiring. The attendance was however disappointing. There were only a few students with innovative ideas. I think it is remarkable that there are so many possibilities for students to get in touch with the labor market through in-house days, business courses, masterclasses and business days, while the possibilities to get acquainted with real entrepreneurs are minimum. Result is that most of the graduates in the Netherlands are pursuing a career at a big international firm. Only a few prefer a function at a small startup or even want to start their own business. The universities need to make up plans on how to excite students to go and work at a small startup company or even start up their own business. The follow up, on how startups will be able to employ university graduates will be discussed in the next concept. The hire a student program which was described under concept 3 can help students to get more acquainted with the life of an entrepreneur. Universities can further offer an elective, or even compulsory, course in entrepreneurship

²⁶⁴ www.bc-e.nl

and invite successful entrepreneurs to give seminars. The universities can also offer a master which is focused on entrepreneurship and innovation. A mandatory internship will not necessarily motivate students to become an entrepreneur, but it will help them in their search of what they really want. It will thereby contribute to the level of cooperation between the industry and the universities. By doing this, students will get the opportunity to really consider their career perspective and figure out what they want instead of following the crowd. They will thereby find out that entrepreneurship is not as exciting like in the movie 'The social network'²⁶⁵ but requires real persistence and risk taking.²⁶⁶ If the commission, together with the universities, will succeed in stimulating university graduates to become an entrepreneur there will consequently be more university spin-offs which will be positive for the entrepreneurial development of the region. The universities can subsequently, together with the commission, play a role by providing additional coaching and (financial) support to further develop the ideas of the graduates. Guidance and involvement can give the new entrepreneurs more confidence and it will help them to see more chances and opportunities to develop their own business. Other projects like the Brabant Center of Entrepreneurship and the KVK18 can also become an element of the commission in order to guarantee the coherency of the interventions. The other initiatives which were mentioned in Chapter 2, like Kickstartup can for instance get a working space in the building of the commission. It is also possible to establish a building where all these initiatives are able to come together, work together and network. Exposure of these initiatives and more pioneers may change the mentality of young people.

Concept 6 If one has succeeded in making graduates more excited to go and work at a startup company instead of a big established firm, the startups need to consequently have enough capacity and finances available to actually employ a university graduate. The startups will in the first place receive a subsidy from the commission if they employ a graduate. The way the commission can provide this subsidy will be discussed in concept 6. Furthermore, the startups will be able to claim lower fees regarding provided legal advice by the law firms. This possibility will be further elaborated in concept 7. By applying this concept, graduates will not prefer to work at a multinational company only for financial reasons.

Concept 7 As was mentioned in concepts 2, 3, 4 and 6, the commission will provide funds to companies, entrepreneurs and research facilities. To gather all the finances that are needed, the commission will appeal to third parties like *venture capital funds, angel investors and wealthy family businesses*. Since these last two sorts of investors were never very willing to invest in high-tech startups, the interference of a commission, acting as a guarantor, could persuade these investors to invest in high-tech startups. The presence of the commission could cause them to refrain from 'collective conservatism'.²⁶⁷ The commission can provide an extra security towards all three sorts of investors since the institution is backed by the government and will carefully pick the startups that can qualify for the funding and extra support. The commission will further try to find the right match by combining the investors and startups that have the same values and expectations. In my opinion, I think the angel investors and family

²⁶⁵ The social network is a movie about the founders of the social networking website, Facebook (www.thesocialnetwork-movie.com).

²⁶⁶ 'Startups are not glamorous - they run on fear' (Peter Hinssen - *Linkedin* June 7, 2013).

²⁶⁷ Thaler and Sustein 2009, p. 58-59.

businesses will be more willing to invest in high-tech startups when there is an institution which first picks out the bad apples and thereby helps them pick an appropriate startup. This concept will reduce the transaction costs for the startup, since it does not have to search for an investor. The investor does thereby not have to research the whole startup it wants to invest in, since this is done by the commission. Most angel investors and family businesses are not familiar with high-tech companies and it is therefore more efficient for the commission, under which some experts, to examine and research the startup. This will therefore also reduce the transaction costs for the investor. Another task of the commission is to teach the investors how to guide, monitor and support the startup. This can for example entail structuring business plans and monitoring development processes. Seminars on these topics can be held in the building of the commission and when the investors, after a while, have learned how to monitor their investments, the commission can step back. Bringing together the investors and the startups can become a task of the intermediaries present in the region. This concept will be discussed in the concept 9.

Concept 8 One of the initiatives of the *Dutch government* to stimulate innovative development is the Small Business Innovation Research Programme (hereinafter: SBIR).²⁶⁸ In this programme, the Dutch government acquires R&D in order to solve problems within the society such as environmental pollution. The development of the most promising products will be supported by the government. The government wants to spend €1.6 billion per year on purchases that are focused on innovation. When the commission receives a business plan of an entrepreneur within the Brainport region, the plan will be examined by several determinants like feasibility, level of innovation, et cetera. If the commission is of the opinion that the business plan entails a real solution that can be beneficial to the society, the commission will propose the plan to the government in order to become part of the SBIR. Especially the R&D that has the potential to become indispensable within society needs to be supported by the government since the development of the innovative product will probably be very expensive. Governmental supervision can in these cases be preferred. However, a regional monitoring authority is in my opinion favored since a regional institution has a clearer view on what is happening within the community, what are the needs, which parties are involved et cetera. The R&D without a real 'social' goal therefore needs to remain within the Brainport region Eindhoven. The government involvement in this regard can entail an annual subsidy directly provided to the commission in order to support the commission's activities and initiatives.

Concept 9 In order to further enhance the coherency of the Brainport region, the *intermediaries* need to play an active role. The presence of such connectors has a positive influence on the entrepreneurial development and they are therefore very important for the further development of the Brainport area. The intermediaries can in time take over the responsibilities and activities of the commission. For now, the presence of the commission is crucial, but it is possible for the intermediaries in the Brainport region to become the real connectors. In the first place, the law firms needs to adapt a new business strategy. Not only in the interests of the region, but also in their own interests since they cannot continue to survive only on their pure legal services. This concept also covers the law firms that are located outside the Brainport area because these law firms can also be active within the Brainport region. The

²⁶⁸ www.rijksoverheid.nl.

commission needs to involve the law firms in their process of connecting the investors to the startups. In time, the commission will outsource these activities directly to the law firms. Another function of the law firms can be to supply the startups that are supported by the commission with legal advice at a lower fee. In this way they can increase their client database and if a startup grows out to a fully-fledged company, the law firm can charge the normal fee. To practice these roles it is important for the law firms to be specialized in the industries that are relevant for the Brainport area like the high-tech, life-tech and automotive industries. Only then they can offer legal advice and create documents that really suffice to the needs of the market. An example of these useful documents can be the supply of standard contracts. Time consuming pre-transaction negotiations will not be necessary when parties use standard provisions. Besides the standard provisions, a clear and specific description of the mutual obligations of both parties needs to be drafted. In order to successfully do this, the lawyers need to be acquainted with the relevant industry. Well drafted contracts that are focused on the weaknesses of the industry can reduce the level of insecurity that exists between transaction parties. If problems arise between the related parties, they can refer to the definitions in the contract which determine when there is a breach of contract and what the consequences of this breach are. Solving these problems, without the interference of a court or judge will enhance the levels of trust and certainty within a transaction and between parties. The transaction parties are aware of what they can expect from each other. Moreover, the assumption that the level of trust is generated within the business relationship will increase the group of potential transaction parties. In order to effectively make lawyers act as transaction costs engineer, one needs to start at the beginning by training law students to become legal engineers.²⁶⁹ The law faculties of the TiU and MU need to train their students in a way that they are focused on the practice. Besides the theoretical subjects, they need to get acquainted with drafting different business contracts, legal negotiations and economic backgrounds.

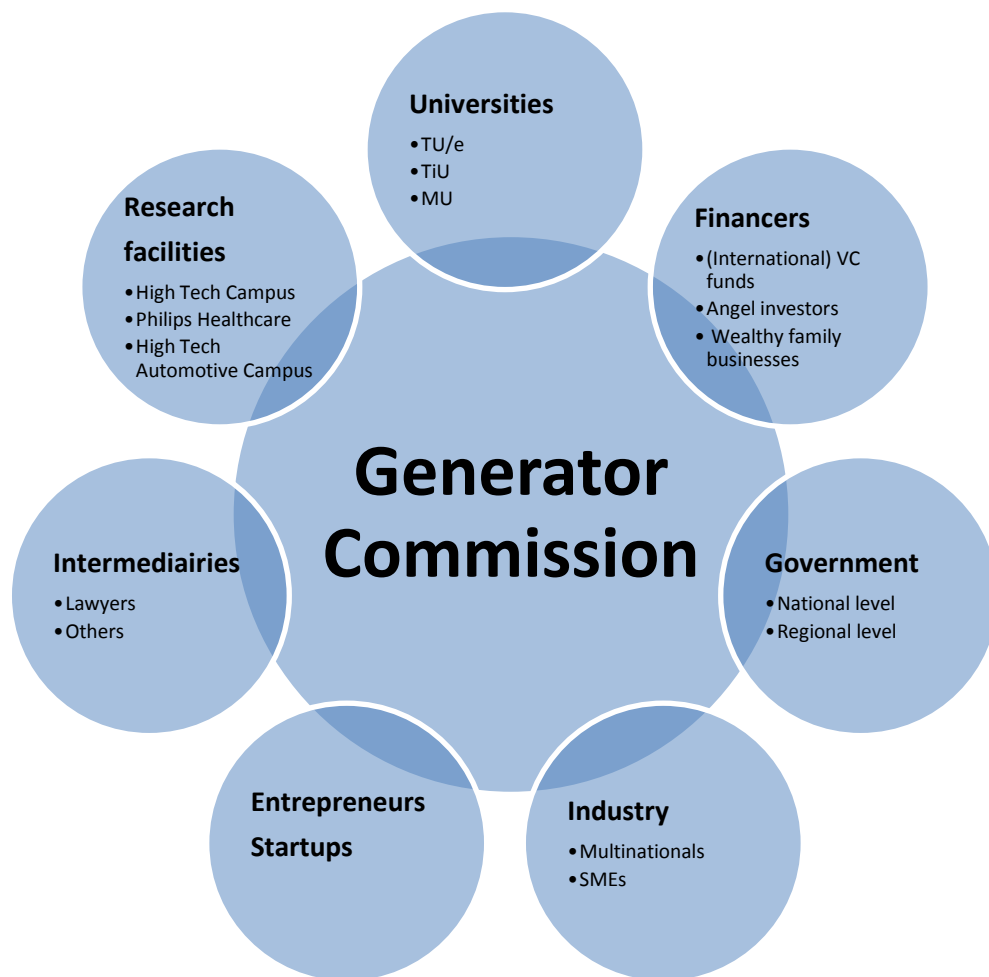
Concept 10 When a party is related to the commission, this relation needs to implicate that the party is reliable and will do everything in order to adequately practice its tasks. This applies to every party that is related to the commission; entrepreneurs, industry, financiers and intermediaries. In order to provide an extra security, these parties will need to sign a *social contract* if they want to make use of the services such as funding and mentoring that are provided by the commission. These social contracts will make the parties aware of the informal rules that apply within the Brainport region. Parties need to be willing to meet with others in the community, help others where possible, pursue innovative thoughts, nurture trust relationships and overall contribute to the development of the Brainport region. By making these informal rules explicit, it will be much clearer when a party is in breach with such an informal provision. Personally, I think that these contracts can provide an extra security. If a party does not comply with the social contract, the commission will need to judge the case and can afterwards decide that the party may no longer be related to the commission. This decision will be published on the website of the commission, in order to inform other parties. This publication can cause a great reputational harm to the party in breach of the social contract. The use of these contracts will in my opinion create a higher burden for a party to act in a way that is incompatible with the values of the Brainport region.²⁷⁰

²⁶⁹ Susskind 2008, p. 272.

²⁷⁰ Hwang & Horowitz 2012, p. 216-217.

It might be suggested that making these social norms explicit will not be effective or feasible. However, it is important that the parties that are joining the commission are aware of the values and norms that apply in the Brainport region. Moreover, creating an environment in which these values and norms are generally known and accepted will not occur overnight. If the concept of explicit social contracts which will be signed by the related parties will not be feasible, the commission could put a list with the *Rules of Brainport* on their website. By doing this, the commission has the chance to refer to these statutes or rules of conduct, in case the behavior or actions of a party are not in compliance with the rules of Brainport. After doing this, the commission needs to examine the seriousness of the breach and afterwards decide if the party in breach of a Brainport value is still allowed to be related to the commission.

Figure 1: Overview Generator Commission Program



2. National level

In order to dissolve the weaknesses and pitfalls of the Brainport region Eindhoven there need to be some adjustments made at a national level within the Netherlands.

It has been proven that the Dutch Bankruptcy laws have a negative effect on the entrepreneurial development of the Brainport region. There is in the first place no efficient reorganization mechanism.

Secondly, the negative thoughts regarding a bankruptcy prevent people from starting their own business. My first recommendation regarding the Dutch bankruptcy laws is that the courts should continue to appoint a *silent administrator*. A silent administrator or a pre-pack procedure can prevent that a bankruptcy brings along a high number of discharges and high rates of capital elimination. When a bankruptcy is made public, the value of the company can decrease rapidly due to among others, reputational harm. Since a bankruptcy in the Netherlands is associated with negative thoughts, it would be better for a company in financial distress to first try to order their business and possibly prepare a start true without the whole world knowing about their problems. The value of the assets will after all be larger before a company is declared bankrupt than afterwards. A pre-pack procedure will therefore definitely provide the company with a better chance to survive. The Dutch Minister of Justice thereby promised to develop a proposal regarding such a pre-pack regulation by the end of this year.²⁷¹ In addition to the possibility of appointing a silent administrator, the Dutch bankruptcy law should provide an effective reorganization mechanism. My proposal regarding this issue is to relate to the Chapter 11 procedure of the U.S. Bankruptcy Code. This procedure has proven to be an effective reorganization mechanism and really provides bankrupt companies with a valid chance to survive.²⁷² The new reorganization procedure in the Netherlands needs to be focused on the continuation of the company and not the settlement of the creditors. The debtor thereby needs to remain in the possession of its assets in normal business affairs. Furthermore, the procedure needs to be much more transparent, meaning that the creditors also need to be informed regarding any development. Creditors thereby need to play a role in structuring the reorganization plan. If the creditors are to such a degree involved, there will be a bigger chance that they will agree on a reorganization plan and do not unnecessarily hinder a start true. If the legislator succeeds in creating an effective reorganization mechanism that is focused on the continuation of the company in financial distress, it can occur that the negative thought regarding a bankruptcy will fade in the future. When a bankruptcy is no longer considered a failure, but a way to reorganize and continue business, all negative thoughts regarding a company in financial distress may disappear in time.

Besides the Dutch bankruptcy laws are the Dutch employment law provisions a pitfall in the entrepreneurial development of the country. As was mentioned in Chapter 2 (Brainport), the high level of employment protection which is applicable in the Netherlands has a negative effect on the ambition perspective of entrepreneurs. If one wants to motivate entrepreneurs into starting their own business, the legislators need to provide a low standard of employment protection. My proposal is not totally eliminate the employment protection, but to soften the provisions regarding the protection for startup companies. These 'softer' employment protection provisions are applicable for the duration of three years, starting from the establishment of the startup. The content of these alternative provisions can be the possibility to more easily set up temporally contracts and more simplified rules regarding a discharge which will make it easier for a company to fire an employee. When employers are not 'stuck' to their employees, they will be more willing to employ other persons, which will have a positive effect on the employment rate. More flexible rules regarding the discharge of an employee will further spur velocity

²⁷¹ 'Crisis dwingt rechter tot nieuwe aanpak bankroet' (Siem Eikelenboom, Joris Kooiman and Jan Verbeek - *Financieel Dagblad* June 14, 2013).

²⁷² Kroese and Woudenbergh, van 2001, p. 17.

employment and subsequently cause knowledge to spill over. Softening the employment protection provision will therefore in the first place create more opportunities for employees and in the second place enhance the chance of innovative developments due to the exchange of information. The possible knowledge spillovers can however be hindered by the enforcement of non-compete clauses or the Dutch trade secret law.

3. Miscellaneous

The level of diversity within a community has a positive effect on the innovative development within a region. When people with different background interact with each other, the output will be much more valuable.²⁷³ The positive effects of diversity can also be related to one of the important institution within a company, namely the board of directors. The board of directors needs to consist of people with different background who together form the 'right mix'. If a company wants to achieve a competitive advantage because of the composition of its board of directors, it is very important that the board consist of the right persons. Both persons who are able to monitor and persons who know about finances are needed. This last group of persons with a financial background is in most cases independent. On the other hand, a company also requires persons who actually understand the business and industry and who can help the company to remain innovative and progressive. Regarding the Brainport region Eindhoven is will be very valuable for the companies to have a board of directors that consists of persons from different backgrounds, like venture capitalists, scientists or engineers, traditional business men/women and young men/women with innovative thoughts. It is the challenge of the board of directors to fill in the gaps, since it is not the responsibility of the board to manage the company, to set the policy or to invest new products, since all these tasks are performed by the management. In order to emphasize the importance of the board composition, a company needs to focus on growth and also have the aspect of growth as a part of the corporate governance of the company. Since the investors and regulators have little influence on the growth perspective of a company, the CEO, together with the board of directors, needs to put the phenomenon of growth high on the corporate agenda. This focus on growth with regarding the corporate governance of a company is also called the 'three dimensional corporate governance model'.²⁷⁴

Overall, there can definitely be some improvements made in the development of the Brainport region Eindhoven. The recommendations which were elaborated above can in my opinion contribute to a flourishing development of the area.

²⁷³ Saxenian 1994, p. 102.

²⁷⁴ McCahery, Vermeulen and Hisatake 2013, p. 30-35.

Conclusion

“Be nice to nerds. You may end up working for them. We all could.”

– Charles J. Sykes

The existence of innovative clusters can be explained by so many arguments and from so many different perspectives. However, no explanation will be able to cover all the aspects of their existence. In reviewing different innovative clusters around the world, one can conclude that one of the most important elements determining the success of a cluster is the cultural and behavioral background of the region. Besides looking at the knowledge infrastructure, government involvement, development of the venture capital industry and legal infrastructure, the aspects of the social environment are crucial. Solely providing and gathering all the required ingredients does simply not guarantee a prosperous innovative cluster.

While examining the most successful innovative cluster, the Californian cluster Silicon Valley in the U.S., one can see that the historical background and cultural mentality of the region played a very important role in the development of this cluster. The open-minded attitudes within the region ensure that the cluster can maintain its high levels of innovation and collaboration. Moreover, the developed venture capital industry, skilled workforce and legal infrastructure of the region contributed to its success. With regard to the Dutch cluster located in Southeast-Brabant, the Brainport region Eindhoven, one can see that the deficits of this cluster are among others, the presence of startups and availability of finances. In order to formulate recommendations on how to improve the development of the Brainport region, I have tried to formulate a structured action plan and provide several fundamental basics. One of the most important recommendations is the institution of the Generator Commission. This commission brings together the; industry, startups, entrepreneurs, universities, financiers, intermediaries and government by instituting several concepts which will enhance the level of collaboration, formation of startups and availability of finances. A summary of these concepts can be seen in the following table;

Table 3: Summary recommendations on how to improve the Brainport region Eindhoven

Concept	Further information
1 Generator Commission	Overall connector 'Visible' commission Consists of a variety of people (successful entrepreneurs, scientists, engineers, financing funds, intermediaries, et cetera) Some sort of membership with the commission Enhances trust relationship between parties and reduces transaction costs Increase level of commercialization
2 Talentpool and pool of problems	Talentpool includes scientist/engineers and startups Pool of problems includes issues which companies can assign to the commission Commission will link these problems to scientists/engineers and startups Funding by commission to cover fee Trigger an increase in R&D expenses
3 Hire a student program	Collaboration between TU/e, TiU and MU Link student to scientist/engineer or startup Students get more acquainted with the business world Flexible and less expensive employee
4 Support entrepreneurs	Feasible and potential commercial ideas

		<p>Commission provides financial support and coaching services</p> <p>Help the people living in Brainport to see more opportunities and chances</p> <p>Will in time increase the level of startups</p> <p>Will in time give something back to the commission, like support and available internships</p>
5	Motivate young people to become an entrepreneur	<p>Universities need to play a role</p> <p>Provide ways in which young people can get acquainted with entrepreneurship; classes in innovation, master that is focused on entrepreneurship and innovation, (mandatory) internship, hire a student program et cetera.</p> <p>Motivate students to formulate individual career perspectives</p>
6	Motivate young people to work at a startup	<p>Startups will receive subsidy by commission for hiring graduate</p>
7	Provide sufficient finances	<p>Commission will provide funds to different parties</p> <p>To obtain these finances, commission will appeal to third parties; venture capital funds, angel investors and wealthy family businesses</p> <p>By acting as a guarantor convincing investors to provide finances to the commission</p> <p>Reduce transaction costs</p> <p>Enhance trust relationship</p> <p>Learn investors how to monitor, guide and support an investment</p>
8	Government involvement	<p>Business plans with potential solution for the society will be referred by the commission to the Dutch government</p> <p>Annual subsidy to support activities and initiatives of the commission</p>
9	Active role intermediaries	<p>Law firms need to adapt new business strategy</p> <p>Law firms need to charge lower fees to startups</p> <p>Law firms need to be specialized in the industries that are relevant for the Brainport region (high-tech, life-tech and automotive industries)</p> <p>Provide standard contracts to eliminate time consuming pre-transaction negotiations</p> <p>Provide specific contracts that describe the mutual obligations of transaction parties to reduce uncertainty and enhance trust</p> <p>Law students need to be trained into legal engineers</p> <p>Intermediaries can in time take over the responsibilities and activities of the commission</p>
10	Social contract	<p>Being related to the commission needs to implicate that the party is reliable and will do everything in order to adequately practice its tasks</p> <p>Can occur by making the informal values and norms explicit or by publishing them on the website of the commission</p> <p>In case of a breach of this code of conduct the commission can decide that the party may no longer be related to the commission</p> <p>Decision of the commission will be published and can cause a reputational harm</p>

Besides the recommendations that can be executed on a regional level, Chapter 6 also entail some recommendations that need to be conducted nationwide like the use of a silent administrator and the creation of an effective reorganization mechanism for bankrupt companies. If the Dutch bankruptcy laws are more focused on the continuation of a company in financial distress, it can occur that the negative thoughts regarding a bankruptcy will fade in time. Another recommendation which needs to be executed on a national level is the softening of provisions regarding employment protection. Startup companies will be able to apply these softer employment protection provisions for the duration of three years, starting from the establishment of the startup. Softening the level of employment protection within the Netherlands will have a positive effect on the entrepreneurial development of the country and thereby create more opportunities for employees. Finally, a recommendation is made regarding the board composition of companies within the Brainport area. Since the level of diversity within a board of directors will lead to more valuable outputs, it is important that the board of directors consists of people with different background who together form the right mix. For companies located in the Brainport region it would be very valuable for them to have board of directors that consists of persons from

different backgrounds, like venture capitalists, scientist or engineers, traditional business men/women and young men/women with innovative thoughts.

Overall, if one wants to improve the Brainport cluster and make the region as successful as the U.S. cluster, there need to be some changes made. The recommendations which were mentioned above and elaborated in Chapter 6 will in my opinion contribute to a flourishing development of the Brainport area. Personally, I think it is about providing a solid and structured framework and creating some fundamental principles. Once such an environment is evolved, it can form the basis for further successful developments. Furthermore, such a (financially) supportive environment will motivate successful, next-best thing startups and the (international) talented workforce to stay in the Netherlands and the Brainport region.

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Appendices

Appendix A

Source: Wonglimpiyarat 2006, p. 1085 (derived from Etzkowitz et al. 2000)

Table 1
The US government programmes in financing innovations

Stages	Programmes
Early stages	Small Business Innovative Research (SBIR), Small Business Technology Transfer Programme (STTR)
Later stages	Advanced Technology Programme (ATP), Defense Advanced Research Projects Agency (DARPA), Dual Use
For small business assistance	Cooperative Research and Development Agreements (CRADAs), Small Business Administration (SBA), Manufacturing and Extension Programme (MEP), ManTech

Table 2
The actions of state government and private programmes

Programmes	Description
Small Business Innovative Research (SBIR)	The SBIR programme was established in 1982. It is the US government equity investment pool focussing on the commercialisation of research and development (R&D) performed within a small firm. The funding programme of early-stage R&D is designed to encourage the conversion of government-funded R&D into technological innovation and commercial application.
The Small Business Technology Transfer (STTR)	The STTR programme was established in 1992 with the main purposes to move research and development towards commercialisation. STTR focuses on the commercialisation of R&D performed in universities and government laboratories.
Advanced Technology Programme (ATP)	ATP was established in 1991 to benefit the US economy by cost-sharing research with industry to foster new and innovative technologies. The ATP programme funds the companies undertaking the research in genomics and Internet tools.
The Defense Advanced Research Projects Agency (DARPA)	DARPA was established in 1958 to focus on the military research and development. The aim of DARPA is to ensure that the US maintains a lead in applying state-of-the-art technology for military capabilities and to prevent technological surprises from potential adversaries.
Dual Use	The Dual Use Science & Technology Programme implements dual use technologies in defense systems by jointly funding the development of these technologies by the Department of Defense and commercial industry. The Programme defines 'dual use technology' as a technology that has both military utility and sufficient commercial potential to support a viable industrial base.
Cooperative Research and Development Agreements (CRADAs)	CRADA is a written agreement between a private company and a government agency to work together on a project. CRADA allows the Federal Government and non-federal partners to optimise their resources, share technical expertise in a protected environment, share intellectual property emerging from the effort, and speed the commercialisation of federally developed technology.
Small Business Administration (SBA)	SBA was established in 1953 to provide financial, technical and management assistance to help Americans start, run and grow their businesses. SBA established a Micro Loan programme nationwide to guarantee on bank loans to small businesses.
Small Business Investment Corporations (SBICs)	The SBIC programme was created in 1958 as a principal US government body to encourage investment (direct equity investments) in small businesses. SBICs are privately-owned and managed investment firms that use their own capital, as well as funds borrowed at favourable rates with the Small Business Administration (SBA) guarantee, to make VC investments in small businesses.
Manufacturing and Extension Programme (MEP)	MEP was established in 1988. It is a nationwide network of not-for-profit centres linked together through the Department of Commerce's National Institute of Standards and Technology. The purpose of MEP is to provide small and medium sized manufacturers with the expertise and services they need to succeed.
Manufacturing Technology (ManTech)	The Department of Defense Manufacturing Technology Programme (ManTech) funds the enabling manufacturing technology developments required for the efficient, effective production of future weapon systems that support the Department of Defense's strategic plans.
California Public Employees' Retirement System (CalPERS)	The CalPERS Programme was established in 1999. It is the government equity investment pool set up to invest in California start-ups and established companies seeking capital. The aim is to help the companies grow and become competitive in the institutional marketplace.
The National Association of Securities Dealers Automated Quotation (NASDAQ)	NASDAQ was founded in 1971 as a capital market for SME investment opportunities. The market provides a place for fund-raising for small companies and venture capital. NASDAQ aids small companies in raising funds before they become more established and move up to the national capital market.
Silicon Valley Bank	Silicon Valley Bank was founded in 1983. The bank provides credit and banking services e.g. term loans, equipment loans, and structured loans to start-up technology-based companies in the technology, life science, private equity and premium wine markets.

Appendix B

Source: Armc

Table 1. Summary Statistics for Bankruptcy Indices

This table summarizes the bankruptcy indices used in the empirical analyses in the subsequent tables for each country and each year. Sources: compiled from the bankruptcy statutes from each country.

	Discharge: Concerns discharge from prebankruptcy indebtedness available for an entrepreneur who has either been trading as a sole proprietor or guaranteed debts of a closely-held private company.	Discharge Years: If discharge available, value is number of years until typical discharge; if discharge unavailable, value is life expectancy minus 40.	Minimum capital to form private company, in 2005 Euros (1/E).	Exemptions: This relates to prebankruptcy assets which are exempted from the bankrupt estate and so retained by the debtor. Takes value 1 if exemptions of assets from the bankruptcy estate cover only personal items, tools of trade, etc. Takes value 0 if exemptions are more generous. Takes value 2 if exemptions are 'negative', i.e. spousal property can be pulled into the estate.	Disabilities: This relates to restrictions on the debtor's civil and economic rights related to bankruptcy. Takes value 0 if no disabilities other than loss of power to deal with assets in bankrupt estate; Takes value 1 for civic disabilities (i.e. loss of right to vote, hold elected office, membership of professional groups); Takes value 2 for economic disabilities (i.e. restrictions on obtaining credit, being involved in the management of a company); Takes value 3 for interference with mail and/or travel (i.e. prohibition on travel without consent, mail opened by trustee); Takes value 4 if debtor may be incarcerated for non-payment of debts.	Composition: This relates to possibility of agreeing a deal with creditors as a means of an existing bankruptcy procedure. Takes value 0 if variable takes a value below proportion of face value and is the sum of (v+c) proportion of face value creditors' claims and c is number of creditors, who favour to effect a court
ustria	1990-1994: 1; 1995-2005: 0	1990-1994: 37; 1995-2005: 7	1990-2005: €35000	1990-2005: 2	1990-2005: 0	1990-2005: 1,2
gium	1990-1997: 1; 1998-2005: 0	1990-1997: 37; 1998-2005: 0	1990-1998: €6174; 1999-2005: €18500	1990-2005: 1	1990-2005: 3	1990-1997: 1,2,5; 1998
anada	1990-2005: 0	1990-1992: 1; 1993-2005: 0.75	1990-2005: €0	1990-2005: 0	1990-2005: 2	1990-2005: 1,1
nmark	1990-2004: 5; 2005: 0	1990-2004: 5; 2005: 3	1990-1991: €10732; 1992-1996: €26831; 1997-2005: €16769	1990-2005: 1	1990-2005: 3	1990-2004: 1,4; 200
nland	1990-1992: 1; 1993-2005: 0	1990-1992: 37; 1993-2005: 5	1990-2005: €2500	1990-2005: 1	1990-2005: 3	1990-2005: 0,1
nance	1990-1993: 0; 1994-2005: 5	1990-2005: 0	1990-2002: €7500; 2003-2005: €0	1990-2005: 2	1990-1994: 1; 1995-2005: 2	1990-2005: 0
nary	1990-1998: 1; 1999-2005: 0	1990-1998: 37; 1999-2000: 7; 2001-2005: 6	1990-2005: €25000	1990-2005: 0	1990-1998: 3; 1999-2005: 1	1990-1998: 1,2,5; 1995
reece	1990-2005: 1	1990-2005: 20	1990-1992: €587; 1993-1998: €8804; 1999-2002: €17608; 2003-2005: €18000	1990-2005: 1	1990-1997: 4; 1998-2005: 3	1990-2005: 1,4
eland	1990-2005: 0	1990-2005: 12	1990-2005: €0	1990-2005: 1	1990-2005: 2	1990-2005: 1
italy	1990-2005: 1	1990-2005: 38	1990-2003: €10300; 2004-2005: €10000	1990-1992: 2; 1993-2005: 1	1990-2005: 3	1990-2005: 1,1
erlands	1990-1998: 1; 1999-2005: 0	1990-1998: 38; 1999-2005: 3	1990-2005: €18000	1990-2005: 2	1990-2005: 0	1990-1994: 1,4,6; 1995
pain	1990-2005: 1	1990-2005: 15	1990-2005: €3000	1990-2005: 1	1990-2005: 3	1990-2003: 1,1; 2004:
veden	1990-2005: 1	1990-2005: 10	1990-2005: €10749	1990-2005: 1	1990-2005: 2	1990-2005: 2
UK	1990-2005: 0	1990-2003: 3; 2004-2005: 1	1990-2005: €0	1990-2005: 1	1990-2005: 2	1990-2005: 1
USA	1990-2005: 0	1990-2005: 0	1990-2005: €0	1990-2005: 0	1990-2005: 1	1990-2005: 1

Appendix C

Source: Lee et al. 2010, p. 7

Table 1

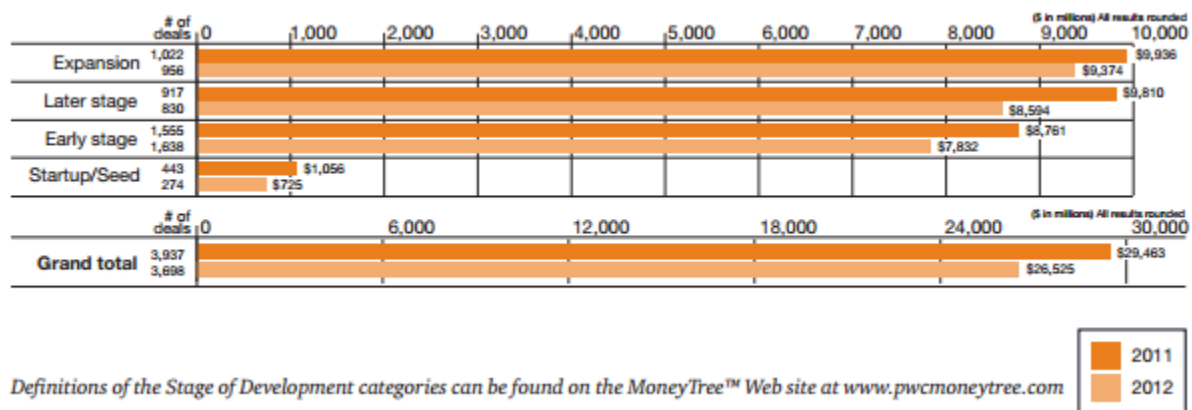
New firm entry rates (the ratio of new firms to the total number of firms) and bankruptcy law differences.
Sources: Claessens and Klapper, 2005; Doing Business Report, World Bank; La Porta et al., 1998; OECD data.

Country	New firm entry rate ^a	Time (years) spent on bankruptcy ^a	Cost (% of estate) of bankruptcy ^a	Fresh start (recovery rate: cents/\$) ^a	Automatic stay of assets (1: stay; 0: no stay)	Stay of incumbent management (1: stay; 0: no stay)
Argentina	0.07	2.8	14.6	75.9	1	1
Australia	0.11	1.0	8.0	19.9	1	1
Austria	0.08	1.1	18.0	26.9	0	1
Belgium	0.07	0.9	4.0	13.9	0	1
Canada	0.10	0.8	4.0	10.4	1	1
Chile	0.07	5.5	17.5	79.8	1	1
Denmark	0.10	3.2	4.0	35.0	0	1
Finland	0.08	0.9	4.0	11.6	1	1
France	0.08	1.9	9.0	53.9	1	1
Germany	0.17	1.2	2.2	44.2	0	1
Greece	0.06	2.0	9.0	55.3	1	0
Hong Kong	0.04	1.1	9.0	19.1	0	0
Ireland	0.05	0.4	9.0	12.3	1	1
Italy	0.08	1.3	18.7	52.4	1	1
Japan	0.04	0.6	4.0	7.4	1	0
Netherlands	0.09	1.1	4.0	12.5	1	1
New Zealand	0.20	1.3	4.0	21.2	0	0
Norway	0.11	0.9	1.0	6.5	1	1
Peru	0.11	3.1	7.0	69.8	1	1
Portugal	0.09	2.0	9.0	26.6	1	1
Singapore	0.18	0.8	1.0	8.7	0	0
South Korea	0.03	1.5	4.0	18.9	0	0
Spain	0.10	1.0	15.0	22.6	0	1
Sweden	0.07	2.0	9.0	28.3	1	1
Switzerland	0.02	3.0	4.0	53.5	1	1
Thailand	0.09	2.7	36.0	59.4	0	0
Turkey	0.04	3.3	15.0	88.3	1	1
United Kingdom	0.13	1.0	6.0	14.7	0	0
United States	0.10	1.5	7.0	20.1	1	1

^a Average during 1990–2008.

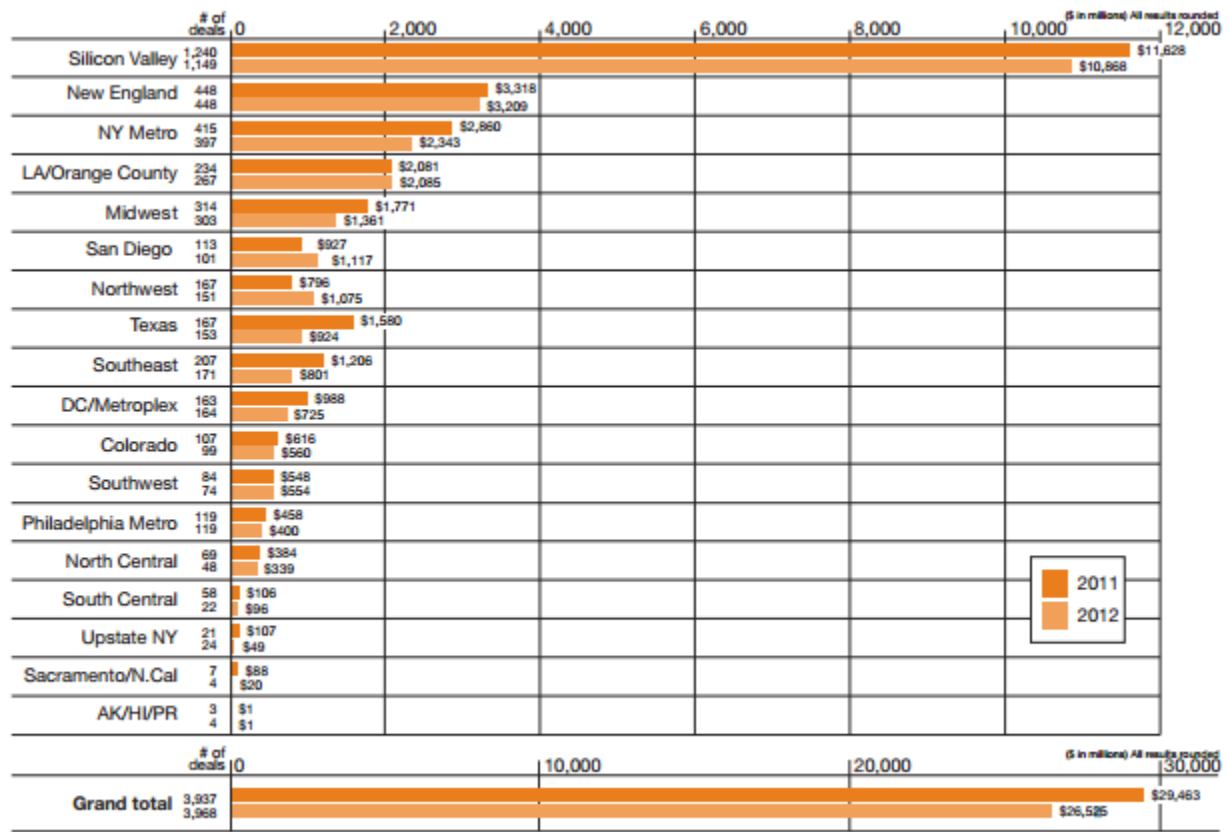
Appendix D

Source: PricewaterhouseCoopers National Venture Capital Association MoneyTree Report Q4 2012/Full-year 2012, p. 5 (available at: www.pwcmoneytree.com)



Appendix E

Source: PricewaterhouseCoopers National Venture Capital Association MoneyTree Report Q4 2012/Full-year 2012, p. 9 (available at: www.pwcmoneytree.com)



Unknown region totals not included

Appendix F

Source: Percentage of entrepreneurs within a province and distinction between male and female entrepreneurs in 2011 - Panteia datasets (available at: www.data.ondernemerschap.nl)

Province	Entrepreneurs (total)	Male	Female
Utrecht	7.6	4.7	2.9
Noord-Holland	19.5	12.5	7
Zuid-Holland	18.6	12.9	5.7
Noord-Brabant	15.5	10.5	5

Appendix G

Source: Percentage of entrepreneurs distinguished by different age categories and education level in 2011 - Panteia datasets (available at: www.data.ondernemerschap.nl)

Age	Entrepreneurs (total)	High education	Low education
15-25	3.1	0.6	0.8
25-35	14.9	5.8	2.6
35-45	30.1	12.1	5.3
44-55	31.2	11.7	6.7
55-65	20.7	7.9	5.1

Appendix H

Source: Entrepreneurial attitudes and perceptions in the GEM countries in 2012 by geographic region - GEM 2012, Global Entrepreneurship Monitor 2012 Global Report (available at: www.gemconsortium.org)

Economy	Perceived opportunities	Perceived capabilities	Fear of failure *	Entrepreneurial intentions **	Entrepreneurship as a good career choice+	High status to successful entrepreneurs+	Media attention for entrepreneurship+
Singapore	23	27	42	16	50	63	77
Taiwan	39	26	38	25	70	63	83
Thailand	45	46	50	19	76	79	84
Average (unweighted)	30	32	41	17	59	65	70
EUROPEAN UNION							
Austria	49	50	36	9	46	76	
Belgium	33	37	41	9	62	57	54
Denmark	44	31	39	7	.	.	.
Estonia	45	43	34	16	55	63	41
Finland	55	34	37	8	45	83	68
France	38	36	43	17	65	77	41
Germany	36	37	42	6	49	76	49
Greece	13	50	61	10	64	68	33
Hungary	11	40	34	13	41	74	29
Ireland	26	45	35	5	45	81	61
Italy	20	30	58	11	67	70	51
Latvia	33	44	37	22	60	53	53
Lithuania	30	40	36	18	63	53	37
Netherlands	34	42	30	9	79	65	58
Poland	20	54	43	22	68	57	56
Portugal	16	47	42	14			
Romania	37	38	41	27	71	74	55
Slovakia	18	50	38	12	50	74	59
Slovenia	20	51	27	13	53	71	51
Spain	14	50	42	11	64	64	47
Sweden	66	37	33	11	.	.	.
United Kingdom	33	47	36	10	50	77	47
Average (unweighted)	31	42	39	13	58	69	50
NON-EUROPEAN UNION							
Bosnia and Herzegovina	20	49	27	22	81	72	39
Croatia	17	44	36	19	64	42	40
Macedonia	31	55	39	28	70	67	64
Norway	64	34	39	5	50	80	59
Russia	20	24	47	2	60	63	45
Switzerland	36	37	32	7	44	63	57
Turkey	40	49	30	15	67	76	57
Average (unweighted)	33	42	36	14	62	66	52
UNITED STATES							
United States	43	56	32	13	.	.	.

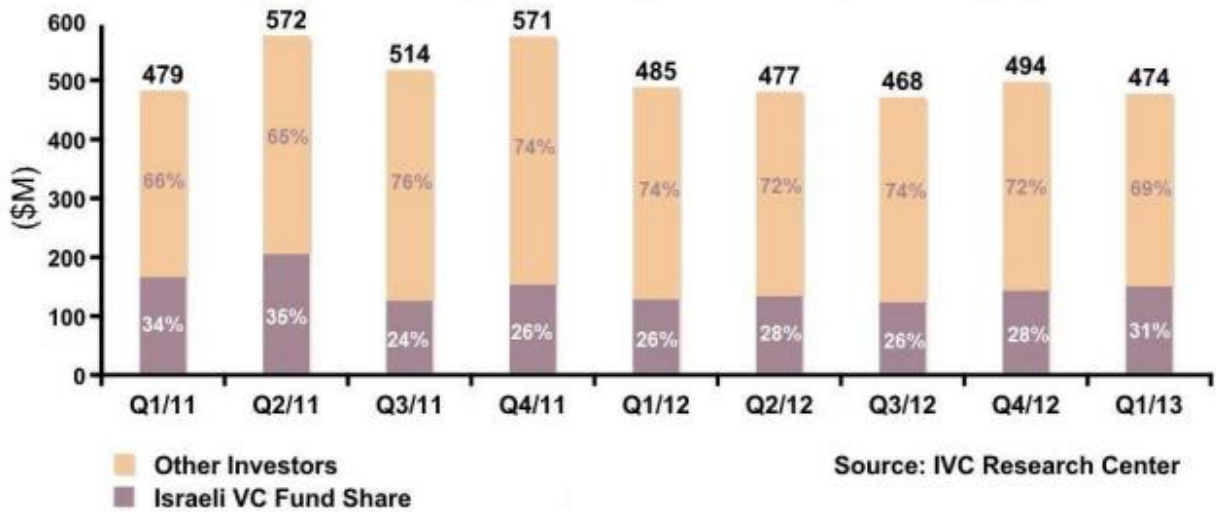
* Fear of failure assessed for those seeing opportunities

** Intentions assessed among nonentrepreneur population

+ These questions were optional and therefore not included by all economies

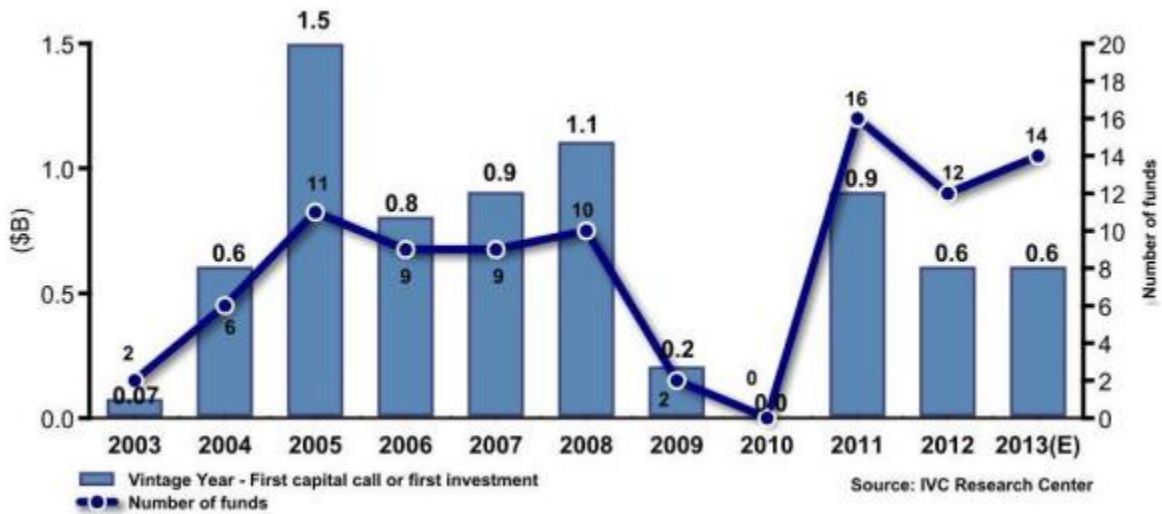
Appendix I

Source: Summary of Israeli High-Tech Capital Raising - Q1/2013 (available at: www.ivc-online.com)



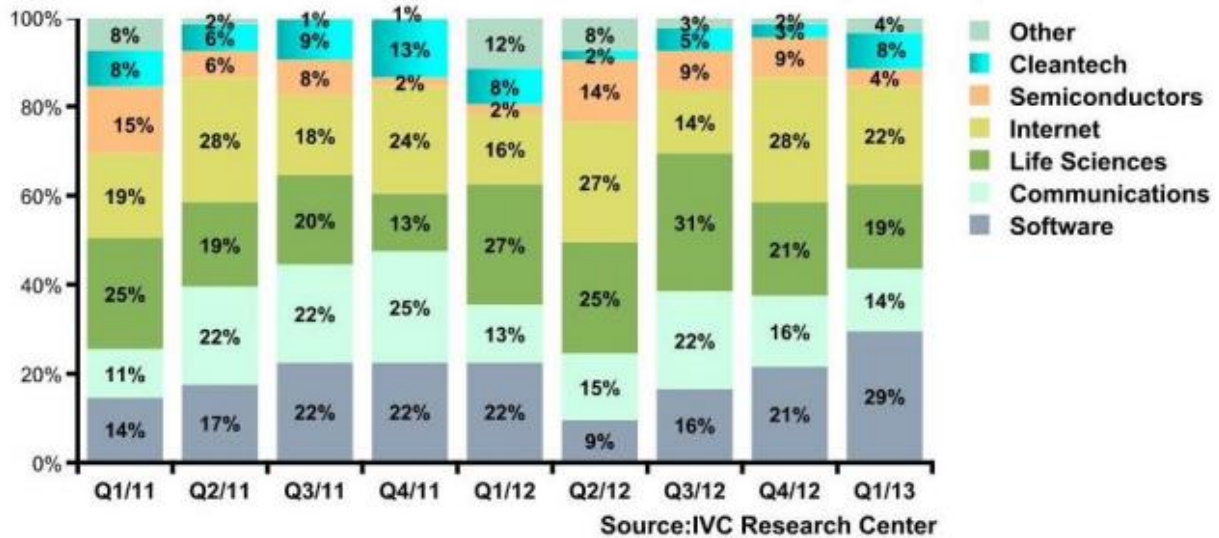
Appendix J

Source: Israeli Venture Capital Fund Raising 2012 (available at: www.ivc-online.com)



Appendix K

Source: Chart 2: Capital Raised by Sector Q1/2011 - Q1/2013 (%) (available at: www.ivc-online.com)



Appendix L

Source: Ondernemingsklimaat; ondernemerschap internationaal vergeleken (available at: www.statline.cbs.nl)

Onderwerpen ↓	Aankomend en jong ondernemerschap						
Perioden ↑	2006	2007	2008	2009	2010	2011	2012
Landen ↗	TEA-index						
Australië	12,0	.	.	.	7,8	10,5	.
België	2,7	3,2	2,9	3,5	3,7	5,7	.
Canada	7,1	.	.	.	.	.	.
Denemarken	5,3	5,4	4,4	3,6	3,8	4,6	.
Duitsland	4,2	.	3,8	4,1	4,2	5,6	.
Finland	5,0	6,9	7,3	5,2	5,7	6,3	.
Frankrijk	4,4	3,2	5,6	4,3	5,8	5,7	.
Hongarije	6,0	6,9	6,6	9,1	7,1	6,3	.
Ierland	7,4	8,2	7,6	.	6,8	7,3	.
Italië	3,5	5,0	4,6	3,7	2,3	2,3	.
Japan	2,9	4,3	5,4	3,3	3,3	5,2	.
Nederland	5,4	5,2	5,2	7,2	7,2	8,2	.
Oostenrijk	.	2,4	.	.	.	.	.
Polen	.	.	.	.	.	.	.
Spanje	7,3	7,6	7,0	5,1	4,3	5,8	.
Tsjechië	7,9	.	.	.	.	.	.
Verenigde Staten	10,0	9,6	10,8	8,0	7,6	12,3	.
Zuid-Korea	.	.	10,0	7,0	6,6	6,6	.
Zweden	3,5	4,2	.	.	4,9	5,8	.

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Appendix M

Source: Ondernemingsklimaat; marktwerking internationaal vergeleken (available at: www.statline.cbs.nl)

Onderwerpen ↓ ↗	Werknemersbescherming															
	Soorten ontslag, totaal				Bij individueel ontslag				Bij tijdelijke contracten				Bij collectief ontslag			
Perioden ↑ ↗	1990	1997	1998	2003	1990	1997	1998	2003	1990	1997	1998	2003	1990	1997	1998	2003
Landen ↗	schaal 0-6															
Australië	.	.	1,5	1,5	1,0	1,5	1,5	1,5	0,9	0,9	0,9	0,9	.	.	2,9	2,9
België	.	.	2,5	2,5	1,7	1,7	1,7	1,7	4,6	2,6	2,6	2,6	.	.	4,1	4,1
Canada	.	.	1,1	1,1	1,3	1,3	1,3	1,3	0,3	0,3	0,3	0,3	.	.	2,6	2,6
Denemarken	.	.	1,9	1,9	1,7	1,6	1,6	1,6	3,1	1,4	1,4	1,4	.	.	3,9	3,9
Duitsland	.	.	2,6	2,4	2,6	2,7	2,7	2,7	3,8	2,0	2,0	1,5	.	.	3,8	3,8
Finland	.	.	2,2	2,1	2,8	2,3	2,3	2,2	1,9	1,9	1,9	1,9	.	.	2,6	2,6
Frankrijk	.	.	2,8	2,9	2,3	2,3	2,3	2,5	3,6	3,6	3,6	3,6	.	.	2,1	2,1
Hongarije	.	.	1,5	1,8	1,9	1,9	1,9	1,9	0,6	0,6	0,6	1,1	.	.	2,9	2,9
Ierland	.	.	1,2	1,3	1,6	1,6	1,6	1,6	0,3	0,3	0,3	0,6	.	.	2,4	2,4
Italië	.	.	3,1	2,3	1,8	1,8	1,8	1,8	5,4	4,8	3,6	1,9	.	.	4,9	4,9
Japan	.	.	1,6	1,5	1,9	1,9	1,9	1,9	1,8	1,4	1,4	1,0	.	.	1,5	1,5
Nederland	.	.	2,8	2,3	3,1	3,1	3,1	3,1	2,4	2,4	2,4	1,2	.	.	3,0	3,0
Oostenrijk	.	.	2,4	2,2	2,9	2,9	2,9	2,4	1,5	1,5	1,5	1,5	.	.	3,3	3,3
Polen	.	.	1,9	2,1	2,1	2,1	2,1	2,1	0,8	0,8	0,8	1,3	.	.	4,1	4,1
Spanje	.	.	3,0	3,0	3,9	2,6	2,6	2,5	3,8	3,3	3,3	3,5	.	.	3,1	3,1
Tsjechië	.	.	1,9	1,9	.	3,3	3,3	3,3	.	0,5	0,5	0,5	.	.	2,1	2,1
Verenigd Koninkrijk	.	.	1,0	1,1	1,0	1,0	1,0	1,1	0,3	0,3	0,3	0,4	.	.	2,9	2,9
Verenigde Staten	.	.	0,7	0,7	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3	.	.	2,9	2,9
Zuid-Korea	.	.	2,0	2,0	3,2	3,2	2,4	2,4	2,3	2,3	1,7	1,7	.	.	1,9	1,9
Zweden	.	.	2,5	2,5	2,9	2,9	2,9	2,9	4,1	1,6	1,6	1,6	.	.	3,8	3,8
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