UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Knowledge-based Entrepreneurship

Case Study

What led Tel Aviv to become a leading entrepreneurial ecosystem?

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Master Degree Project No. 2017:192
Graduate School

Abstract

"How has Tel Aviv become a leading entrepreneurial ecosystem?"

This thesis investigates the factors behind the growing success of Tel Aviv as an entrepreneurial scene. The economic capital of Israel has become one of the most important clusters of innovation in the World (Engel & del-Palacio, 2011). By analysing these factors with key entrepreneurial actors, the hopes were to find new qualitative evidence to back up the statistics. The aim of the thesis was to use qualitative interviews with chosen entrepreneurs and investors to give insights in Tel Aviv and how it has become a flourishing ecosystem. This has in turn enhanced the previous research on Knowledge-Intensive entrepreneurship by adding a singular case study. Analysing the Tel Aviv ecosystem allowed me to find ten different factors of its success. These can potentially be used as inspiration points for stimulating clusters of innovation around the World.

Keywords: clusters of innovation, entrepreneurial ecosystem, knowledge-intensive entrepreneurship

Acknowledgements

I would like to show my deepest gratitude to all the interviewees who generously gave their time to make this thesis possible.

- Amir Lahat, Olive Tree Ventures
- Neria Nachum, Co-founder and COO at Slyde
- Ariel Assaraf, Co-Founder at Coralogix
- Efrat Rapoport, Co-founder & CEO at Bonobo.ai
- Moshe Safarty, Krypton Venture Capital
- Ori Fingerer, Co-founder at Weissbeerger
- Arnon Dinur, 83North
- Limor Sandach and Ron Livne, Access Medical Ventures
- Gil Tamir, CEO at Smartlation
- EcoMotion Investor Event
- Ilai Fallach, Co-Founder & CTO at StoreSmarts
- Amir Milo, CEO at Equivio

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1. **Introduction**

    1.1 Purpose

This thesis focuses on clusters and how Tel Aviv has become successful. The purpose of writing a thesis about Israel and Tel Aviv in particular is to outline a growing entrepreneurial city on the international scene. A vast majority of the research papers on ecosystems treats Silicon Valley as the core entrepreneurial scene. However, when looking at the non-american cities topping the rankings, Tel Aviv seems to be outclassing every major European capital claiming the first spot outside of the U.S in "The Global Startup Ecosystem Report 2015". Taking into consideration the age of Israel and its many challenges, this raises many questions. On one hand, studies have been made on the factors behind the success of Tel Aviv as a startup scene, but these are still very few and limited. Although these studies being written by Jews or Israelis might not alter the objectivity of the studies, it is important to complete the field by adding outsiders perspectives. This will in turn add awareness of the phenomenon outside of Israel and the US to hopefully catch the eye of other researchers. By conducting a qualitative study, it will allow for further enrichment of the statistics. The purpose is also to lay a foundation to inspire policy changes in ecosystems around the world. There is a great need to actually find ways of becoming an attractive startup scene for various ecosystems throughout Europe and the world in order to grow. There is today a gap in the scientific knowledge when it comes to secondary innovation countries such as Israel or South Korea. This thesis therefore deals with this issue by adding a relevant and singular case study.

    1.2 Research question

The main research question for this thesis is "*What led Tel Aviv to become a leading entrepreneurial ecosystem?*"

To answer this question in a structured way, we first need to outline the history of Israel in order to understand what unique factors lie behind the country's success. Secondly, the qualitative study of the interviewed respondents will confirm or reject these factors. Finally, this will allow the use of the Tel Aviv case to create possible alternatives for countries on how to make their entrepreneurial scene more dynamic. The sub questions can therefore be split up in three parts

1. *What historical factors led to the emergence of the Tel Aviv ecosystem?*
2. *What characteristics are singular to Israeli Knowledge Intensive Entrepreneurs?*
3. *How could the example of Tel Aviv inspire other entrepreneurial ecosystems?*

2. Empirical framework

This thesis focuses on the factors lying behind the success of Tel Aviv as a Startup scene. In order to understand a country and its people, it is important to first have a look on its history. Since Biblical times, there has been a notion of the "Land of Israel". It is however the modern history that is most relevant for this study, as it might partly explain the relevant factors later studied.

2.1 Historical background

The Jewish community has a strong religious relationship to the land of Israel which has become throughout the years a refuge for expelled Jews around the World. (Gilbert, 2005). The First Aliyah (modern time Zionist immigration) began in 1881, when Jews fled persecutions in Eastern Europe. This led to the foundations of Israel based on Theodor Herzl's notions of political Zionism. (Kornberg,1993). This immigration wave was followed by several waves, with the Fifth Aliyah being the largest during the 1930s. During the rise of Nazism, a quarter of a million Jews fled from Europe to Israel, causing many tensions with the local Arabs. (Laqueur 2009)

Post World War II marks the time of the early years of the declared State of Israel. Shortly after the war, the British rule was fought by the Jewish Paramilitary (Fraser, 2004) and hundreds of thousands Jewish Holocaust survivors were immigrating. This lead to the withdrawal of the British government in 1947. In december 1947 Arab gangs began attacking Jewish targets, which later led to the 1948 Arab-Israeli War. (Tal, 2003). Lasting one year, this war ended in a ceasefire with Israel shortly declaring its independence and becoming a member of the United Nations on 11 May 1949 (United Nations, 2007). Between 1948 and 1970, the population of Israel rose by 1,15 million (Bard, 2003) as Jews were now welcome to the newly declared country. However, building a new country came as a challenge: food clothes and furniture were rationed with many crises between the new immigrating communities (Shindler, 2002). With conflicting relations both within and outside the country,

the chances of a brighter future seemed grim for Israel. In May 1967, Egypt blocked Israel's access to the Red Sea (Gat, 2003) which led to the beginning of to the Six-Day War. During these six days, Israel defeated Jordan, Egypt and Syria, capturing three important strategic areas (Smith, 2006). This was followed by the Yom Kippur war, a surprise attack from the Egyptian and Syrian armies, that ended 20 days later with Israel successfully repelling the attackers. Peace negotiations were finally on the table by 1979 leading to the Israel-Egypt Peace Treaty (Bregman, 2002).

In the 1980s and 1990s, the population of Israel became even more diversified as several waves of Ethiopian Jews immigrated. Post Soviet Immigration also increased Israel's population by 12 percent between 1990 and 1994, after emigration restrictions were lifted (Friedberg, 2001). In 1987, the First Intifada (Palestinian uprising against Israeli occupation) broke out (Tessler, 1994). This was a new period of conflict with waves of uncoordinated demonstrations and violence in the West Bank and Gaza. It later became more organised, including economic and cultural measures. The following years were marked by failed international negotiations, terrorist attacks, intifadas and retributive Israeli operations.

2.2 How Israel became innovative

Facing enormous difficulties already at start, Israel had to experiment and innovate in order to build a stable economy. While the immigration waves kept multiplying during the years, the primary focus was to sustain food production. This led the Jewish farmers to undertake agronomic experiments in order to quickly learn how to work the land with difficult climatic conditions (Kark, 1989). Although this might sound trivial at first, it marked the beginning of extensive agricultural research. Engineering innovations such as water-conserving irrigation methods and greenhouse technologies are today exported to countries around the world. In the beginning of the 20th century, Jews were denied technical education in Europe, leading to the creation of the Technion. Also called Israel Institute of Technology, Technion grew to become a "global pioneer in fields such as biotechnology, stem cells, space, computer science, nanotechnology, and energy" (Technion website). It is today the home university of three Nobel Prize professors and of Israeli industrial research that began in 1934. Israel is also the home of the WEIZAC, one of the first electronic computers in the world, recognized as a milestone in the history of electrical engineering and computing (Bogdanowicz, 2006).

The Scientific and technical research was later stimulated with the introduction of a chief scientist aimed at providing grants covering 50-80 percent of the outlay for new start-ups with no conditions, shareholding or management participation. Additionally, the BIRD Foundation was formed, which financed cooperative U.S.-Israeli projects. "This resulted in a high-tech start-up growth of more than a tenfold" (Freedman, 2009).

As the second most innovative city after Silicon Valley (Steven Plaut, 2016), Tel Aviv became an important part of the Startup Nation. Often shadowed by its American counterparts, the startups from Tel Aviv are impressing the international scene by attracting more foreign capital than any European ecosystem (The GSER, 2015).

The massive investments and entrepreneurial interest in Israel come as a result of a long political focus on creating innovation and research and development (R&D). High-tech industry giants such as Intel and Microsoft built their first overseas R&D facilities in Israel, while other MNCs such as IBM, Google, Apple, HP, Cisco systems, Facebook and Motorola quickly followed. This has led the science and technology field to become one of Israel's most developed sectors. R&D as percent of GDP was 4.1% in 2014, second to only South Korea with 4.29% (OECD, 2014). When looking into the Bloomberg 2017 innovation Index, Israel ranks 10 with a first place in researcher concentration (See appendix 1).

Israel is the home of one of the highest density of start ups in the world with a total of 3850 start-ups, one for every 1844 Israeli (Senor & Singer, 2009). On the 17th of march 2017, Intel acquired the company Mobileye for $B15.3 and moved its automotive unit to Israel. This is yet another step towards Israel becoming the great innovation centre it aims to become. Venture Capital (hereby VC) is a variable that can be considered in order to study the situation in Israel. The VC is steadily growing in Israel, as markets such as China and India are starting to invest into the country's startups. According to the IVC Research Center, the VC raising in Israel reached a total of 1.6 billion in 2016. (See appendix 2)

3. Literature Review

3.1 Clusters and policy

Pitelis defines clusters as "geographical agglomerations of firms in particular, related, and/or complementary, activities, sharing a common vision, and exhibiting horizontal, vertical intra- and/or inter-sectoral linkages, embedded in a supportive socio-institutional setting, and cooperating and competing in national and international markets" (Pitelis, 2012). In this rather complete definition, Pitelis emphasizes on the firms which create the cluster. Here the shared vision and the linkages between the firms forming the clusters are important. Engel and del-Palacio's definition focuses more on the infrastructure around the entrepreneurial ventures: "A cluster is an environment that favors the creation and development of high potential entrepreneurial ventures and is characterized by heightened mobility of resources, including people, capital and information" (Engel & del-Palacio, 2011). Clusters are not isolated islands according to Engel and del-Palacio (2011). Instead they are globally connected, utilizing linkages with other clusters to leverage resources, access markets and accelerate the innovation process. In these clusters are gathered all types of actors such as "startups, small/medium/large corporations, universities/research centers, entrepreneurs, investors and service providers" (Engel & del-Palacio, 2011). Clusters are a result of many variables such as entrepreneurial, socio-political and historical processes. Focus on ecosystem and cluster policies has been growing in the past decades to be seen as "the only, or best, supply-side strategy for competitiveness" (Porter, 2000). Israel has proven to be one of the markets where these policies have been very efficient towards the high-tech sector. Avnimelech et al. (2007), studied the high-tech clusters in Israel and how the policies try to diffuse these into more peripheral areas. Here, two different policies were used: Yozma, which stimulated the venture capital industry as well as the high-tech incubator programs. These had significant effects on the development of the Israeli high-tech cluster (Avnimelech et al, 2007). The benefits of being part of a cluster are undeniably outweighing the drawbacks. First of all there is an economical benefit as companies in the cluster benefit from economies of co-location. Also, clusters present a concentration of skilled labour that is often beneficial to innovation and information diffusion between firms. This allows for social and capital embeddedness, especially for high-tech firms, where there is a strong link between financing and clustering (McKelvey & Heidemann Lassen 2013). Social and capital embeddedness implies that the ventures are part of an ecosystem with easy access to other

actors and financing. This allows companies to increase in efficiency when it comes to recruiting new skilled labour or finding new ways of financing. All these aspects contribute to a higher knowledge-value-creation which offsets any costs (Maskell, 2001). The negative impacts include a narrow geographical distribution, meaning the cluster is bound geographically and a narrow technological diversification (Avnimelech et al, 2007). These aspects can lead to lock-ins and sclerosis-inertia. In this thesis we mainly use the definition provided by Engel & del-Palacio as it is more in line with our research topic.

3.2 Knowledge Intensive Entrepreneurship (KIE)

In the book "Managing knowledge intensive entrepreneurship", a framework presenting three different processes in knowledge intensive entrepreneurship is introduced (McKelvey & Heidemann Lassen, 2013). Firstly the Input phase, where the focus is put on the endowments that already exist in the ecosystem. Secondly the Development phase, where the venture is faced with problems such as organisation and development on structural internal processes. This is where the venture will have to learn how to balance multiple objectives simultaneously. Finally the Output phase, where the venture is measured in terms of quantitative measures such as performance or patents (McKelvey & Heidemann Lassen, 2013).
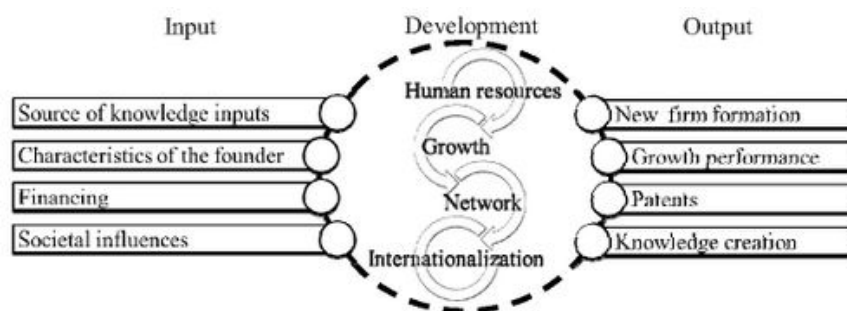
Figure 2.3   The KIE creation model

As this thesis is treating the factors that lay behind the success of Tel Aviv, it was logical to focus on the input phase. This phase focuses on "the processes and phenomena before the venture is created" (McKelvey & Heidemann Lassen, 2013). Here we have four main factors that lay as a pillar to the interviews and the analysis. Source of knowledge inputs, Characteristics of the founder, Societal Influences and Financing. "Some of these aspects are

directly related to the individual founder, while some are related to how to access resources and ideas from the external environment" (McKelvey & Heidemann Lassen, 2013). Some factors such as the financing are also relevant in later stages of the venture, but in this study we are solely focusing on the initial financing of the ventures.

The sources of knowledge input is a vital part to study in order to understand KIEs. One argument McKelvey & Heidemann Lassen put forward is the fact that the KIE ventures probably do not appear out of nowhere (2013). Instead, these emanate from other organisations and institutions which are knowledge intensive. In the literature, these are separated into four different categories. First, companies with high knowledge intensity that provide expertise in a given field. These are also called Corporate spin-offs. The type of spin-off happens when employees leave a larger company to start their own venture. It has in the later become a more formal procedure where companies try to "manage" this process in order to keep the linkage to the mother company. Second, academic institutions such as universities and research centers create Academic spin-offs. Most often, the academic founders were previously researching at a university although they might also be founded by recent graduate students. Academic entrepreneurship is defined by McKelvey & Heidemann Lassen (2013) as "the situation when university researchers and students commercialize science, specifically through patents and starting companies". University is often a key asset for policy makers, as it gives clear and relatable data for evaluation. Third, Independent Start-up is another type of organisation presented as a form of KIE, where there is no obvious link to any parent organisation. Finally, it is mentioned that there might be more types of parent organisations in society that are not mentioned in the book, these will be worth mentioning during our analysis. The sources of knowledge are relevant to study as these might directly affect the access to resources and future success of the companies.

The characteristics of the founder (person or team starting the venture) are also important to study in order to understand what drives the people to enter entrepreneurial endeavours. Many of these personal traits are investigated by psychologists trying to find the links with entrepreneurs (McKelvey & Heidemann Lassen, 2013). Firstly the "internal locus of control" (Rotter, 1975), which refers to the extent to which individuals believe they can control events affecting them. Also the need for autonomy, independence, approval, personal charisma,

following role models and contributing to society are personal traits that can be found within entrepreneurs (Witt, 1998). McClelland also studied the propensity of entrepreneurs to assume risk. Entrepreneurs tend to overestimate their chances of success and underestimate the risks and uncertainties (McClelland, 1961). It is however not only risk-taking that characterizes specifically knowledge intensive entrepreneurs. They also have a way of processing opportunity recognition that is different as their knowledge gives them this ability. Over-trust is therefore not the only reason for knowledge intensive entrepreneurs to start a venture. In order to succeed in starting a venture there is a need for a sense of convincing potential partners and collaborators. The founder should be able to conceptualize and communicate the business project in a way that convinces others. Future entrepreneurs might have a feeling that building their own company is something positive and have other successful entrepreneurs as role models. Some studies also show the importance of a strong network and social capital, in order to effectively mobilize resources and implement ideas (McKelvey & Heidemann Lassen, 2013). Therefore, it is interesting to see how much the founder's experience and personality affects the venture. Education and experience, being two main sources of knowledge, play an important role in KIEs, as the people often are the main assets for this type of venture according to McKelvey & Heidemann Lassen (2013). Having a clear understand of the market can be made easier by this experience and by interacting within the venture. The presence of social capital and exposure to entrepreneurs are also an important factor for people to start a company. In this study, we will take a look at the similarities between the founders, as these may present us with relevant factors to answer the research question.

Financing, or the method used to mobilize resources to exploit innovative opportunities, is a third aspect to take a look at. When it comes to knowledge intensive ventures, financing has shown to be critical (McKelvey & Heidemann Lassen, 2013). Unless the company is able to bootstrap the market or finance itself, KIEs are often gathering capital externally, often through debt or equity. As the assets in a KIE venture are often intangible (knowledge, experience, creativity), it is sometimes hard for these entrepreneurs to raise financing as securing these assets is difficult (McKelvey & Heidemann Lassen, 2013). Financing the venture may be done at different times, not only at start, which means this process takes part in the rest of the venture's life too. However, many types of financing are available for

entrepreneurs. According to the AEGIS survey (2012), Venture capital is very limited in the early stages of KIE ventures. Only 5% of the companies did include venture capital in the early phase. 92% of the ventures used own financial resources and only 28% financed the venture through a bank loan. (See appendix 3). Regarding Venture Capital, we will use the definition of Landström (2007), who categorizes VCs in three types: informal venture capitalists (business angels), formal venture capitalists (VC firms) and corporate VCs (Large companies investing in venture creation). These three different types differ in investment motivations and goals. While Corporate VCs often are interested in in-house control or use of the ideas for the other parts of the company, formal VCs want to maximise financial return by selling privately or through an IPO (Metrick, 2010). The Corporate VCs also tend to invest later in the venture, to secure strategic assets and lower the risk of failure (See appendix 4). Depending on their field KIEs can be a risky investment as they might take years to be fruitful, as in the pharmaceutical industry for example. Nevertheless, all type of VCs tend to be very involved in the ventures they invest in, most often taking a seat on the board (McKelvey & Heidemann Lassen, 2013).

Finally, the last aspects we look into are the societal influences and public policy. These present us with the broader aspects affecting venture creation such as incubators and clusters. Incubating is an interactive development process where the aim is to encourage people to start their own business and to support start-ups in the development of innovative products (National Business Incubation Association). According to Aaboen (2009), the role of incubators for KIEs is for public policy to stimulate the "links between technology, capital and know-how in order to leverage entrepreneurial talent, accelerate the development of new companies, and thus speed the exploitation of technology". Therefore, incubators are not just free workspaces, but should allow access for ventures to services such as legal advice and access to finance. Grimaldi and Grandi (2005) present us with two different overall purposes of incubators. Firstly, incubators can reduce start-up costs for small entrepreneurial initiatives. These are often public incubators, promoting entrepreneurial activity in local areas. Secondly, incubators can accelerate the startup process by giving them access to various assets. These are often private incubators whose main aim is to reduce the time-for-profit (McKelvey & Heidemann Lassen, 2013). Clusters are also an important societal factor as performance and financing of firms is often dependent on its geographical

area. Close network relationships and access to VCs is a vital part of entrepreneurial venture creation. In that sense, ecosystems such as Silicon Valley or Tel Aviv present optimal pre-requisites. Others argue that clustering is mainly affected by the large companies that move to a region, creating a snowball effect of knowledge and various spin-offs (McKelvey & Heidemann Lassen, 2013). In that sense, Keeble and Oakey (1998) argue that financing is not the only factor in venture creation. The existence of skilled labour, corporate spin-offs and networks seem to be of equal importance. Grants also play an important role in some regions such as the European Union with the example of Poland that values the European Union (EU) grants in order to finance marketing of the innovation (McKelvey & Heidemann Lassen, 2013). To some extent, Lerner (2009) argues that these policies often fail and ends with wasting public money. Service providers are also a valuable part of KIE success. These help with the commercialization of new products, process and services (Garcia-Quevedo and Mas-Verdu, 2008).

Although KIEs are a particular type of venture creation, these are meaningful on a national scale as they represent one way of solving societal challenges. "By bringing together people, resources and ideas, KIEs deliver things that society wants" (McKelvey & Heidemann Lassen, 2013). As the high-tech and knowledge intensive sectors have become the core of the ecosystem, it is relevant to study this specific type of entrepreneurship in Tel Aviv. Additionally, the sources of knowledge described in the KIE literature are limited to experience and education. Although experience can englobe a vast array of knowledge creation, it is important to be more specific in order to find viable sources for decision making.

4. Methodology

4.1 Research Strategy

The qualitative research is used to highlight the value of words rather than the numbers (Bryman and Bell, 2011). It helps the theoretical framework from being predetermined and instead derives directly from the data, resulting in a high reliability if not tampered with. In this thesis, the aim is to dig deeper into the respondent's experience in order to receive detailed information on the factors affecting Tel Aviv as a startup scene. By analysing the

obstacles and successes for startups, it will allow for hypothesis confirmation and a better understanding of the overall entrepreneurial infrastructure. The methodology is to interview ten knowledgeable venture founders or venture capitalists in order to obtain useful information on the startup scene through semi-structured interviews. Moreover, in order to get a broader scope, many different sectors took part in this qualitative study, ranging from pharmaceutical and early seed VCs to cyber-security startup founders. The choice of using both entrepreneurs and venture capitalists was done due to the fact that entrepreneurs might have a more idealistic approach over starting a company. The extensive experience venture capitalists have in the sector give a deeper understanding of the Tel Aviv ecosystem.

In order to write this thesis methodically the following steps were followed:
1. Development of purpose
2. Theoretical framework, methodology, historical background
3. Designing the semi-structured interview guide
4. Screening of potential interviewees
5. Contacting 80 entrepreneurs and investors for interviews
6. Preparing interviews
7. Interviewing and transcribing in parallel
8. Computing data
9. Analysing transcripts, results and conclusions
10. Discussion and further potential research

The questions were all in line with the theoretical framework provided by McKelvey & Heidemann Lassen, 2013. The interviews were first prepared using an internet look-up on the interviewee's profile in order to get a better understanding of the person and company. The subjects were raised in the following order: Source of knowledge input, Characteristics of the founder, Financing, Societal influences. The final question was "Why do you believe Tel Aviv has become a successful entrepreneurial ecosystem?". This question allowed the interviewee to reflect and share his thoughts on the ecosystem he/she develops in.

According to Bryman and Bell, the qualitative research prefers to put emphasis on the individual explanations and understanding of their personal experience, which in this research

is the founder and VC experience. It will also allow for an inductive approach that will hopefully generate new theoretical frameworks aimed at defining the success of Tel Aviv. The data gathering for the qualitative study began in early february 2017 in Tel Aviv. It was done using professional entrepreneurial networks and websites in Israel.

Interviewee	Company	Position	Int. length (m)	Format
Amir Lahat	Olive Tree Ventures	Founder	35	Face to Face
Neria Nachum	Slyde	Co-Founder	41	Face to Face
Ariel Assaraf	Coralogix	Co-Founder	30	Skype
Efrat Rapoport	Bonobo.ai	Co-Founder	30	Face to Face
Moshe Safarty	Krypton Venture Capital	Founder	35	Face to Face
Ori Fingerer	Weissbeerger	Co-Founder	30	Face to Face
Arnon Dinur	83North	Partner	30	Face to Face
Limor Sandach	Access Medical Ventures	Partner	90	Face to Face
Ron Livne	Access Medical Ventures	Associate	90	Face to Face
Ilai Fallach	StoreSmarts	Co-Founder	45	Face to Face
Amir Milo	Equivio	Founder	40	Face to Face

The interviews have mainly been face-to-face meetings apart from one to ensure high quality over convenience and speed. This will also allow the participant to freely think and answer the questions, which allows to obtain relevant information with a given objective (McNamara, 1999). The last one was made via Skype because of the interviewees tight schedule. The interview is an effective way of actually gathering data on the respondent's reflection and experience. The format used is semi-structured interviews with clear and unbiased main points to ensure reliability and validity. While this method is considered to capture broader topics, analysing each interview and following up with previous interviewees will allow for a deep understanding of developed point. Depending on the conversation during the interview, questions were added to capture a broader content, while staying within

the semi-structured interview guides framework. The startup founder interviewees will be chosen by a set of specific requirements set for knowledge intensive ventures (McKelvey & Heidemann Lassen, 2013), being:

- Age: companies less than 8 years old
- Innovative: translate knowledge to goods or services for sale
- Significant knowledge intensity
- Involved in market activities and potentially exploiting opportunities in many sectors

According to Eisenhardt (1989), *"the case study is conducted upon the purpose of understanding the dynamics within individual context."* The cases should be generalisable, yet have particular characteristics that distinguish them. By interviewing ten different entrepreneurial actors, it will allow to answer the research question accurately. The choice of using six entrepreneurs and four venture capitalists was to capture broader factors, as the entrepreneurs often have a very different experience of the ecosystem than the investors. Additionally, the multiple case strategy has been chosen as it expands the sample range (Yin, 1984), thus improves generalisability and scope of the research. The similarities allow us to define the factors that lay behind the success of Tel Aviv. The comparative study is therefore critical to actually identify the performance factors behind Tel Aviv's success and to establish a clear approach to startup scene development. The research was conducted in Tel Aviv, Israel over the period 22nd of January - 22nd of April. Moreover, the respondents are not anonymised in order to add legitimacy and give interesting results for the reader.

4.2 Criteria for qualitative research

In order to ensure a high quality research, the eight "Big-Tent" criteria for excellent Qualitative Research by Sarah J. Tracy has been used (2010). By providing an eight-point conceptualization of qualitative studies, we are able to aim for validity, reliability, generalizability and objectivity (Winter, 2000). The eight different points are "Worthy topic, Rich Rigor, Sincerity, Credibility, Resonance, Significant contribution, Ethical and Meaningful coherence" (Tracy, 2010).

The topic of Tel Aviv as an ecosystem is worthy as it is relevant, timely, significant and interesting. As a knowledge intensive ecosystem, Tel Aviv is reaching a point of rapid

expansion which makes this study more relevant. The topic emerged after a visit to entrepreneurs and venture capitalists in the area in September 2016. Also the current political climate in Israel, taking off economically from its neighboring countries, was interesting to study. Israel and Tel Aviv were also completely unknown to me previously, as there was no link to the country or its people in any way. This results in a more objective research than what the previous research by Jews or Israelis might have been. Although there has been research on this ecosystem previously, it is significant to verify assumptions and complete the literature about knowledge intensive entrepreneurship.

High-quality qualitative research is marked by a rich complexity of abundance (Winter, 2000). According to Weick (2007), the research should be "at least as complex, flexible, and multifaceted as the phenomena being studied". The study should also be reasonable and appropriate (Golafshani, 2003), which would ensure validity. There are several important questions that have to be answered in order to ensure rich rigor in a qualitative study. For example, "are there enough data to support significant claims?" or "did the researcher use appropriate procedures in terms of field note style, interviewing practices, and analysis procedures?" (Tracy, 2010). By carefully reflecting around these questions, this research aims for high quality. As the research around this topic still is very limited, its rarity is a valuable contribution (Scarduzio & Geist-Martin, 2008). The data collected and the transcription will allow for relevant and clear conclusions to contribute to the research field. When computing, the results were summarized in key points in order to help for the analysis. The eight weeks spent on the field, meeting entrepreneurs through face-to-face interviews and informal meetings through several events were central in ensuring a high quality research and creating an original empirical study.

The study is aiming for sincerity. This can be reached through "self-reflexivity, vulnerability, honesty, transparency and data auditing" (Tracy, 2010). This will be reflected in the limitations part, where every aspect concerning bias and goals will be mentioned. By ensuring a full transparency on these aspects and on what research mistakes could be done, the sincerity will be intact. As any research thesis, there are flaws that can be identified through honesty, authenticity and full transparency.

Credibility refers "to the trustworthiness, verisimilitude and plausibility of the research findings" (Tracy, 2010). The research should be credible enough for actors to actually take decisions and build an opinion on. Credibility can be achieve through thick description, with "abundant concrete detail" (Bochner, 2000). Instead of telling the reader, this thesis will aim at showing actual reasons for the conclusions and use rhetoric questions. In terms of multivocality, it is important to be aware of the cultural differences between the author and the interviewees. As the researcher is European, there might be misunderstandings in certain statements to beware of. The findings will also be sent out to the interviewees for review in order to potentially improve the quality and scope of the findings.

The resonance refers to the "ability to meaningfully affect an audience" (Tracy, 2010). In order to engage the reader, "aesthetic merit, evocative writing and formal generalizations" (Tracy 2010) may be used. It is important to present the text in an evocative way in order to capture the reader's attention. By using clear and comprehensible language, this thesis aims at affecting the readers opinions and stimulate reflexions around the subject. Instead of aiming for generalisability, the study aims for transferability. In this way, the findings may be used on other clusters or ecosystems in order to enrich the research around this particular subject.

This study also aims to bring forward a significant contribution to the research. The case of Tel Aviv is yet understudied by non-israeli researchers. This gap is hopefully be filled by studies such as this one. The thesis also aims at developing a few concepts found in the literature review, bringing theoretical significance to the research and potentially improving it. The hopes are also to include heuristic significance which would motivate future researchers to study this subjects in other markets and maybe further study Tel Aviv. Heuristical significance is found when the research "develops curiosity in the reader and helps inspire new discoveries" (Abbott, 2004). Finally, the study is hopefully useful, shedding more light on a yet quite mysterious ecosystem which allows for practically significance.

The previous factors are also part of making an ethical study. Regarding this point, it is important to look at procedural, situational and culturally specific, relational and exiting ethics. The data was stocked on a crypted hard drive in order to ensure procedural ethic. The results will also be presented in a clear and objective way in order to avoid any confusions or

misconceptions.

Meaningful coherence is the last aspect to look into for a great qualitative study. In order to reach the meaningful coherence, the study should achieve the stated purpose, accomplish what was aimed for, use coherent methods and representation practices and interconnect with the literature (Tracy, 2010). In this research, the meaningful coherence is mainly reached by using the theories of McKelvey & Heidemann Lassen as the theoretical spine of the study. By designing the interview methods, results and analysis in the same hierarchy as the theory, the study is coherent and easy to follow.

4.3 Data analysis

The framework and empirical findings during the literature review provided the base for the semi-structured interview topics. Based on the KIE models from McKelvey and Heidemann Lassen 2013, the thesis underlies the key concepts and factors to gather data. By analysing the data, the hopes were to either confirm or reject the frameworks while adding case studies to the research. By meticulously going through the transcripts, the key points of the entrepreneurial approach will be identified in order to be used in the analysis. These are computed into tables in order to give a clear picture of all the answers from the different interviewees.

The validity and reliability are important in this study, as it defines the credibility of the results. In order to ensure good results, the report focuses on content expressed by the interviewees in a loyal manner, not changing the data in any way. This has been done by opting for a systematic and clear method. Before each interview, a similar profile of each interviewee was made in order to get a good understanding of the business. During the interview, a few key points dealt with in the thesis are treated. Finally, directly after the interviews, a thorough transcript was made to get the most output possible. Moreover, in order not to bias the research and compromise reliability, there is a strictly objective observation. The reliability of the research is related to what degree the researcher accepts the information from the interview conversation (Bryman and Bell, 2011). By being impartial, including complete information and not taking out meanings out of context, the thesis allows

for strong reliability.

4.4 Limitations

As any research, especially one limited in time, there are limitations. By analysing thoroughly what aspects might be lacking, these mistakes will be avoided in the conclusion. All the findings have to be relative to the study undergone, and not act as the true image of the Tel Aviv startup scene. Nevertheless, the hope is to enhance the KIE theoretical framework in order to fill possible gaps. The different limitations are credibility, interview length, skewed statistics, narrow interview requirements, biased interviewees and relevancy.

There is a credibility limitation in the sense that the literature studied and sources are quite limited. The focus was put on using a specific model in order for the whole study to be coherent. By having limited frameworks, the scope of the analysis is limited to the few factors presented in the KIE literature. Although these are broad subjects that could present a study each, they are still limited. The triangulation notion is respected to a certain degree, but the conclusions will most likely not have enough background to be generalisable.

The length of the interviews is relatively short. With interviews ranging between 30 and 90 minutes, the resulting output is different in terms of depth. The shorter interviews might present too much surface information without digging in the real subjects. This again can harm the credibility of the study and the generalisability of the final results, something to keep in mind for the conclusion.

Another limitation is the statistics from different studies. For example, when it comes startup ecosystems, we usually talk about cities and not countries. The per capita numbers of Berlin, Stockholm or Boston get lost inside a large country. This means that on a country and percentage level, Israel might have extremely nice looking numbers. But in reality it does not accurately show the differences between the ecosystems. In that sense, it is a good idea to keep to Israel as an economic entity or to Tel Aviv as an eco-system. The problem presented if the latter choice is made, is the lack of data regarding only the city. In that sense, data is presented on a country level, which aims at showing trends and assets of Israel.

There is also a limitation when it comes to the narrow interviewee requirements. The KIE requirements for the qualitative study might be too narrow to actually observe a difference between the ten interviews. The study could be considered very specific to the knowledge intensive high-tech sector. By including entrepreneurs that are not defined as knowledge intensive, the study could cover broader concepts. This gives room to more research to be done within the field. The reason for using the Knowledge intensive requirements is to ensure the coherence of the thesis as it lies as the theoretical framework.

Another limitation is naturally the possibility of biased results. As the research has been done through a limited networks and VC contact lists, the interviewees might be biased towards certain answers. Ten interviews might therefore not be a sample big enough to actually generalise the findings to all industries and all countries. A quantitative analysis might prove useful in the future to fill this gap.

Finally there is a relevancy limitation. Some factors behind entrepreneurial success could be very hard to copy: cultural, geo-political or financial factors are complicated to change spontaneously in an ecosystem. These may very well be the final results, which will imply that no real change can be applied from the example of Tel Aviv to other clusters.

5. Results

The interviews are composed of six knowledge intensive entrepreneurs and four investors from venture capital firms. While the entrepreneurs have rather similar profile in terms of field, the VC firms capture a broader scope with fields ranging from B2C to pharmaceuticals and High-Tech. This section starts with an introduction of every interviewee to get a clear picture of their profile, and then present the computed results.

5.1 Venture Capital Firms

Olive Tree Ventures

Interviewee: Amir Lahat

Type of company: Venture Capital firm

Geography: Israel - Silicon Valley cross border fund

Stage: Seed and Early-Stage investments

Focus: Enterprise Software, eCommerce, Digital Health & Internet of Things

Company portfolio: 11 companies

Amir is an international and dynamic entrepreneur with a positive and altruistic mindset. He has founded a mobile venture company (infrastructure and software for mobile networks), later sold to Nokia Siemens Network. Here he became head of corporate business ventures in Silicon Valley. This has provided Amir with an extensive entrepreneurial network in both Silicon Valley and Tel Aviv allowing him to start Olive Tree Venture.

Olive Tree Ventures is an early stage venture capital looking to invest in entrepreneurs who make significant impact on people's life. They are particularly involved in the fields of Enterprise and Digital Health. The portfolio is diversified with companies within pharma, oil spill protection and even social platforms.

Access Medical Venture

Interviewees: Ron Livne, Associate & Limor Sandach

Type of company: Venture Capital firm

Geography: Tel Aviv

Stage: Seed investments

Focus: Medical devices

Company portfolio: 11 companies

Michael Tal, the founder of the fund, is a serial entrepreneur and an interventional radiologist with expertise in minimally invasive procedures. He operated as a physician for twelve years. In 2010, he decided to move back to Israel while retaining his relationships with investors back in America, allowing him to create the investment fund.

Access Medical Ventures is an investment firm that focuses specifically on investing and advancing medical device start-ups. AMV see themselves more like a management company than a traditional VC firm. They are very involved in their companies, in particular when it comes to operations. By creating very lean teams, they can really see the needs of the companies. Most of the operations are therefore outsourced to partners (development,

manufacturing, advisors, etc..). The portfolio consists of 11 companies of which half are companies AMV created, coming up with ideas and then bringing in a CEO. When looking for partnerships, investors evaluate an idea on the Intellectual Property. This means IP is one of the most important assets within medical devices. Another particularity within this field is the long time for products to reach the market.

83north Venture Capital

Interviewee: Arnon Dinur

Type of company: Venture Capital firm

Geography: Israel and London

Stage: Seed investments

Focus: B2C

Company portfolio: 14 companies

Arnon joined Greylock (now 83North) in 2009. Previously, Arnon spent seven years with SanDisk, the world leader in Flash memory cards, as Senior Vice President leading SanDisk's mobile strategy. He joined SanDisk as part of the company's $1.6 billion acquisition of Msystems in 2006. While at Msystems Arnon was Senior Vice President of Strategy and M&A. Prior to that Arnon was the Corporate Vice President and General Manager of the DiskOnKey division at Msystems. Before joining Msystems Arnon was the co-founder of Contact Networks, a California based Software Company with worldwide operations. He currently sits on the boards of Applicaster, CloudMade, Marqeta and SocialPoint.

83North, formerly Greylock IL, is a global venture capital firm with more than $550 million under management. The fund invests in exceptional European and Israeli entrepreneurs, across all stages of consumer and enterprise companies. With offices in London and Tel-Aviv, 83North is the sum of the latitudes of these two main hubs of operation. 83North started as Greylock IL, and remains deeply rooted in the main US tech hubs, with over half of its portfolio companies having operations in the US.

Krypton Venture Capital

Interviewee: Moshe Safarty

Type of company: Venture Capital firm

Geography: Israel

Stage: Seed investments

Focus: B2C

Company portfolio: 14 companies

Founder and co-owner of Krypton VC – with a Dual degree in Economics & International Studies from Yale University. Moshe has accumulated years of experience in investment banking, trading, business valuation & strategy and equity funds. Prior to that he co-founded and managed a company in Belize which recognized the promise of river logging in the country and its "Green" potential. He oversaw the project in its pilot stage while forming business relationships with the highest echelon of Belizean officials and its business community. He guided the project until it made an exit. Before that he was an Investment Banker in Bank of America Merrill Lynch in NYC a part of investment grade capital markets division. He now uses his large skill set, experience and qualities to invest, mentor and transform small promising businesses into independent profitable ones.

Krypton Venture Capital believes that the new online B2C (business to consumer) startup world and its potential cannot be analyzed, evaluated and estimated by investment bankers of the traditional VC world. Rather, the voice of the masses is the real determining factor in the potential for a start-up's success. Using their own investment method, the Krypton Investment Mechanism, they are able to test their startup portfolio in the market and use it at a proof of concept. They go by the motto "If two heads are better than one, then 80 million must be foolproof".

5.2 Entrepreneurs

Efrat Rapoport - Co-founder & CEO at Bonobo.ai

Type of company: IT, marketing automation

Geography: Tel Aviv, Israel

Stage: Start

Efrat is a young and dynamic entrepreneur of 27 years. She was born in Tel Aviv and had the entrepreneurial spirit already at birth. At four, she started her first business importing and selling products from Egypt. She then went on bread baking for neighbors and all kind of small businesses. After Highschool she went to the army and served in 8200, the top intelligence unit in the Israeli Army. There, she was in a very technical subunit within 8200. She has international experience and learned Japanese and Chinese during her childhood. Working as a data analyst in the israeli defence forces, she then started university studies at the Special program at The Adi Lautman Interdisciplinary Program for Outstanding Students, where she studied a master without having a BA. Choosing all her courses, she ended up with a Msc Computational Neurobiology. After university, Efrat started a nonprofit (fair trade) and worked with a factory in China and weaving women in India. The profits were used to finance eye surgery in these countries. Later, she and her business partner built a database of israeli startups that work towards the Chinese market, which helped attracted Chinese investors to the israeli market.

Now she founded Bonobo that drives personalized user engagement in conversational interfaces. A customer will be able to interact with a company via communication channels such as messenger, skype or whatsapp. This way, it feels like talking to a person even though it is a computer on the other side. Thanks to historical data, they are able to offer a personalised feeling even though it is not a real person. In term, these systems will be used in cars and home appliances to give a personalised interaction. Bonobos algorithms help to create these interactions between machine and human.

Ori Fingerer - Co-Founder and VP Business Development at Weissbeerger
Type of company: IT, Data analysis towards the beverage field
Geography: Tel Aviv, Israel and New York, US
Stage: Scaling up, becoming a global company

Ori Fingerer has worked with Weissbeerger for the past 6 years and been part of the whole adventure. They started off with a developed version of the "pint table" scattered in bars across the World. By adding an analytical part, they were able to gather valuable data for the bars. They then partnered up with Coca Cola Israel and realised they should monitor all the

taps of every bar in order to provide really good data to the beverage manufacturers. The first two years, they piloted to minor markets instead of heading to the US directly. Even though it was very tempting, it was nice to learn in smaller markets (Moldova, Turkey). They failed heavily in some of these markets, but learnt some valuable lessons from it. By witnessing the evolution to a data driven market, they saw the potential of their product growing exponentially with time. As you would expect from a very conservative market, some of the breweries were and are still today very change resistant.

Weissbeerger is a company specializing in the development and marketing of real-time solutions for monitoring beverage consumption on-trade and increasing sales for bars, breweries and beverage distributors. By providing insights to help significantly decrease beer waste, bars can increase their overall revenues and be in touch with the end-consumer. Presenting that information in an easy-to-understand way leads to smarter and better informed management decisions.

Ilai Fallach - CTO, Co-Founder at StoreSmarts (formerly Analoc)
Type of company: IT, Data analysis towards retail
Geography: Tel Aviv, Israel
Stage: Scaling-up, exit

Ilai liked computers since he was a kid, mainly playing games. Which is why he studied Computer science in high school, where he met Bill Gates as one of 44 students in Israel. He completed his military duties in a different area than Tech. Instead, he went to the artillery corps, where he was faced with many complex systems. Starting as a Soldier, Ilai then became Commander and finally Officer. He spent 4,5 years in the army and ended up being intelligence and operations officer of a battalion, which could be compared to working in a company of a 1000 people. He learned to handle mission critical tasks and making real decisions. This was the first major step that gave him both the confidence and the ability to build something from scratch. He also learned how to build relationship with and how to maintain it to reach what he wanted. As a platoon commander, he learned how to handle complex concepts and how to teach and lead others with these.

StoreSmarts is collecting data from the metadata emitted by cell phones in retail stores. Many store owners ignore who the "non-buying" customers are and why they are not buying, which is where StoreSmarts come in. By monitoring customers in real time, StoreSmarts is able to give great insights in how the customers interact with the retail store.

Amir Milo - Founder and CEO at Equivio

Type of company: IT, law

Geography: Herzliya, Israel

Stage: Acquired by Microsoft in Jan 2015

Amir worked in several companies such as Motorola, Amdocs and now Microsoft. This has given him the opportunity to work and live in Toronto, Paris, Milan, and Philadelphia. He also worked for smaller companies including two startups that he founded. Amir studied business at University of Toronto (MBA). His background include a strong experience within Business, Tech and Commercial.

Equivio provides a text analytics service for legal and compliance that uses machine-learning techniques to identify documents relevant to their legal and compliance needs. Their product Zoom is a court-approved machine learning platform for the legal arena.

Ariel Assaraf - Co-founder & Product manager at Coralogix

Type of company: IT, Data analysis

Geography: Tel Aviv, Israel

Stage: Scaling-up

Ariel was part of the Intelligence Unit 8200 during his military. After this, he studied Economics and Mathematics at the Open University of Israel. Working first as a Quality Architect and then as a Group leader for Verint-Systems, Ariel was able to learn how to manage a team of 16 people. This gave him the confidence to start Coralogix with his business partner that he met in an investment board.

Coralogix is a machine learning powered log analytics solution aimed to solve the problem of unmanageable log data. By automatically clustering millions of log records back into their

patterns and finding connections between those patterns, companies get ahold of their log data and proactively solve their production problems.

Neria Nachum - COO at Slyde

Type of company: IT, helping kids, parents and teachers optimize the way to school

Geography: Tel Aviv, Israel and Chicago, USA

Stage: Start

Neria was a software developer and later leader for the software development team in the Israel Defense forces. Shortly after the end of his service, he joined FTK Technologies and worked as an Android developer. With a lot of technical knowledge in the pocket, Neria started Slyde with two partners, of which one that he served with in the army. Neria is in charge of the contact and testing with local customers but also programming for Slyde.

Slyde is an online and mobile platform that uses real-time data from multiple sources to let parents and students know exactly when the school bus will arrive. Slyde can also alert parents and schools to unexpected incidents or when a student is skipping school. It offers a variety of solutions for managing transportation expenses, including live route shortening to automatically remove unnecessary stops; optimizing the assignment of students to routes; and allocating bus stops in the most efficient manner. In addition, Slyde cuts idling time by letting drivers know whether they have to wait or not.

5.3 Computed results

Source of knowledge input

Amir Lahat	University, International Experience
Neria Nachum	Military, Field experience
Ariel Assaraf	University, Military
Efrat Rapoport	University, Military, International experience
Moshe Safarty	University, Military, International experience
Ori Fingerer	University, Military
Arnon Dinur	University, Military

Limor Sandach and Ron Livne	University, Field Experience, Spin-off
Ilai Fallach	University, Military
Amir Milo	University, International Experience

The sources of knowledge input were very similar between all the interviewees. The main results and common source is the military service and university. Several interviewees also considered their international experience and previous work to be a strong source of knowledge for their entrepreneurial journey.

All the interviewees have gone through military service as it is obligatory in Israel. The service is three years long for men and two for women. Although many saw this previous experience as a reason for their entrepreneurial journey, Limor and Ron who invest within the medical field did not consider it as a central part. For all the interviewees however, this was a time of learning fundamental principles such as teamwork, responsibility and respect. "The military enables a good foundation for future entrepreneurship" according to Amir Lahat. Additionally, "The military helps you to create an entrepreneurial spirit, the culture of solving problems and creating companies" according to Limor and Ron from Access medical ventures. The points of view were very diverse in terms of the impact the military has on Tel Aviv as an ecosystem. Neria saw it as a crucial and the most important source of growth, while Amir Lahat considered it as a good pipeline for fields such as cyber-security. It is important to point out that the knowledge created is very dependent on which unit the soldier is working for. Many tech people come from 8200, the top intelligence unit of Israel. In this unit, soldiers work with very technical systems which provide them with top technical knowledge. The network is also an important factor as we can observe that the 8200 alumni network is very strong. Efrat explained this experience as a rebuilding process: "They literally tear you apart and rebuild you through intensive courses. You have to solve all kind of problems from morning to night. By putting 18 years old in front of complicated problems, they realise that nothing is impossible. The risks in starting a business are not that scary anymore." Due to this experience, 8200 soldiers are also very popular for companies to recruit.

University is also a common denominator in nine of the ten interviews. Israel has a well developed and renowned academic infrastructure with universities such as the Technion - Israel Institute of Technology and the Hebrew University of Jerusalem. Both are part of the top 100 in the Academic Ranking of World Universities 2016. Ori thinks that university is great, although he didn't feel that he could really exercise what he learnt. Ilay studied a bachelor in computer science which was relevant for his tech startup he was developing at the same time. Efrat, who studied a master in computational neuroscience is now working within the field of artificial intelligence. In summary, there is often a clear link between academic studies and the startup field for the studied startups. Here again, the interviewees did not only gather knowledge but also a broader network and a methodology to solve problems. Limor explains that "What you get from university is the skills to learn quickly and solve complex problems." Ariel also mentioned that the fees for studying in Israel are low compared to many other westernized countries, which gives the opportunity for everyone to study.

Another aspect that was important for four of the interviewees was their International Experience. Efrat learned Japanese and Chinese in a young age, which lead her to start a nonprofit company that worked with fair trade in China. Later, she and her business partner built a database of israeli startups that work towards the Chinese market. Moshe graduated from Yale University and sold a startup to the Belize government. Amir Milo and Arnon also studied and worked in several Western countries.

Finally, a couple of interviewees also mentioned previous field experience as an important source of knowledge. In particular when it comes to fields such as the medical field, previous experience is seen as crucial. Michael, the founder of Access Medical Ventures, is first and foremost a physician that operated for 12 years. He has become a serial entrepreneur within medical devices. This mainly comes as a result of the problems he observed when practicing his work as a physician. With the gathered experienced, he was able to solve these problems through his startups.

Characteristics of the founder

Amir Lahat	Optimistic (perceived), Network
Neria Nachum	Technical, Network
Ariel Assaraf	Network, Knowledge
Efrat Rapoport	Entrepreneurial soul, Network, Technical
Moshe Safarty	Pragmatic (perceived) , Network
Ori Fingerer	Opportunity Recognition, Network
Arnon Dinur	Network, Knowledge
Limor Sandach and Ron Livne	Industry expert knowledge, Strong network
Ilai Fallach	Strong Network, Technical, Optimist
Amir Milo	Industry knowledge, Adventurous

While the personal traits of the entrepreneurs are sometimes hard to judge from a first meeting, some aspects were still raised. Network and knowledge are two of the main characteristics for the majority of the interviewees. Although venture capitalist are not always entrepreneurs, in our case they all have founded or been part of a founding team.

The knowledge came as a natural trait as the focus was put on knowledge-intensive startups. Although starting a company is a risk, having previous experience and high-end knowledge ensure a higher rate of success (McKelvey & Heidemann Lassen, 2013). The experienced individual will be able to recognize opportunities and gather the confidence to start a company. The best example in the interviewees would be Michael from Access Medical Ventures who uses his expert knowledge to start new companies frequently.

Previous experience also allows for a broader network. Whether it is the army, university or work, network has an important effect on entrepreneurship according to our interviewees. As a direct effect of their military service, we can observe that several interviewees such as Neria, Ariel and Ilai have started companies with former soldiers. Others have acquired their

ties through work experience throughout the years, for example Amir Lahat, Moshe and Ori. Access Medical Venture's is composed of US investors that have worked with Michael. In all these cases the network has been crucial to the startup. In addition, networks provide an access to human resources and other external knowledge than can be beneficial in the development phase.

Financing

Amir Lahat	Venture Capital Firm, Seed and early Stage
Neria Nachum	Private Investors
Ariel Assaraf	Venture Capital
Efrat Rapoport	Currently seeking Venture Capital
Moshe Safarty	Venture Capital Firm, Seed Stage
Ori Fingerer	Venture Capital, Angel Investors
Arnon Dinur	Venture Capital Firm, All stages
Limor Sandach and Ron Livne	Venture Capital Firm, Seed Stage
Ilai Fallach	Angel Investor, Venture Capital
Amir Milo	Bootstrap, Exit

As shown in the literature review, external financing is often a crucial variable for many knowledge intensive entrepreneurs. With only Amir Milo having bootstrapped the market from the first day, there is a clear tendency to finance through venture capital. It is worth noting that Amir Milo founded his company in the 90s with experienced colleagues. At that time, the venture capital structures were not as developed as they are today. Neria and Ilay are also the only interviewees who raised money from angel investors.

The venture capital firms were mainly investing in Israeli companies. There is one exception, 83North, who also invests in European startups. One of their investments is the Swedish Klarna, in which they invested in the B round. The majority of the investments are also coming from the United States.

Societal influences

Neria Nachum	Workspace
Ariel Assaraf	Microsoft Accelerator (private)
Efrat Rapoport	Workspace
Limor Sandach and Ron Livne	Chief Scientist
Ilai Fallach	Public library, Workspace
Amir Milo	Tax credits

The Venture capital firms were deleted from this section as the societal influences were not relevant. None of the interviewed entrepreneurs used Incubators but we can see a clear tendency towards Workspaces. Incubators are often quite niched organisations which present barriers for entrepreneurs. They sometimes consider coaches and investors as equally important in the startup process. Workspaces were very popular as they offered various benefits. First of all, you are surrounded by other entrepreneurs inspiring each other, partnering up to succeed, but also creating a valuable network for the future. As networks play a big role in the development phase, it is a non negligeable result of hiring a startup workspace. These also gives the opportunity for entrepreneurs to work in "real" offices very early on as the space is often cheaper (as it is shared) than a normal office. Finally the infrastructure around workspaces allow the entrepreneurs to have an easier access to financing and to other vital services such as business and law consulting.

Factors behind Tel Aviv's success

Amir Lahat	Mature ecosystem, Culture, MNC R&D, Immigration, US relationship, Survival instinct
Neria Nachum	Culture, Military, Survival instinct
Ariel Assaraf	Military, Education, Culture, Survival instinct, Infrastructure
Efrat Rapoport	Military, Success stories, Culture

Moshe Safarty	Us relationship, Military, Mature ecosystem
Ori Fingerer	Mature ecosystem, Survival instinct, Culture
Arnon Dinur	Mature ecosystem, Military, Culture
Limor Sandach and Ron Livne	Culture, Immigration, Military, Limited means, MNC R&D, Success stories
Ilai Fallach	Success stories, Immigration, Military, Network, Survival instinct, Culture
Amir Milo	Culture, Success stories, Military

The last question of the interview was about the factors that lay behind the success of Tel Aviv. Here the interviewees thought that Culture, Military, Survival instinct, Maturity of the ecosystem, Immigration waves, R&D Investments were the primary reasons. Secondary reasons such as Expensive life, Size of the market, Us Relationships, Universities and education were also mentioned during this part. In the last part of the analysis these reasons will be discussed in detail in order to clearly define why Tel Aviv has become a dynamic ecosystem.

6. Analysis

6.1 The knowledge intensive entrepreneurship model

Source of knowledge input

The sources of knowledge input for Israel emanate from various knowledge intensive organisations and institutions. In our interviews, we can observe two traditional sources such as previous experience in knowledge intensive companies and university education. These have led to corporate and academic spin offs. There are also Independent Start-ups which have no obvious link to any parent organisation. Finally, there is one particular source of knowledge that is not mentioned in the theoretical framework, military institutions. It is undeniable that military service has some impact on the Israeli entrepreneurship scene. It is however not the military service per se that stimulates entrepreneurship. The resulting strong network, high-end knowledge and "nothing is impossible" culture are all aspects that lead to this entrepreneurial stimulation. A three year military service would be very hard to motivate

in any westernized country, so it is these three aspects that have to put into focus instead. The military is however not everything. Many great engineers do not come from defense. Tel Aviv has many sectors that are not at all linked to military knowledge. This means that to a certain extent military could be considered as a fourth source of knowledge input for Israel.

Characteristics of the founder

When looking at the characteristics of the founder we can observe that Israelis have a very different culture. Israelis believe they can control events affecting them. They value independence and contributing to society as a result of their jewish culture and heritage. As any entrepreneur, Israelis tend to overestimate their chances of success and underestimate the risks and uncertainties. Failure is however considered as a lesson to be learned rather than something negative for most Israelis. The majority of the interviewees also had a strong network which can prove vital to the company. A similarity between most of the entrepreneurs was their love for the country and what it has achieved. Many stories are told about the Israeli economy and how it built its way from nothing to a modern economy. This shared enthusiasm for Israel gave the entrepreneurs a meaning and an important place in society.

Financing

The most interested takeaway regarding financing is the high use of venture capital for all our interviewees.This is often done at a later stage, in order to have a higher company value, thus giving away less shares per invested dollar. Although many types of financing are available for entrepreneurs, these are not fully used by entrepreneurs in Israel, as no one actually took a bank loan for example. Own financial resources and sacrifices are also very commonly used in the earlier stages of venture creation. The interview within pharmaceuticals with Access Medical Ventures confirmed the hypothesis that financing KIEs can be a risky investment as they might take years to be fruitful.

Societal influences

Regarding the societal influences, the entrepreneurs had surprisingly not used any incubators. Instead, there is a strong use of workspaces or accelerators in order to scale-up the start-up. These often allow to engage in competitions and develop the professional networks of the

entreprencurs. The workspaces contribute in lowering the initial costs for the start-ups. Clustering and geographical area was also important for the entrepreneurs. The visited areas in Tel Aviv and Herzliya were both very active in various fields with close access to Venture Capital firms and other services. The workforce in Israel is composed of much skilled labour, which has been the result of the great academia combined with highly skilled immigration. Grants only played a partial role for the interviewed entrepreneurs, as these can only be seen as support mechanisms for the companies. Grants in themselves are not enough to run a viable business.

6.2 Factors behind Tel Aviv's success

From the results of the interviews, the following ten factors were picked up as being reasons for Tel Aviv's success:

- Jewish and Israeli Culture
- Military Service
- Survival instinct
- Lack of natural resources and the necessity of self reliance
- Maturity of the ecosystem
- Immigration waves and a culture of diversity
- R&D Investments from MNCs
- Expensive lifestyle
- Size of the market & US Relationships
- Universities and education

Israel has become a unique blend of many cultures and languages. This has created a unique Culture. The historical factors mentioned in the empirical framework may explain some details of why the culture has become so entrepreneurial and risk-taking.

Jewish culture highly values being independent, as many Jews lived outside of Israel. This implies that they could not work in other companies due to religious holidays and that they do not work on fridays. This made it almost impossible for a religious jew to work for a non jewish company. Therefore, many jews decided to be independent, being stock market traders, lawyers etc. When everyone is independent, it becomes part of the culture and is taught to the children. In addition, the israeli culture is very direct, people feel free sending

email to top VCs as 21 year olds starting a business. There is a good chance the VC accepts to meet. People are very open with feedback and criticism. Many startups are also spin-offs of other solutions, Israelis are very flexibles and do not hesitate to pivot their ideas to find great market fits. Israelis are used to stress, being under pressure from the outside all the time. This has created a unique economy where the Israelis had no other major resource to export except for their minds.

The military service is also a reason for Tel Aviv's success. At the age of 18, everyone goes to the army. Those that get recruited as programmers or any other technical field are "thrown" into "the deep waters" really fast. The resulting network, experience and sense of responsibility involved in this process are all important factors to the development of tomorrow's entrepreneurs. Especially the top intelligence unit 8200 develops a "nothing is impossible" state of mind. This also allows the society for a bigger cohesion and shared experience that is highly valuable. The proprietary knowledge Israelis receive in these top units can become their most valuable asset when looking for financing in the early days of their startup.

Closely related to the cultural traits and to some extent the military, is the survival instinct. As shown by the history, the country and its people has for a very long time been persecuted due to their religion. Surrounded by potential enemies, Israelis have in their opinion no choice but to do their best. Although this danger might not always be as big as certain israelis think, it still has a strong effect on the people. It has somehow created a culture of being forced to think of creative solutions in order to survive. As they do not have the power to excel in quantity, they try to do so in quality. By being historically and still under external pressure, this survival instinct has resulted in creativeness on the nation's economy.

The maturity of the ecosystem is an important factor as well as the success stories. Israel's has a long history of innovation and entrepreneurship, which has brought many success stories throughout the years. The scene started during the 80s with government support programs when other countries didn't even think about it. They created success story very early, which spinned the wheel. Having a well developed venture capital, incubator and workspace environment, Tel Aviv presents all the assets to ease entrepreneurial journeys. The

serial entrepreneurs who also often reinvest in new start-ups become a central part of the ecosystem. Inspiring students and young professionals, showing them that taking the risk to start a new company is not impossible. The global successes such as Waze or Viber give hopes to young entrepreneurs trying to bring forward the next unicorn. Israel reports a high level of societal admiration for entrepreneurs with 86% (GEM 2016 / 2017 Global Report). When the environment is filled with ideas and confidence and when people are trying hard, the ecosystem becomes more dynamic. Entrepreneurs do not have to invest their own money as the external financing has become very active within the ecosystem. This also comes as a result of success stories within the ecosystem. Some interviewees gave nuanced answers, for example Moshe mentioned that the israeli ecosystem is really crowded: There are currently more investors on the market than good startups to invest in, especially in the seed level. He also questions the efficiency of the ecosystem, because bad startups can survive a long time, and good startups just get drowned in the noise. In european countries there are fewer investors, allowing for better efficiency through a tougher screening.

The immigration waves that have hit Israel throughout the years present a different important factor. The arrival of large masses of skilled and diverse workers allowed for both a high-end innovative economy but also for a unique melting pot. With large communities from France, Spain, Germany, Eastern Europe, North Africa, United states and more, Israel has become a singular ecosystem which allows strong connections with all these countries. These connections allows for unique commerce and geopolitical links that have been very valuable for the development of the country. As in the US, who has a lot of immigrants, the immigrants feel that they have to do something and work hard to succeed which results in a key asset for any entrepreneurial ecosystem.

The R&D investments from many multinationals, such as Intel, Microsoft, IBM, Cisco, Oracle etc, also play an important role in stimulating the ecosystem. Providing Corporate Venture Capital, Accelerator and incubators programs these actors raise the ambitions and knowledge of the ecosystem. This in turn leads to knowledge creation allowing for corporate spin-offs in the high-tech industry. Without this asset, the ecosystem would miss great investments and exit possibilities. It should be noted that many of the multinationals have been able to take part of tax benefits for R&D centers from the Israeli Ministry of Finance.

This had a great effect on the stimulation of innovation and research on a national scale.

There is safeness in European countries that does not exist in Israel. Israel and Tel Aviv in particular have become very expensive, which caused people to understand that the only way to own an apartment and be financially stable is to start a business. This factor is also true for other hubs like San Fransisco, where a good salary is still not enough to live on. This might explain to a certain extent why so many entrepreneurs are part of this ecosystem. The question this raises is if social protection has a negative impact on entrepreneurship. Many would argue that social protection is actually benefiting entrepreneurs as they can take the risk to fail without putting everything at risk. The answer to this question might also reside in the culture. Either how, this would be an interesting phenomena to study further.

Israel is a very small country (20 770 km²) which means they can't have a local or a close country export in the same way as many other countries. As the population is only 7,5 million people, the startups have to think globally from the first second. Unlike many startups from Europe and the rest of the world, Israeli startups have to open their doors to the global market directly. Whether it is the east or the US or Europe, the products are then designed for global markets. It is however sometimes a mistake to go to the US market directly according to Moshe and Ori. For Moshe the US customers are expensive and far away. There are closer markets, such as Europe or Turkey where there is less competition. The less players on the market, the less expensive every customer will be for them. However, Israel has a close proximity to the United States in terms of culture, mentality and geopolitics. Many Israelis are currently living in the United States, which creates a direct link between the Israeli and American clusters. Bridges between the ecosystems have been created thanks to decades of collaboration.

Finally, Universities and education are considered very good in Israel. Technion is the first World university for computer science in the World after US universities. With high-end universities on such a small land and low fees, higher education becomes an asset for many israelis. This in turn has the potential to lead to university spin-offs and Knowledge Intensive entrepreneurs. However, some entrepreneurs now feel they do not have to study at all. Neria criticized university as being a time-consuming and unadapted form of education for certain

fields. For example, the programming field is changing too quickly: studies might become obsolete already at the time of graduation. University is teaching basic concepts, but for programming, experience is much more important in his opinion. Are we entering a time where academia are so disconnected with reality that studying proves itself to be less important? Limor argued that university education does not only give specific knowledges, but it also teaches the students how to solve problems with given means. In any case, the efficiency of this process can be questioned in certain fields.

7. Conclusions

In our last chapter, a conclusion is drawn based on the empirical findings and the accompanying analysis. Here we answer the main research questions followed by the sub-questions. The last sub-question in particular provides a recommendation for policy makers in order to stimulate entrepreneurial ecosystems.

Our main research question was "*What led Tel Aviv to become a leading entrepreneurial ecosystem?*". This question delivers a complicated answer where a multitude of variables come into play. By combining historical, cultural and economical assets, Israel have played their cards well compared to their neighbouring countries. This has lead them on a path of economic growth that allowed infrastructural changes. Ten factors were analysed as being central for the development of the Israeli cluster. With a hard military service and a singular survival instinct, the Israelis have built a strong a secure country for the entrepreneurs to start their ventures. The lack of natural resources and the necessity of self reliance obliged them to become creative and innovative already seventy years ago. This has resulted in a culture of problem solving and constant questioning. The ecosystem has been active for the past forty years, seeing waves of skilled labour flowing into the country to help stimulate it. With the people came the capital, as many multinational tech firms invested in research centres throughout Israel. With the people came also the strong network from previous countries which allowed for stable trade partners who were much needed considering the small size of Israel. Taking this into consideration with the top education Israelis receive really points out all the assets needed for a fruitful ecosystem. Finally, by adding the Jewish-Israeli culture of risk taking and entrepreneurship, the recipe for a competitive cluster like no other is fulfilled.

To answer the question "*What historical factors led to the emergence of the Tel Aviv ecosystem?*", it is needed to go back in time and the history of Israel. Jews have lived through many times of persecution throughout the history, the most striking being the persecution by the Nazi Regime. In the book "Hitler's Gift: The True Story of the Scientists Expelled By the Nazi Regime" Jean Medawar presents us with the repercussions on the Jewish population of the persecution by the Nazi Regime. "As a result of the rise of Nazism 1,500 Jewish scientists fled Germany and consequently found their place in the US academia. These 1,500 scientists constitute a significant chunk of the most distinguished academics of the 20th century". Parallel to this, the massive immigration of Soviet Jews in the 1980s increased the population of Israel by 25% in ten years. Many of these were important researchers in fields in science, engineering and mathematics.The successful absorption of a huge population is in itself a miracle, but today, these immigrants and their children are an integral part of Israel's success story (Mitzner, 2015). In addition to the immigration, the early scarcity of resources that still exist to a certain extent today, has made Israel understand that innovating is their only way out. For example, Israel had a big problem with water as the only source of water was the sea of Galilee. This was not a long term solution for the growing population, which resulted in research on desalination centers. Today, Israel relies for about half of its water supply on unconventional water resources, including reclaimed water and desalination. With this problem-solving mindset, the Israelis show that they are not afraid to tackle any problem anymore.

"What characteristics are singular to Israeli Knowledge Intensive Entrepreneurs?" is our second crucial question to answer. Entrepreneurs in Israel have a very different mentality than european countries. The low risk perception and the "nothing is impossible" mindset is present within every respondent which creates a dynamical atmosphere to start a company. The Israeli ecosystem has matured over a period of thirty years, ensuring the apparition of success stories inspiring the younger generation to become entrepreneurs. This in turn developed a dense infrastructure to help young start-ups on their road to success. The high-end universities and educational programs offered to young Israelis allow for a development of a knowledge intensive society. By bringing capital from multinational knowledge together with knowledge intensive people, the ecosystems has flourished within

the high-tech fields. Some think that the ecosystem has become a bit too crowded, making bad startups survive for longer. This is probably true to a certain extent, but has to be put into perspective with the impressive growth of some Israeli startups. The last example to date is the sale of the company mobileye to Intel for 15 billion dollars in march 2017. Another example of a success story is the GPS application Waze, which was bought by Google for 1.3 billion dollars. The size, location and strong relationships of the Israeli market in a globalised World is also seen as a strong asset. By thinking globally from the first day, entrepreneurs aim higher to reach higher.

Our last sub-question *"How could the example of Tel Aviv inspire other entrepreneurial ecosystems?"* is a way to make recommendations for other clusters that wish to develop their startup scene. Many successful entrepreneurs in Israel emanate from the top intelligence unit 8200. This can be seen as another source of knowledge for societies to develop an attractive ecosystem. The military service per se might not be the adequate answer, but the knowledge it creates have to be put into focus. It might seem obvious but university education can not be the only answer in today's fast paced environment. There is a need to educate the young people on new technologies, for example by teaching coding already at a young age. Efforts to improve an ecosystem has to be proactively put into place by local and national institutions in order to spin the wheel and create success stories. These success stories seem to have a far more powerful effect on the innovational and entrepreneurial spirit of the younger generations than any education or marketing campaign. Moreover, Immigration should be seen as a source of knowledge and potential trade relationships rather than a cost for society. In the case of Israel, the immigration is very special as it is mainly jewish immigration. There is however some value in the diversity this creates both in terms interaction and knowledge. Immigrants have also developed the problem solving culture that is so important to Israel's ecosystem today.

8. Further Research

There is a strong potential for further research on the Tel Aviv ecosystem. A quantitative study on the profiles of the founders, the methods and amount of financing and use of workspaces, incubators or accelerators could provide evidence of the growth of the ecosystem. The statistics on the entrepreneurial activity is still limited when it comes to

scientific research. Many business reports have been made, but none is reliable enough to draw conclusions upon.

Having scarce resources has led Israel to invest in their knowledge, which has a much longer-term potential than natural ressources for example. Another example of a country who bet on knowledge would be South Korea, which could also prove to be interesting for further studies. South Korea's story of rising from one of the poorest countries to the 11th economy in the World (Kleiner, 2003) can be put in parallel to Israel building a strong economy out of nothing in 80 years. These case studies do not only show the importance that knowledge plays in today's world economy, they also enrich the previous literature such as the knowledge intensive entrepreneurship field. By adding more in depth studies, both quantitative and qualitative, the model presented by McKelvey & Heidemann Lassen (2013) can be enhanced in order to cover a broader spectrum of entrepreneurs.

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10. Appendix

Appendix 1: Bloomberg Innovation Index

Bloomberg 2017 Innovation Index

2017 rank	2016 rank	YoY change	Economy	Total score	R&D intensity	Manufacturing value-added	Productivity	High-tech density	Tertiary efficiency	Researcher concentration	Patent activity
1	1	0	S. Korea	89.00	1	1	32	4	2	4	1
2	3	+1	Sweden	83.98	5	11	15	7	18	5	6
3	2	-1	Germany	83.92	9	3	16	5	12	16	9
4	5	+1	Switzerland	83.64	8	6	2	11	16	14	4
5	7	+2	Finland	83.26	4	13	20	15	5	3	5
6	6	0	Singapore	83.22	14	5	12	17	1	6	12
7	4	-3	Japan	82.64	3	9	28	8	27	9	3
8	9	+1	Denmark	81.93	6	17	5	13	22	2	11
9	8	-1	U.S.	81.44	10	22	10	1	34	20	2
10	11	+1	Israel	81.23	2	30	30	3	20	1	18
11	10	-1	France	80.99	12	34	18	2	10	18	10
12	13	+1	Austria	80.46	7	7	11	23	6	10	17
13	16	+3	Belgium	77.18	11	21	9	10	19	19	25
14	14	0	Norway	76.89	19	36	3	12	25	8	15
15	18	+3	Netherlands	75.23	17	24	19	6	44	15	19
16	15	-1	Ireland	74.94	22	2	6	16	13	22	31
17	17	0	U.K.	74.52	20	38	21	14	7	17	14
18	20	+2	Australia	73.33	13	44	1	20	21	12	21

Appendix 2: Mitchell J. Freedman, Haaretz Books, December 2009, IVC Research Center
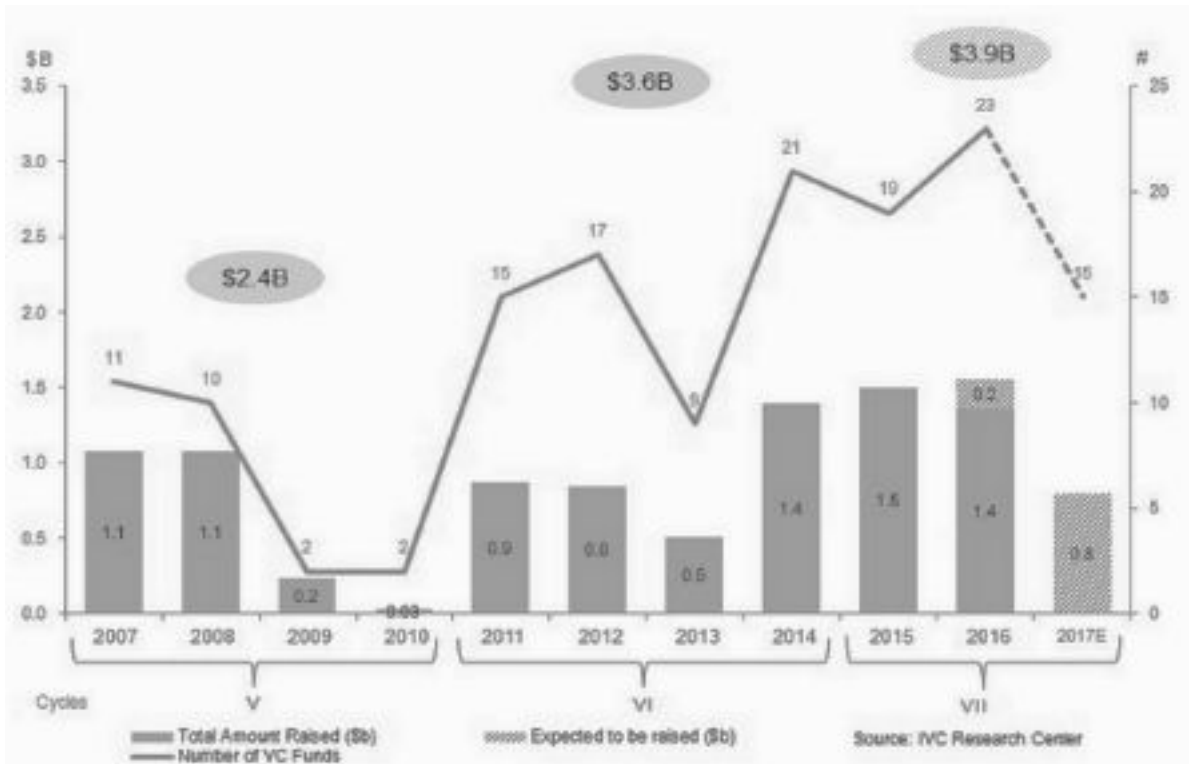
Appendix 3: Knowledge intensive entrepreneurship financing, McKelvey & Heidemann Lassen, 2013
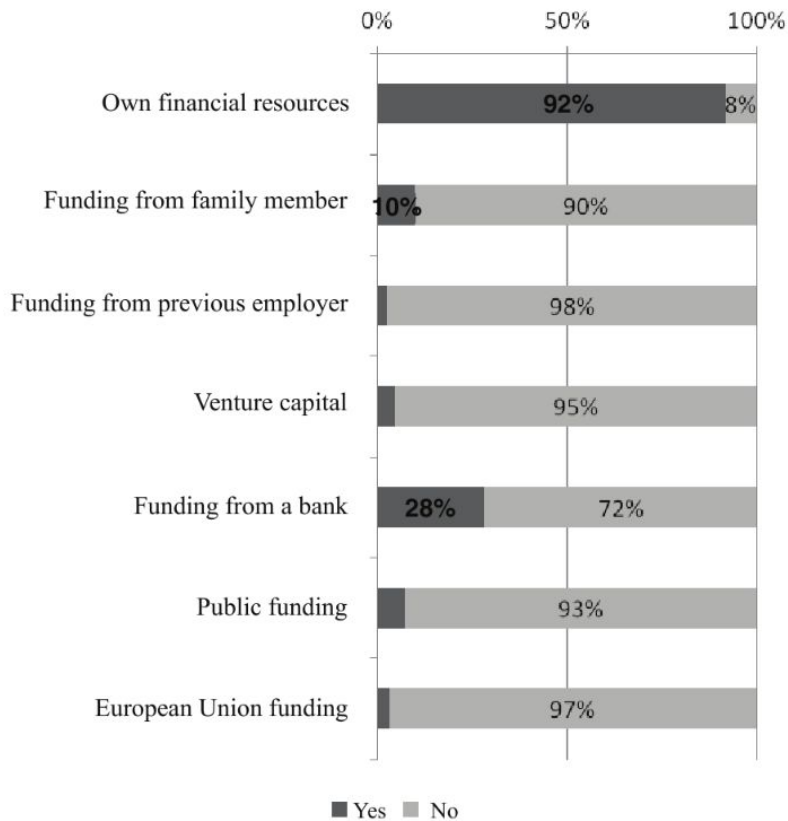
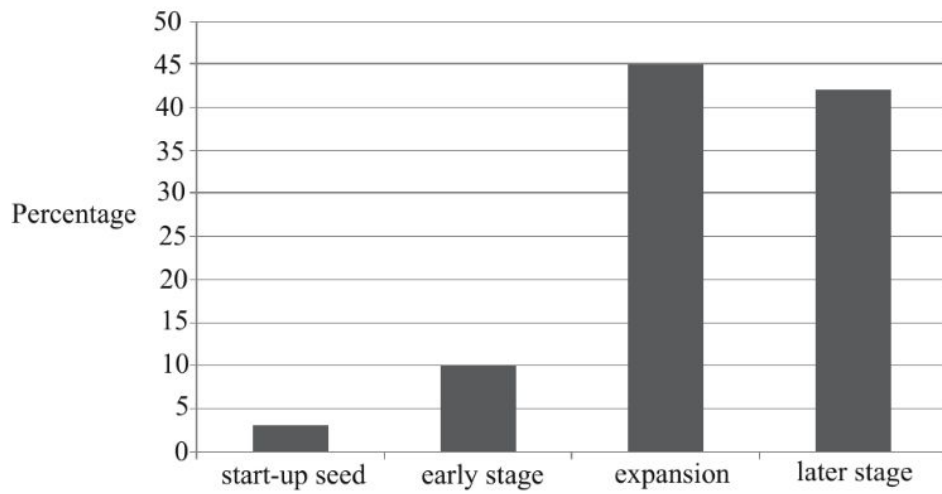Appendix 4: Corporate Venture Capitalists investment focus, McKelvey & Heidemann Lassen, 2013

Figure 3.3   CVC investment focus