MASTER THESIS

The most attractive practice for (University) incubation facilitators to improve performance of academic startups

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Abstract

This research focuses on best practices for incubation facilitators that are attached to a university. Several university incubation facilitators have different approaches to support academic start-ups and increase their performance. According to literature, performance can be distinguished by several indicators, including valorization for universities, growth, profitability, survival and creating entrepreneurial awareness. This performance was studied with in-depth interviews at academic start-ups and incubation facilitators. The goal was to get insights into which elements and tools are most attractive for academic start-ups in terms of performance. The results were diverse; many university incubation facilitators had different policies. Technical university incubation facilitators seem to have more knowledge and experience concerning how to increase performance of academic start-ups. Overall, a few elements were found that are important for the performance of academic start-ups, including assembling the right team and human resources management (HRM) support, coaching, availability to an internal and external network, and customization in a later phase of development.

Executive summary

In this research, the following research question has been asked: *Which elements and/or tools are the most attractive for incubation facilitators and academic start-ups in terms of performance?* An incubator facilitator supports a start-up with a variety of elements and / or tools and to increase the survival odds. According to literature, three different factors are important for the performance of an academic start-up: (1) accessibility of knowledge, which is needed to build and sell the actual idea to the customer; (2) accessibility of resources, which are needed to create the actual products and/or services; and (3) access of an internal and external network, to interact with the right people so the right knowledge and expertise can be accessed. To measure the performance of incubation facilitators, several indicators were found in literature: (1) creating entrepreneurial awareness, (2) knowledge transfer, increase survival for startups, and create economic growth. For academic startups, the indicators were (1) growth of a start-up, (2) innovative ideas, (3) survival, (4) profitability, and (5) knowledge transfer.

In this research, seven academic start-ups and twelve incubation facilitators who were connected to a university in the Netherlands were interviewed to find the most attractive elements and/or tools. The incubation facilitators were asked about their policies and which elements had the most significant impact on their performance. According to the interviews, incubation facilitators have major differences in their approaches to academic start-ups. For instance, certain facilitators were at the start phase of building a well-organized incubation facility, while on the other hand, other (usually technical) incubation facilitators were more evolved and had a great deal of experience with academic and technical start-ups. However, because all incubation facilitators have the same incentives and goals overall, they also have many policies in common. Therefore, some insights might be useful for different incubation facilitators and academic start-ups.

In the findings, it seems that survival is the most important performance indicator for an academic start-up. Many incubation facilitators confirm that survival skills are important in a competitive market. More than half of all respondents thought that assembling the right team is directly related to the survival of a start-up, and ten respondents stated that having the right team is the most important factor for academic start-ups. This is remarkable, since many incubation facilitators do not spend much time on the diversity and expertise within their team. While theory confirms that HRM is an important tool, it might be strengthened due to its importance. According to the interviews, founders of academic start-ups usually start an idea with friends or with colleagues, and this may not be the most favorable for the performance of

an academic start-up. However, there is increasing awareness that the selection of team members should get much more attention. Several incubation facilitators already bring multiple disciplines together to create ideal teams. This includes professional team assessments and personal feedback mechanisms.

Secondly, the network capabilities from academic start-ups likely have a positive influence on performance. According to one specific start-up, it is less difficult to survive if there is a broad network available to interact with. Therefore, an incubation facilitator having a broad network could lead to a certain competitive advantage, since academic start-ups might have the feeling that these incubation facilitators could generate higher odds for them to be successful. In literature, a broad network is indeed found to be important; however, the findings indicate a need for a more qualified judgment. For instance, many academic start-ups have different needs for different phases in their development. The timeline of an academic start-up is crucial to decide what sort of expertise in this network they need. Another observation was that incubators could extend their network with other university incubation facilitators. It is striking that they do not utilize each other's networks and make use of each other's policies. Fortunately, almost all incubation facilitators see this as an opportunity, but they simply do not have time to contact other incubation facilitators.

Content

1. Introduction

This research was conducted to gain insights into which elements and tools are most attractive for academic and university incubation facilitators. This chapter will first elaborate on the background of universities and entrepreneurship. Secondly, it will explain the importance of entrepreneurial universities and the era of academic spinoffs. Finally, it will discuss the difficulties that arise between academic start-ups and universities.

1.1. History of universities and academic start-ups

According to Astebro and Bazzazian (2009), universities in the previous century were not concerned about commercialization. Universities were primarily based on production and transmitting information, which was for public use only and free for all (Samuelson, 1954). Gradually, universities became more collaborative with other scientific institutes and became more motivated to provide research as a service for society. However, universities were prohibited to make profit or new equity (Astebro & Bazzazian, 2009).

In the last decade, universities have become more involved with commercialization, patenting, and licensing. Since then, academic start-ups have become a significant global occurrence. Governments in Europe, the United States, and Asia have improved their policies to support academic start-ups as engines for economic growth (Shane, 2004). There are several advantages to commercializing universities. For instance, Simone and Mitchel (2010) mentioned that nearly 75% of university inventions are profitable by royalties and licensing. Another advantage of academic start-ups is that they can use the knowledge and resources from universities, which helps them to gain trust and loyalty from investors (Simone and Mitchell, 2010).

However, Swamidas (2012) stated that universities faced several difficulties with facilitating these academic start-ups in bringing their potential value successfully to the market. For instance, these start-ups need investors and entrepreneurial management to enter markets successfully. Furthermore, universities are embryonic, and they are distant from commercial markets, which could be a higher risk for potential investors, who require reliable evidence about future cash flows (Swamidas, 2012). According to Jongbloed (2012), universities saw the potential value of academic start-ups, but they were concerned that commercially driven values from academic start-ups would conflict with the values of the university like independence, transparency, and quality research. To tackle this problem, the United States

(US) changed policies so that technology transfer between universities and firms would be improved. For instance, to reduce the strict regulations for Universities to make profit.

Since then, there have been many examples of successful academic start-ups. This policy provided incentives for universities to interact with partners who were willing to invest in the development and commercialization of new technologies. The University of Maastricht approached this issue with another construction, bypassing policies with a holding. This holding contains a private company that can make profit. These policies are meant to prevent public institutions crossing the mission they have (Jongbloed, 2012).

1.2 Valorization and universities

The commercialization of knowledge (valorization) is increasingly important for universities (Jongbloed, 2012). In various countries, it is common that universities engage as consultancy services to industries and governments to support economic and social growth. The effective and efficient interaction between public research producers and the private sector is important for the development of innovation systems. Another valorization form that has been common for universities is patenting and licensing. In the last decade, many universities have become active with obtaining intellectual property rights for commercial exploitation. Therefore, universities established facilities like incubators and technology transfer offices (TTOs) to support academic start-ups. As result, the profit from universities and academic start-ups increased.

1.3 Next generation of incubators

Bruneel et. al (2012) compared demand and supply of incubation services by comparing best practices from incubation facilitators all over Europe. They stated that incubation facilitators had several generations in the past decades. The first-generation (1980st) incubators focused typically on estate solutions, like workplaces/ facilities, while the second generations (early 1990s) incubators included also intangible services. Finally, third generation incubators (late 1990 – 2000) were more focused on technological (innovative) firms. Bruneel et al. (2012) compared a few best practices from these generations. They found that these generations had many similarities, for instance, all generations had similar infrastructures, shared resources, access to shared facilities, access to resources, and mentoring services. However, there were also some differences. A larger percentage of the third-generation incubation facilitators offered training, coaching, and financial resources, while these services were much less offered in the first and second generation. It also seems that incubation facilitators differ in their available services. While certain incubation facilitators offer a variability of services, other

incubation facilitators offer this in a far less extend. The question arises if incubation facilitators would not be better off, if they would work more closer together and learn from each other which tools and / or elements they find most attractive for the performance of startups.

1.4 From an academic start-up perspective

Jordi Bekker and I are cofounders of an academic start-up at the University of Wageningen and can confirm the importance of commercialization from universities. We think that universities could play a major role in innovative products, since all sorts of expertise can be accessed. We also believe that support and facilitations at universities help significantly to improve our marketing skills and innovativeness of our products. With scientific knowledge, we can be more competitive in the market, which therefore has influence on our performance. This performance is also positively influenced by the support we get from the StartHub and StartLife, incubators of the University of Wageningen. They have a broad assortment of elements and tools (e.g., resources, experts, network, accommodation) that start-ups can use, and they assist academic start-ups in becoming successful companies. Many other start-ups also like to be linked to the university because it gives credibility, trust, and more value for investors. Nevertheless, there are also some difficulties within this broad assortment of assistance by the incubators. We also believe that it is sometimes preferred direct access with the professional or expert for specific questions. For instance, with help from an expert, less time is needed to develop a certain product. If there are no sales, this time is crucial to survive. However, it is currently a challenge to meet the right experts and/or professionals in the field. For instance, marketing / sales. We know that this expertise can be found more within other Universities like the Erasmus University in Rotterdam. It would help if we could connect to this incubator, or if their knowledge is also available at our incubator. We believe that incubators could work more closer together and learn from each other's policies. We would like to know what other incubation facilitators could offer us, compared to our own incubation facilitator.

Different university incubation facilitators in the Netherlands currently have their own approaches to support academic start-ups. However, it is not clear what all these facilitators are offering in their policies. This could mean that certain incubation facilitators not use the right policies for their academic startups or they struggle with certain problems which are solved at other incubation facilitators. Since, many incubation facilitators are funded with subsidies from the Dutch government, it is essential that all (University) incubation facilitators provide the best available services for their startups. A way for incubators to provide the best service could be by learning from other incubation facilitators to improve their own policies which in the end improves the performance of their startups. It might be interesting to

understand which elements are important for academic startups, and which tools would be most attractive for incubation facilitators and startups.

2. Problem statement

As mentioned within the introduction incubation facilitators could learn from each other's experiences and elements they use. Since not all policies from all university incubation facilitators in the Netherlands are known, it is possible that certain learnings about successful elements and / or tools could be shared. There is a gap in insights into which elements and / or tools from incubation facilitators are most attractive for academic startups and how they relate to their performance.

2.1 Objective

This research will gain insights into which elements and / or tools are most attractive for academic start-ups and university incubation facilitators in terms of performance. I compare best practices from university incubation facilitators by interviewing academic incubation facilitators and academic startups. It is important to include both perspectives, since an attractive method might be most attractive (perceived) for startups, but less attractive (perceived) for incubation facilitators.

2.2 Research question

In order to reach the objective, the following research question is set:

Which elements and / or tools are the most attractive for incubation facilitators and academic start-ups in terms of performance?

The sub-questions of this research are:
- *Which performance indicators, according to literature, are the most commonly used for academic start-ups and university incubation facilitators?*
- *Which elements and/ or tools according to literature, are most attractive for academic start-ups and university incubation facilitators?*
- *Which performance indicators are most attractive according to academic start-ups and university incubation facilitators?*
- *Which elements and / or tools are most attractive according to academic start-ups and university incubation facilitators?*

2.3 Relevance

Many incubation facilitators use different elements and tools. These elements and tools might be interesting for other incubation facilitators to learn from. Since the majority of these incubation facilitators are publicly financed, it is important to facilitate services that are valuable to academic start-ups. If certain elements and tools improve the performance of academic start-ups, more value can be added to economic growth.

2.4 Research framework

According to Doorewaard and Verschuren (2015), a research framework is important to determine the theoretical background of a study and shows how the research questions can be answered in a chronological way. This research focuses on three research variables: academic start-ups, university incubation facilitators, and their performance indicators. Figure 1 shows a framework of how this research will be conducted.
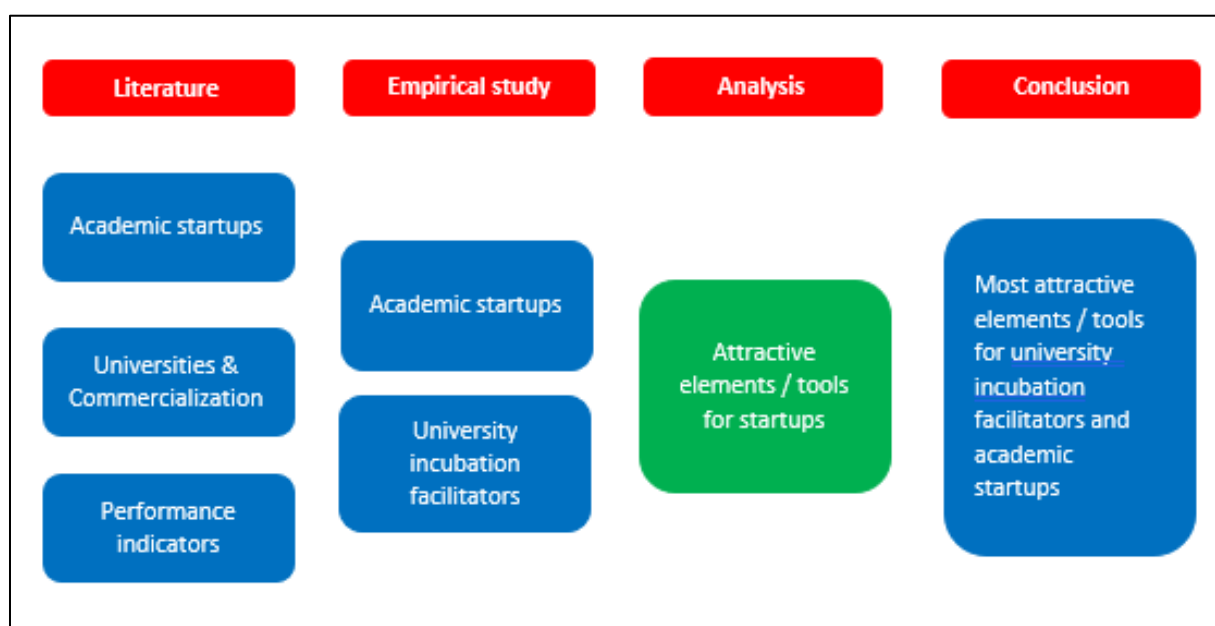
Figure 1: Research framework

First, a literature study was conducted to find out which elements or tools are most attractive for academic start-ups' performance. The first research subject is universities and commercialization. Many different universities are changing policies to stimulate academic start-ups and spinoffs. They do this with incubators, TTOs, and valorization centers. In this study, all these incubators are referred to as "incubation facilitators." The second variable

12

involves academic start-ups. Academic start-ups are companies that are attached to a university incubation facilitator. A literature study will explore their nature and their goals. In the empirical study, interviewees from start-ups will be asked about the most attractive elements and tools from incubation facilitators that influenced their performance. The last variable is the performance indicator. Academic start-ups and incubation facilitators might have different goals and different interpretations of performance. A literature study will be conducted to find performance indicators that might be the most important for incubation facilitators and academic start-ups. An empirical study can then verify or identify new performance indicators that are most important for academic start-ups and incubation facilitators.

3. Literature study

This literature study will contextualize academic start-ups, incubation facilitators, and their relations with performance indicators.

3.1 Academic startups & Incubation facilitators

According to "Bryan et al. (2017), an academic startup can be defined as a new company that evolves from academic research and is able to scale up by using resources of the University. Academic startups can basically be divided within two domains: spinoffs and startups. A spinoff represents an enterprise or company that is developed by former employees from parent organizations, which includes technology transfer from an academic institution. Within this research the focus lays on (academic) startups only. According to Lukes et al. (2018) academic startups can be supported in several ways, one of them is by incubation facilitators. Incubation facilitators support startups with several elements and tools like: "providing office space under favorable conditions, providing services like information technology, public relations, human resources, providing access to financial resources, providing tools like coaching / mentoring and training, and offer an internal and external network of expertise in all kind of fields, (i.e. accounting, legal and intellectual protection support), (Colombo and Delmastro, 2002; Phan et al., 2005). Incubation facilitators exist in five different types. Two of these types are public orientated, (University incubation facilitators and regional innovation centers), while the other three types are commercial driven. (Grimaldi and Grandi, 2005; Von Zedtwitz and Grimaldi, 2006) The main objective of those (public) incubation facilitators is to increase economic development and stimulate new innovative technology (Bergek and Norrman, 2008). In the last decades Incubation facilitators experienced many changes, for instance, while in the beginning, incubation facilitators focused on offering shared office spaces, nowadays more intention is given in providing services. For instance, Bruneel (2012.) showed that older business incubation facilitators should improve their services, use stricter selection criteria and introduce clear exit policies. However, little research is found why business incubation facilitators don't interact with each other to learn from their experiences.

3.2 Entrepreneurial obstacles of academic start-ups and incubators

Academic start-ups have many obstacles during their transitions toward becoming successful businesses. They often have a lack of knowledge in certain areas, and as mentioned before, the accessibility of resources is one of the most difficult obstacles that influence growth (Colombo and Piva, 2008; Galati et al., 2017). Rasmussen et al. (2011) reported that start-ups need a wide range of different resources and competences to create a successful company.

Lichtenstein and Brush (2001) separated resources into tangible and intangible resources that directly influence the growth of start-ups. Tangible resources can be described as organizational, infrastructure, technology, and organization planning, while intangible resources can be distinguished as employees, culture/identity, relationships, and decision-making. Start-ups often have a deficiency of financial resources, technology, and human resources. Other obstacles can also occur, like a deficiency of knowledge in "technology, management or commercialization, marketing, and management skills (sales, marketing, and customer base knowledge)" (Van Geenhuizen and Soetanto, 2009; Soetanto, 2010; Frencesco et al., 2017). According to Geenhuizen and Soetanto (2010), networking capabilities are an obstacle for academic start-ups. Within the growth phase of academic start-ups, interactions with equal partners are more intense, and there is a positive relation between these interactions and growth. According to Sorenson and Stuart (2001), the geographic area is also an important factor that influences growth. They state that investors are less willing to invest in companies with a greater geographical distance from their market and partners (Frencesco et al., 2017; Van Geenhuizen and Soetanto, 2010). Van Geenhuizen and Soetanto (2009) also state that "accommodation, infrastructures, and distance from important partners" influence potential growth from academic start-ups.

Also, incubation facilitators experience differences in the performance of their academic startup, despite their efforts. Luke et al. (2018), concluded that incubation facilitators could also have a negative impact on startups. For instance, he argues in line with Autio and Rinannikko (2016) the importance of milestones. He believes that incubation facilitators could limit startups entrepreneurial orientation, since these startups act in a supportive and safe environment, compared to the actual external competitive environment. Luke et al. (2018) also didn't found a clear relation between incubators had effect on the sales revenue on start-ups. He found more evidence that startups being involved with an incubator leads to a lower performance of the startup. He also believes that incubators should focus more on their selection methods that retain on performance measures. Luke et al (2018) states "*This should involve loose selection criteria for acceptance, and subsequent support would become more substantial only if the new venture met growth-related milestones.*" In line with In line with Coate et al. (2014) he believes that clear millstones could lead to the decision if public support should be limited. This will prohibit the incubator for the status "to safe" which were start-ups are likely to underperform. Luke et al. also stated that it could help to have stricter agreements with start-ups to define conditions when they have to leave their incubator facilitator.

3.3 Valorization, academic start-ups, and universities

Valorization is becoming more and more important for universities. In the last decade, the collaboration between private industries and universities has increased to support development in high technology-driven solutions (Kadlec & Blazek, 2015). Miner et al. (2001) stated that universities are very supportive of inventions and research. Universities have evolved in research capabilities to be more reactive to transfer technology toward existing industries that support economic growth and innovation. Slaughter and Leslie (1997) recognize that universities are an important asset for economic growth, but they add that technology transfer might also have difficulties, since private companies and universities have different goals. This raises the concern that commercial influences may end the norms of open science that were meant for national interest (Poyago-Theotoky, 2002; Nelson, 2001). This dilemma may have an important role in collaborations between universities and the technological industry. According to Sanchez (2003), an entrepreneurial start-up starts existing when an entrepreneur quits an organization to initiate a company. For instance, Oakey (1995) mentions two sources of technology-based companies. One source is based on high educational organizations, also called academic start-ups. The second source is based on larger firms, which are also called corporate start-ups. Both types have much in common; however, there are also some major differences. For instance, a university motivates academic start-ups to transfer their knowledge to the outside, while a private company would hold this information within its organization. Academic start-ups are usually based on technology or research. The founders of these academic start-ups are mostly engineers or scientists, and their competences are often focused on ideas and intellectual capital that is originated and gathered at universities (Shane, 2004; Wright et al., 2007; Heblich & Slavtchev, 2014). Additionally, they have minor knowledge about marketing and sales (Perez & Sanchez, 2002). Academic start-ups also tend to be more innovative by nature and therefore have more risk from the start. It is crucial to have access to intellectual capital (knowledge) and resources to improve their products or services. However, in practice, this can be difficult. For instance, academic start-ups frequently have a scarcity in financial resources and in entrepreneurial competences, which increases the risk of surviving starting a business (Lindholm Dahlstrand, 1999; Heblich & Slavtchev, 2014).

3.4 Successful valorization

According to Jongbloed (2012), successful valorization between universities and companies only works when there is a mutual interest. Valorization encompasses the private benefit and adds value to the public from the scientific domain (Slaughter & Leslie, 2001; Jongbloed, 2012). An important factor of valorization is the accessibility of resources and expertise. Jongbloed and Venniker (2001) found several examples that influence valorization of academic start-ups including access to sources of expertise and equipment, access to a source of relevant new research and problems, knowledge transfer between the public and industry, a channel between students and experiences with private research, and access to revenues. Valorization is important because industries can benefit from intellectual capital from universities' facilities and also from students as potential employees (Jongbloed, 2012). Furthermore, Heblich and Slavtchev (2014) found a positive relation between the knowledge that is available at the university (e.g., professor or expert) and the decision from the academic entrepreneur to stay near this same university. This seems to be an indicator that the social ties between researchers and academic start-ups are important. They also suggest that personal relationships and common background form a basis for loyalty that might be considered as a basis for global interactions. When the communication between universities and academic start-ups improves, it takes less effort to transfer new knowledge into the market. In this process, scientists from universities play an important role, so academic start-ups should have close linkages with these scientists and hire them more often (Heblich & Slavtchev, 2014). Audretsch et al. (2012) mentioned another positive side effect of valorization; when businesses (like academic-start-ups) have access to external knowledge (intellectual capital), it is more likely they will turn into higher profit organizations. O'Shea et al. (2005) stated that universities can play an important role in valorization by giving students knowledge to become highly qualified personnel and that economies that include highly advanced technology tend to have a better position in the marketplace to attract investment from multinational corporations. To obtain successful valorization, Clark (1998) defined five important elements. First, it is vital to have strong ties between universities and industries in research, where processes should have mutual benefits, like clear structures, policies, procedures, and successful activities. The second important element is a strong top-down leadership approach that motivates processes of academic entrepreneurship that coincide with values of traditional universities. A third element that is common for successful entrepreneurial institutions is financial resources from the industrial organizations through resources for universities that also derive from public agencies. Fourth, a strong academic base is required to retain intellectual capital that could be used for the start-up or to recruit experts out of a certain profession. A final element for

successful entrepreneurial institutions is its culture to sustain fundamental values for the institutions. According to Hoenen et al (2017), Dutch universities are less commercially driven than other countries; however, Dutch universities are also becoming more aware about the impact that they can make with valorization. For instance, the University of Wageningen places commercialization of intellectual capital as one of their main missions next to teaching and research. One way to increase valorization is with the support from start-ups. The researchers noticed that disruptive and radical innovations are most effectively reached by start-ups, since larger companies are less willing to invest in risky technologies. The University of Wageningen supports the incubator StartLife to assist students with entrepreneurial intentions or start-ups by offering coaching and workplaces. The results of this type of valorization are promising, since they have increased the agri-food innovation and reputation. For universities, it becomes interesting to assist start-ups within niche markets to ultimately create change in the market.

3.5.1 Performance measures for academic startups

To determine an academic start-up's success, it is important to understand what type of elements or tools influence its performance. To measure performance, Hiriyappa (2008) described multiple goals for a business: "profitability, productivity, efficiency, growth, technological, dynamism, stability, self-reliance, survival, competitive strength, customer services, financial solvency product, competitive strength, satisfaction, and welfare." A company tries to balance those objectives in a correct manner. Hiriyappa (2008) gives a list of the most important business objectives, which can be seen in Figure 2. In this part of the literature review, survival, growth, and profitability will be discussed, since these objectives are, according to Nerkar and Shane (2003), closely related with academic start-ups. Academic start-ups tend to have higher survival rates and be more profitable than regular start-ups, which is because of the available knowledge at universities.

Figure 2: Objectives of a business (Hiriyappa 2008)

Survival

The major goals of academic start-ups are survival and retaining market growth. Gartner et al. (1999) stated that an indicator of survival is the ability to survive a minimum of four years, and it should still have the status of in operation. Survival is dependent on the abilities of start-ups to recover from insolvency before terminating operations or being bankrupt, also explained as mortality risk (Shepherd et al., 2000). It should be noted that when a start-up is bankrupt, but operations are still in progress, the company is still mortal. For example, when potential academic start-ups are out of funds, they have a higher chance to attract capital from investors or business angels.

Nerkar and Shane (2003) found that the survival rate of academic start-ups is also influenced by the quality of the university and its entrepreneurial focus. Academic start-ups that were launched between 1980 and 2000, almost 68% were still operational in 2001, which is much higher than average start-ups. In addition, the survival rate is even higher at the high graded universities, where only 20% failed. They also found that academic start-ups are more profitable than average technology start-ups. Research of Blair and Hitchen (1998) also demonstrated that academic start-ups have a higher level of added value in sales than other technological companies.

Profitability and growth

According to Hiriyappa (2008), profitability is vital for the long-term objective of a company. It is the capability to continue in the long term by releasing an acceptable level of profit. Profitability is therefore an important motive of the business. Bercovitz and Mitchells (2007) defined profitability as "a measure of the flow of capital that a company can change into new stocks." It shows how successful a company is in creating resources. Profitability can be measured by return on sales, since they generate more resources. Profitability measures the success of a business and shows the willingness of customers to pay more than the cost of resources. In the definition of Delmar et al. (2013), profitability is defined as return on assets (ROA) and is strongly correlated with growth and survival rates. They found a positive relation between profitability and its influence on survival and growth. However, growth has a negative impact on survival while it has a strong effect on profitability. This suggests that enhanced operations increase profitability, while growth could also have a downside on risk. More operations lead to more uncertainty, which reduces the odds of survival.

Studies show different findings about the profitability of academic start-ups. Audretsch et al. (2012) argued that companies with access to external knowledge (intellectual capital) likely

turn into higher profit organizations. Since academic start-ups have access to external knowledge, they should be more profitable. This is in contrast with the results of Jongbloed (2012). He found that academic start-ups score less on performance (profitability and financial performance) than non-academics. He suggested that this might be caused by the type of businesses academic starts-ups are in, which are highly technological, since they can use the specific knowledge of universities. Performance of these companies is more uncertain, because they become more effective after the starting phase. Also, a lack of knowledge in general management could cause lower performance than with non-academic start-ups (Jongbloed, 2012).

Innovation

An interesting indicator that influences growth is the innovativeness of an academic start-up. Past research reveals a movement from innovation as an important influence on performance to more specific aspects of innovation that influence performance. As cited in Kleinschmidt and Cooper (1991), Schumpeter (1911) recognized that the concept of "entrepreneurship as innovator" has an important role in economic growth. When entrepreneurs do innovative activities, it creates opportunities and disrupts the economic system (Schumpeter, 1942). According to Kleinschmidt and Cooper (1991), product innovativeness has a consistent impact on new product performance. It also has a positive effect on the overall success of a company (determined with profitability). Geroski and Machin (1992) and Geroski et al. (1993) found that there is a positive relation between innovation and profit. A reason for this could be that innovators might have a better market position. It is likely that innovators can better protect their innovative product or service in a strong competitive market with patents and licensing. According to Roper (1997), innovation is important for small companies, since it has a direct impact in the competitive marketplace.

However, Leiponen (2000) noted that there are also some doubts in the relation between innovation and profitability. For instance, his research shows that profitability effects of innovation only relate to process innovation. This is in contrast with product innovation, where he found a negative relation with profitability. Leiponen (2000) also gives several other factors besides innovation that may be important to determine the profitability of a company, like educational competencies and technological capabilities. In addition, Peng and Love (2008) argued that the most profitable innovators are likely to have success because of their capabilities and competences. Recently, Baporikar (2015) stated that profitability is a driver for innovation. However, he also stated that innovation could be a strategy to survive in the

marketplace. Innovation can create new content, changes, and products to make sure customers will keep coming back.

3.5.2 Performance measures for incubation facilitators

According to Bruneel et al. (2012) incubation facilitators are tools to support and create successful companies. They are often publicly funded with the goal to simulate job and wealth creation. Siegel et al. (2003) stated that also technology transfer of universities (incubation facilitators) play a significant role in the *creation of new ventures*, *jobs* and *growth* from firms. Ratinho et al. (2009) adds a second goal which should provide academic startups an access to networks, providing needs, physical infrastructure, business support and related services. Research also shows that the lack of technology transfer of Universities is a limitation for academic start-ups. When there are not enough resources and knowledge available, (scientific, organizational and technical knowledge) the academic start-up will have a lower chance to survive (Lockett et al., (2005). By supporting startups with several kind of tools or elements like coaching, providing space, training or financial support, startups could improve their performance (Bruneel et al, 2012). Hanadi, & Busler (2012) found also other goals from incubation facilitators, like: "transfer technology, creating entrepreneurship awareness, and commercializing technology".

3.6 Theoretical framework

This research focuses on best practices from University incubators which, based on the literature study, create economic growth, jobs and stimulates innovation. Many universities around the world are supporting academics to start a company. Universities see the potential to earn profit from academic start-ups with licenses and patents, and governments urge them to invest in valorization. Therefore, university incubators support and offer several elements and tools to increase the performance and survival rates of an academic start-up. In figure 3.0 a theoretical framework has been made to clarify the subjects. According to theory, incubation facilitators offer several methods or elements to support academic startups. For instance, they provide access of knowledge, performance, the most important indicators are listed here. Frencesco et al. (2017) noted that many start-ups have a deficiency in knowledge. Within this framework providing access of knowledge contain the following elements: "coaching, training and teach entrepreneurial skills (like management skills) and provide technological knowledge to enhance their startups, product or services". Incubation facilitators could also offer access to resources. Both Clarck (1998) and Lichtenstein and Brush (2001) defined several sorts of resources. For instance, providing intangible or tangible assets, facilities, funding through business angels / capital investors, or technological resources in

form of expensive equipment. Incubation facilitators could also play a major role in human resources. This concerns support them finding the best qualitative people to increase the performance of academic startups. Finally, Delmastro, (2002) and Phan et al. (2005) found that incubation facilitator could support their startups with an internal and external network. When certain resources or information is not directly accessible, they could be referred to a network source from the incubation facilitator and help the startup further with their problem. All these indicators influence performance to a certain degree. To measure performance this research tries to find if goals can be met. Incubation facilitators have different goals then academic startups (Bruneel et al. 2012). Hanadi, & Busler (2012) found several goals for incubation facilitators: "Creating entrepreneurship awareness, transfer knowledge, (which is also referred to valorisation), increase survival of startups, and to support economic growth. According to Delmar et al. (2013), Leiponen (2000), and Jongbloed (2012), the performance of startups can be explained in growth, survival, innovation, profitability, and knowledge transfer. These indicators form a theoretical framework that is also shown in figure 3. Within this research, this framework has been used to find important elements / tools for academic startups that relate to the performance from academic startups and incubation facilitators based on three concepts, according "provide access to knowledge, provide access to resources, and provide access to a network.

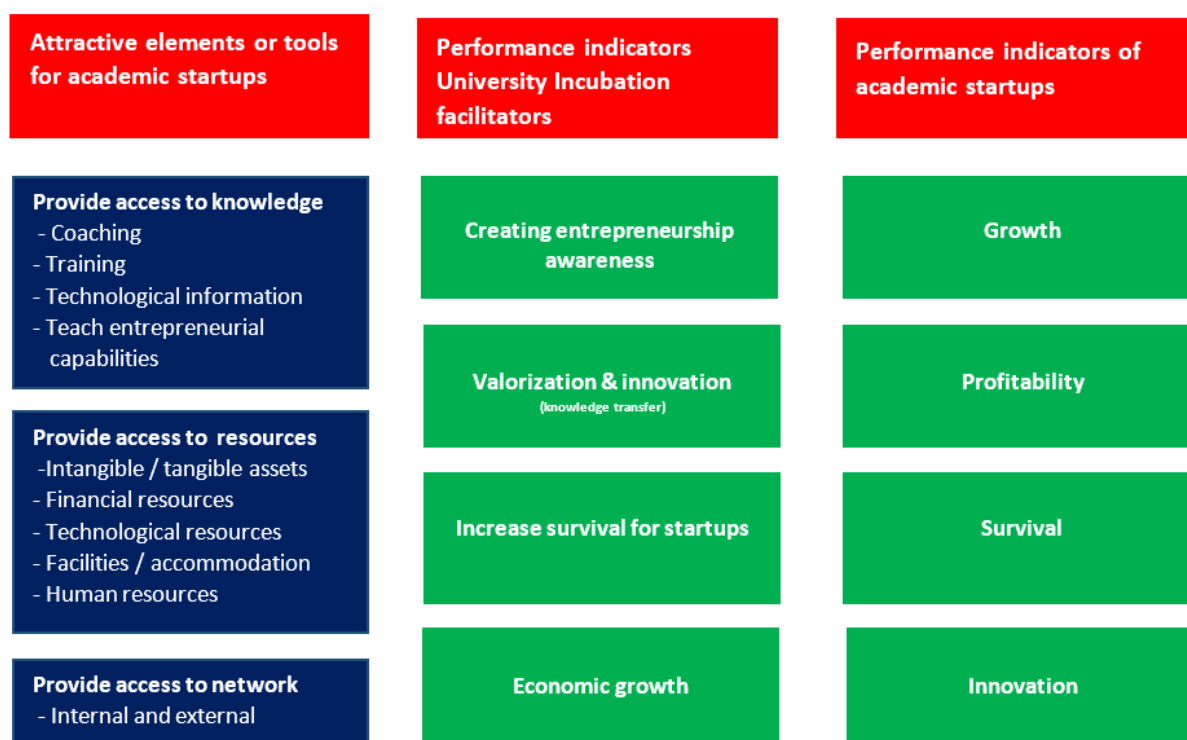| Attractive elements or tools for academic startups	Performance indicators University Incubation facilitators	Performance indicators of academic startups
Provide access to knowledge - Coaching - Training - Technological information - Teach entrepreneurial capabilities	Creating entrepreneurship awareness	Growth
Provide access to resources -Intangible / tangible assets - Financial resources - Technological resources - Facilities / accommodation - Human resources	Valorization & innovation (knowledge transfer)	Profitability
	Increase survival for startups	Survival
Provide access to network - Internal and external	Economic growth	Innovation

Figure 3: Theoretical framework

4. Methodology

This chapter elaborates on which elements have been used in this research and how data has been gathered. Research can be defined in a qualitative or quantitative manner (Blumberg, Cooper & Schindler, 2011). In this research only, a qualitative study has been conducted, since this research was explorative in nature. The purpose was to gain insights into current elements and / or tools that were used by incubation facilitators.

4.1 Research strategy

Verschuren and Doorewaard (2010) stated that the most important decision for a research methodology is a research strategy. They mentioned five different research strategies: survey, experiment, case study, theory approach, and a desk research strategy. Current research will be based on desk research and a single case study strategy with qualitative in-depth interviews. This research will also contribute to the literature about incubators, to what extend elements and tools influence the performance of academic startups.

4.1.1 Desk research

A desk research can be recognized by textual or audio/visual materials (Verschuren & Doorewaard, 2010). In this research, a literature study was conducted to get insights about incubation facilitators, academic start-ups, and performance indicators. This literature study was done by first finding information with certain keywords in the university library and other scientific libraries. The following keywords were used: valorization, technological transfer, commercialization of knowledge, entrepreneurial universities, performance, and academic start-ups. When all literature was found, all important paragraphs were highlighted. The most important information was used for this literature study to get a clear view of which indicators influence the performance of academic start-ups.

4.1.2 Multiple case study

A multiple case study focuses on multiple cases and is more in-depth (Verschuren & Doorewaard, 2010). With a qualitative approach, it is possible to get more information about each domain that should be explored. Since all university incubation facilitators have their own approach to support academic start-ups, in this research, in-depth interviews were used. A multi-stakeholder analysis was used, because it is possible that incubation facilitators might have a different view on academic start-ups than academic start-ups themselves. That is why both groups have been included in one research.

4.2 Sampling design

According to Blumberg et al. (2011), several approaches are important in a research design. A first approach is identifying a relevant population, which is important to get the right information for the research question. In this research, two groups were interviewed: academic start-ups and incubation facilitators. The first group that was interviewed are the managers of incubation facilitators from universities. It is assumed that they have the knowledge about what are currently the most attractive tools and elements in terms of performance. The selection criteria were that this incubation facilitator should be connected to a University in the Netherlands and should be a director / manager of this department. This was because they can elaborate more on why certain elements / tools were chosen. In total 12 Incubation facilitators could be identified that related to a University in the Netherlands. What should be mentioned is that one incubation facilitator (ACE) facilitated two Universities, accordingly the "University van Amsterdam and the Vrije Universiteit." The second group that were interviewed are founders of academic start-ups. The academic startup should be no older than 4 years and should be connected by a University incubation facilitator. Seven startups that were connected to the interviewed incubation facilitators were being asked to be interviewed. Their view may be different from incubation facilitators, and to prevent biased results, both groups are included.

4.3 Data Collection

As mentioned before, the data that was collected in this research is based on qualitative in-depth interviews. Interviews can be taken with several approaches (Blumberg et al., 2011). The first approach is a personal interview, which can be described as a two-way conversation that is initiated by the interviewer to obtain information from a participant. An advantage is that the information that has been given in personal interviews is more in detail than telephone or e-mail surveys. A disadvantage is costs that are involved for traveling.

The second approach is with telephone/skype interviewing. This approach is less costly and could save time. A disadvantage is that technical malfunctions can occur, like failing connections, which could lead to problems within the interview. In this research, both approaches were used. Since all universities are spread out over the Netherlands, several Skype phone calls were arranged. A overview from respondents can be found in table 1, paragraph 4.6.

4.4 Interview techniques

Several techniques were used to make sure that the quality of these interviews is valid. Most of the interviews were done with a Skype call. Unfortunately, not all interviews could be done

face-to-face, since it was expensive to reach all universities in the Netherlands. A Skype call still has the benefit that the participant can be seen by the interviewer.

Before a participant was interviewed, several steps were taken. The first step was getting as much information as possible about the participants. This was done by research on the internet but also by screening questions within a phone call from employees from the incubator. They transferred the researcher to the right person. The second step was sending an e-mail to the respondent with an explanation about the research to find out if they were the right person to talk with. The last step was making the appointment with the participant. The participants were selected based on function. They needed to be in a manager or director role at the incubation facilitator. When universities didn't have an incubator, the manager or director from a TTO or entrepreneurial office was asked to answer the interview.

During the interview, several techniques were used to get as much information as possible. The first technique is called *probing*. This technique stimulates participants to answer more broadly and with relevant answers to the research questions. A few examples of probing techniques are: (1) using expected pauses, with a head nod; (2) repeating the participant's reply, which could give some more time for the participant to add relevant information; (3) a brief affirmation to show interest and understanding of the topic; and (4) question clarification, when the answer is not clear or inconsistent with the research/interview question. Each interviewee provided more specific information that could be used to adjust the follow-up questions of the next interview. This may also affect the quality of the questions of the semi-structured interview but can include more specific interesting information.

Qualitative unstructured interviews usually contain much information that is hard to note. Therefore, all interviews were also recorded (audio only). This helped to make the transcriptions. When transcribing the interviews, it is recommended to transcribe only the relevant part of the interviews, since long interviews are very time consuming. All interviews will take circa 30 – 60 minutes of recording, depending on the respondent. A table listing all participants who were interviewed in this research can be found in Attachment IV.

4.5 Content analysis

In this research, a content analysis was used to analyze the interviews. According to Blumberg et al. (2011), a content analysis is "a technique based on the manual or automated coding of transcripts, documents, articles, or even audio and video material." The goal is to eliminate or

reduce information that is irrelevant for the research question. With coding, qualitative data from the transcripts of the interviews can be translated to categories and coding labels. Blumberg et al. (2011) noted the following list of questions that can help within the coding process:

- *What is going on?*
- *What are the involved actors doing?*
- *What are the actors saying?*
- *What is taken for granted?*
- *What is a structure of actors, statements, and actions?*

In this research, a computer program called Atlas.ti was used to structure the dataset. This program offers tools to write memos, notes, and coding and provides an easy search function to find specific words. The program also includes a coding function in which words can be categorized. With Atlas.ti, these words can be analyzed in a quantitative manner (i.e., how many words can be counted in a certain topic). The assumption is that when something is important, a participant will use these words more often.

The coding structure was done according to the Gioia methodology, which has three steps. First, all information was categorized into paragraphs (data ordering) about certain topics. All data was read and structured with labels; for instance, paragraphs about teams will be labeled as TEAM. The second step was finding certain similarities between the respondents. For instance, all interviews were compared with the same label. Also, all labels were counted. When a certain label is often found, this might be a more important indicator then other label. Third, the labels and/or indicators were analyzed. For instance, with the example of TEAM, differences and similarities were compared to make conclusions out of this. The last step is finding the right dimensions out of these phases. A summary was written to make correct statements. In Appendix V, a USB is found with all interviews and coding results. These are also elaborated on in the results section, including the atlas.ti files.

4.6 Validity, reliability and sample

According to Blumberg et al. (2011), validity can be explained as the extent to which a researcher actually measures what he wants to measure. Validity can be separated into external and internal validity. External validity "refers to the data's ability to be generalized across persons, settings, and times", while internal validity is about the ability of a research instrument to measure what it is supposed to measure. In this research, two groups with a total of eighteen different participants (see in table 1.0) were interviewed to get reliable insights into

the most attractive tools and/or elements that influence the performance from academic start-ups and university incubation facilitators. Since there are two groups, there will most likely be different opinions. If there is congruence in answers, this might strengthen the outcome (Schiele andKrummaker,2011).

Table 1 Subjects for research questions

Respondent	Time	Location	During interview
Startup Delft	30 – 11- 2017	Delft	~ 50 min
Startup Delft II met programma	13 – 04- 2018	Delft	~ 45 min
Startup Groningen	26 – 03 -2018	Groningen	~ 30 min
Startup Rotterdam	5 – 12 -2017	Rotterdam	~ 30 min
Startup Utrecht	1 – 03-2018	Utrecht	~ 40 min
Startup Twente	20 – 04 – 2018	Twente	~ 40 min
Startup Tilburg	06-11-2017	Tilburg	~ 40 min

Respondent	Time	Location	During interview
Erik Boer	21 - 2017	Incubator Amsterdam ACE (VU + UVA)	~ 50 min
Sjoerd Louwaars	12-03-2018	Incubator Leiden Hubspot	~ 30 min
Mike Verkouter	10 – 05 -2017	Incubator Twente NovelT	~ 30 min
Pepeijn Duyvenstein		Incubator Delft Yes!Delft	~ 50 min
Rob Groenendaal	19-12-2017	Incubator Nijmegen Radboud Innovation	~ 45 min
Robert Al	15-11-2017	Incubator Eindhoven StartupEindhoven	~ 110 min
Thomas van der Boezem	15-03-2018	Incubator Wageningen Startlife	~ 50 min
Aniek Ouendag,. Acting for: Prof. Groen	Maand mei 2017 specifieke datum niet meer bekend	Incubator Groningen StartupCity	~30 min
Jaspar Casey	28 – 17 -2017	Entrepr. Maastricht mc4e	~30 min
Chris Eveleens (PHD) Acting for Utrecht.inc Ruben Brands	13-10-2017	Incubator Utrecht Utrecht Inc.	~ 50 min
Karen Lanning	13-11-2017	Incubator Tilburg Starterslift	~50 min
Rotterdam Martin v. Luxemburg	27 – 11 – 2017	Incubator Rotterdam ECE	~50 min

Note: For publication please remove names

The external validity in this research is dependent on the person who is being interviewed. For example, when a participant has less experience within its own profession, the information

may be biased. In addition, motivations and regulations of universities may be diverse, which makes it difficult to compare the results. Blumberg et al. (2011) stated that reliability is about "the characteristic of a measurement concerned with accuracy, precision, consistency." In this research, multiple interviews were gathered; however, this information could be less reliable since this information is not static. To increase reliability, certain interview techniques were applied to receive quality information. The respondents were also asked to give certain examples to bring more context to the answers.

5. Results

In this chapter, several outcomes will be discussed. In Section 5.1, the findings of the interviews will be reviewed, and Subsection 5.1.2 discusses the elements and/or tools that are most attractive for academic start-ups and incubators. In Subsection 5.1.3, the performance will be discussed, and also which elements or tools did in fact have an impact on start-ups, and finally, other interesting findings will be discussed. In the results, not only elements and/or tools will be described but also certain factors that had a major impact on these tools and/or elements.

The interviews were conducted with managers or directors from twelve incubation facilitators and founders of seven start-ups. The interviews were analyzed on how performance is related to three different factors: accessibility of knowledge, accessibility of resources, and network capabilities. In this chapter, all factors will be explained further.

5.1 Accessibility of knowledge

All interviews proved that knowledge transfer is an important aspect of the performance of an academic start-up. Within these interviews, knowledge seemed to be gathered specifically from two forms of networks, internal and external. A participant from the incubation facilitator of Tilburg said:

"*We have experts in the work field, and we have experts on the university. For example, expertise about marketing. It is easier to contact experts in the normal world, so therefore it is more likely that we contact them.*"

The internal network can be defined as experts or coaches that are employed within the incubation facilitator or the universities. An external network can be identified as experts, professors, coaches, or investors who are indirectly connected to the incubation facilitators. They often work as independent entrepreneurs or in a company and can be accessed or hired on demand. As participants from the incubation facilitators of Leiden and Wageningen stated:

Incubation facilitator from the University of Leiden:
"We have a group of experts, lawyers, financial expertise, marketing experts, communication experts, all this sort of themes. They are usually known from a mix of people that we know by ourselves or that we have trained in recent years."

Incubation facilitator from the University of Wageningen:

"The incubation program offers a soft loan, for a piece of working capital, we offer a coach for strategy or business development, or we try to help finding the right partners / partnerships."
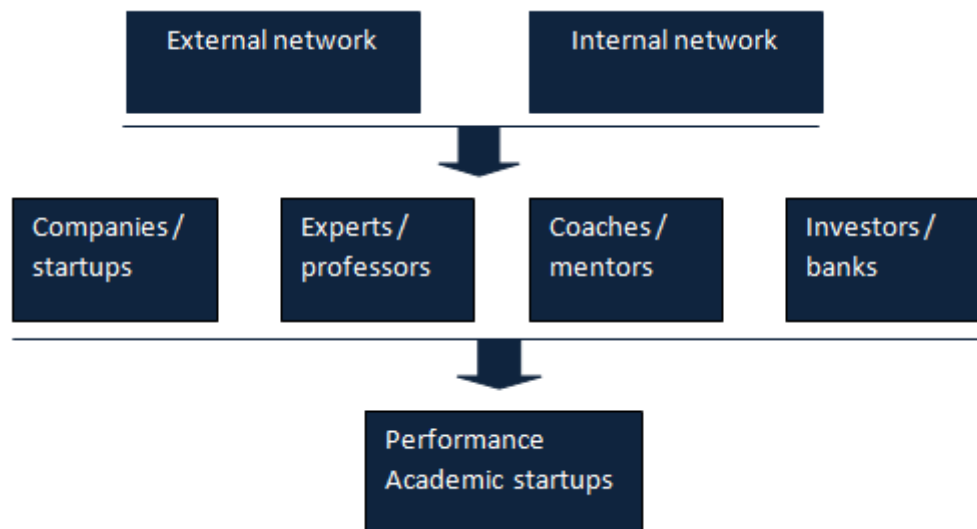

Figure 4: Internal and external network of incubation facilitators

5.1.1 Knowledge exchange (internal network)

An internal network is closely attached with incubation facilitators. In this subsection, the most attractive elements, factors, and/or tools of academic start-ups and incubation facilitators in terms of performance relating to knowledge will be discussed. Figure 4 shows these types of network in a clear way.

Coaches and mentors

In all interviews, the theme of "internal accessibility" could be identified 108 times. The most identified source of information within an internal network was coaches (36), probably because getting the business expertise of a coach or mentor is usually free. Academic start-ups and university incubation facilitators state that many start-ups make use of this expertise, since they often lack the experience and knowledge to actually sell their products or services. Coaches and mentors are usually chosen by the start-up with speed dating or matchmaking. When there is a match, a coach offers workshops, training, and individual feedback moments that reflect on the processes of the start-ups. It is also important for start-ups to be coachable. It improves the survival rate as long the start-up listens to the coaches' advice. A participant

from the incubation facilitator of Amsterdam stated this about influences for performance for academic start-ups:

"One of the most important factors is if the entrepreneur is coachable, if the start-up listens to the advice of others. That does not mean that an entrepreneur has to do what others say, but that entrepreneurs make decisions based on given advice combined with their own judgement."

This is usually hard to measure and is often evaluated from experience with this startup. Close interaction with the startup is essential to steer the startup in the right direction. More research should be done to avoid uncoachable behavior.

<u>Professors and experts</u>

Academic start-ups also tend to contact professors or experts to improve their products or services. The intensity of the collaboration depends on the type of start-up; it tends to be more intensive when the academic start-up is more technological or scientific in nature. The position of the professor in this collaboration can differ; sometimes, the professor is a shareholder, and at other times, he is involved on an advisory board. Overall, professors usually help academic start-ups with their questions. A technological startup states:

"professors think very theoretical. They can give you decent help you how to design your product, but not how you have to integrate your business"

Unfortunately, not all professors are open to this type of meeting. Incubation facilitators and academic start-ups argue that this is probably because a typical researcher does not have an entrepreneurial mindset. According to one participant from a technical start-up, professors could be induced to help by providing them free access to data of new populations or by giving a certain service, like giving training or guest lectures. A startup in Rotterdam states:

"Access to professors depends, usually it works with cooperation. This can be very easy, if they help me with certain expertise, I can help them with giving a certain test population. You always have to think: "what is important for the professor". Commonly this is generation of data and population. This can have a high value for a professor, and that can give them enough reason to cooperate. "

Another issue illustrated in the interviews is that some academic start-ups do not even start a collaboration, because it takes too much time to get an appointment. A startup in Tilburg stated:

"It would be better if professors could be accessed easier, but Universities are very bureaucratic, if you have to contact a professor following the original route, it takes far too much time; You can better call them yourself "

According to the incubation facilitators, the relation between accessibility to the knowledge of professors and/or researchers and the performance of academic start-ups or incubation facilitators is not clear. It seems that if academic start-ups had a collaboration with professors, they profited the most from getting insights into certain specific topics. It reduces time in comparison to do their own research, it gives often new insights, and there is a higher rate of valorization.

Other experts

A few incubation facilitators from all respondents (technical and non – technical Universities) have their own panel of expertise within the organization. These experts are employed because their knowledge is frequently needed. An example is legal knowledge or knowledge to deal with intellectual property. The academic start-up is able to use this expert for a reduced price. The incubation facilitator of Eindhoven stated:

"We have a business consultant from our self, they support startups with all kind of issues, and we have a few jurists a board. But they are very strict when a startup is not from the University, but they offer their service for free"

5.1.2 Knowledge exchange (external network)
Besides the internal network, there is an external network, people who are indirectly connected to the incubation facilitators. The theme "knowledge exchange from experts" in an external network was identified fifteen times in the interviews. The following experts were mentioned: *external* coaches from the academic startups, communication advisors, intellectual property experts, resource experts, investors, jurists, professors from other universities, other incubation facilitators, banking / insuring advisors, other start-ups, experienced entrepreneurs, and subsidy advisors. Academic start-ups also have their own expertise networks like friends, family, or acquaintances. According to participants from several start-ups, the impact from expertise depends on the phase the start-up is in. For instance, one person from an academic start-up stated that when a product is still in development, more questions could be asked

about the design of the product, while later on, the expertise of a lawyer may be more important for an academic start-up to decide which corporate structure should be applied.

The interviews show that experts influence some part of performance, but this is often difficult to measure. Using experts reduces time in comparison to doing their own research, and as an interviewee from an academic start-up in Utrecht mentioned, it can be more profitable when a certain expert or coach challenges the start-up with higher targets.

5.1.3 Workshops and training (internal and external networks)

Especially in the initial phase of an academic start-up, workshops and training are important. These are usually given by an expert or a coach from the internal or external network from the incubation facilitator. Workshops and training could be a part of a pre-seed program, which is commonly a full-time program for academic start-ups. The goal is to provide start-ups certain skills and knowledge, like negotiation techniques, marketing, road mapping, intellectual property, website optimization, venture financing, sales, and validation of a product (lean start-up approach).

In the interviews, none of the respondents mentioned a clear relation between workshops and training and performance indicators of academic start-ups. This doesn't mean that these workshops and trainings did not have an effect. Within this research only hard performance indicators were chosen, since they were mentioned the most often. Several interviewed start-ups have followed these workshops and found them useful, however, they did not find a direct relation what effect this had on their perceived performance after this workshop or training. It seems that it really depends on when this skill is needed and in what ways it will be used.

5.2 Accessibility of resources

Accessibility of resources is divided into three different factors: financial resources, which could be identified (28) times, human resources that could be identified 131 times, and accessibility of facilities, which could be identified (20) times.

5.2.1 Financial resources

The accessibility of financial resources was identified (28) times in the interviews. Within this research two types of academic startups can be identified. One type is a typical academic startup. These startups have an idea, but don't need many researches to complete their product. On the other hand, a (academic) technological startup like a startup from the

University in Delft, (which develops a new hyperloop train) and a startup that was focused on "food based on DNA" has different needs. In this research financial resources seem to be more important for these technical startups than for regular academic start-ups. Another reason why financial resource are important is because well-trained personnel are expensive, and financial funds are then important for survival. Several sources of financial resources can be identified based on the interviews: capital investors and business angels; loans, fund foundations, and subsidiaries; family, friends, and personal capital; and customers. Many incubation facilitators offer their services for free.

Capital investors and business angels

Almost all incubation facilitators mentioned in the interviews that they offer a funding option (internal and/or external). They have a broad network and are closely connected with capital investors or funding foundations such as Lfund, Brightmove, Waterlanden, and Oost NV. When an academic start-up needs financial resources, they will be brought in contact with a venture capitalist or a business angel. That is why investors can play a major role in the performance of academic start-ups. It seems that academic start-ups that are more (high) technological from nature are more dependent on financial resources, and therefore, investors also influence their survival rate. This will be even more enforced since an investor will provide, for example, advice or workshops for free to improve the performance of an academic start-up, because he benefits from a profitable start-up. Interviews show that incubation facilitators also have their own business angels' network; however, they are much harder to find and are usually accessed from a known (personal) network. As the University incubation facilitator of Eindhoven stated:

"We do know all investors, but we know important players that can help us connecting to the right investor, Business angels are much more difficult to reach, since they are usually not making themselves very visible. They hare much harder to get in touch with and that means that we should be more creative to find them"

Some academic start-ups also confirm that an internal network is an important factor to find business angels or individual investors.

Loans, fund foundations, and subsidiaries

Interviews show that many incubation facilitators offer academic start-ups a loan under favorable conditions, such as lower interest, longer repayment terms when the start-up fails, a

total remission of the loan, or a certain number of shares. These loans are typically maximized with a budget of €300.000. Incubation facilitators that are connected with a technical university can also make use of another special fund, called innovation industries. This fund was initiated by the European government and several investor foundations. In the Netherlands, four technical universities are connected to this foundation with a maximum budget of five million euro.

In the interviews, participants from academic start-ups and an incubation facilitator mentioned that the start-ups can also use a special innovation subsidiary fund. The government further supports subsidiaries for highly innovative products/services. Some incubation facilitators are personally connected with the Rijksdienst voor Ondernemers (RVO), a service from the government to give innovation loans. An academic start-up from Rotterdam has used this loan, which was important since it was their last financial resource to survive as he stated:

"At first I had a family friends fund from 115.000 euro, but on the end of sept 2015 the money was already spend. One a certain moment we came in contact with Eurostar. This is European money. We did a proposal to use this money to do research in pancreatic cancer. How can you use genetic markers for patience for personalized care? Well this project is now working, and on this way the subsidiary for the RVO saved the startup."

Family, friends, and personal capital

According to many incubation facilitators, financial resources like investors, loans, and funds are important, but there are also other financial sources. As was said several times, "*a real entrepreneur can also survive without fund foundations.*" For instance, they can pre-sell their products to customers or investors. In practice, many founders of academic start-ups used capital like their own personal savings from previous work or capital from friends and family. According to an interviewee from a specific academic technical start-up, it is a possibility, but it gives a lot of stress:

"*The last couple of years were mentally very tough because friends and family are aware if you can pay them back. You are always scared that you cannot deliver. This feeling is less when you have a professional investor behind you.*"

Stress is a common factor for academic start-ups when funding is not available. Surviving by seeking capital or customers is then a top priority.

Customers

Interviews show that the most attractive way to get financial funding is from customers. According to a start-up from Utrecht, it was sometimes hard to pressure itself to get the first customers. A coach can help in this process. When capital is really a problem, customers are even more of a priority. It is therefore important to stay in close contact with customers. Incubation facilitators help startups with getting their first customers by their own network. For instance, a startup at the University of Delft stated:

"A partner from Yes!Delft is Bam, and I know that another startup that YES!Delft connected Bam as first customer for them"

Within this quote the network of incubation facilitators could also be a network full of potential customers for startups. 2

5.2.2 Human resources

Human resources are a very important factor for the performance of an academic start-up. The interviews show there is an overall consensus that having the right team is important and often recognized as the most important aspect of an academic start-up; it was identified 131 times in all interviews. A team needs to have the right attitude, motivation, entrepreneurial mindset, and skills. It also should be diverse. A participant from a university incubation facilitator said:

"*You want to have a perfect mix, with someone that is adventurous and someone that is more into the product development and perhaps less extroverted. We facilitate this with a group of students where one comes from life science technology, one from technical physics, and one with a political background. That is the triangle you want to make. And that is what we stimulate, and of course, that is easier for us since all programs at the university are interdisciplinary by nature.*"

Based on the interviews, incubation facilitators differ in their policies for forming teams. A few incubation facilities have a clear policy, while others don´t. For instance, several university incubation facilitators have a database with vacancies where academic start-ups can select qualified employees. Another tool that is often used to form teams is matchmaking. Periodically, students who are interested in an internship or assignment can meet start-ups. They can work together, and if the intern did well, he can join the team. A last method mentioned by university incubation facilitators in the interviews is having a team assessment service. This is usually done in the second or third stage of a startup were the team is already more experienced. In the first stage this is done within the selection from academic startups.

This can be done by the incubator itself or by an external HRM company. As the participant from the incubation facilitator of Delft said:

"At first, we do this ourselves. We are in favor of self-assessments, discuss the results, and then we know if this team is professional enough or not. In the meantime, a professional HRM company is also assessing this team. And if there is not enough expertise in the team, then we offer a website with vacancies with students and a professional vacancy network. We deliver the tools. We are not a recruitment company."

Not many incubation facilitators focus on team assessments, however they recognize the importance of a good team. The incubation facilitator usually accesses the startup in the start on motivation, work experience, and student background. For instance, the University incubator of Amsterdam uses Matchmaking.

"One of our activities is student matchmaking. We have a few courses for different education programs, that have agreements were students can work for startups. For example, students can do marketing assignments, or programming assignments for these startups. It is possible to connect these students for a couple of months to a certain startup. This is one way to recruit students to startups"

5.2.3 Accessibility of facilities

Interviews reveal that most incubation facilitators offer office space with favorable prices. They are often located near a university and have a shared kitchen and/or meeting place. When a start-up just begins, it can start as a flex station. This is usually free for students or alumni. External people can rent a flex station or desk for a reduced price. When all academic start-ups are located near each other, they can share workshops and training together, and it has influence on the image of a university as entrepreneurial start-up.

Interviewees from five of seven academic start-ups mentioned the importance of the geographic coverage from these incubation facilitators. The building needs to be close to customers and investors, but it should also have a professional (high tech) and open environment to make a better impression on customers and investors. Two startups found geographic coverage and location less important. A startup in Groningen stated:

"It is important that people have a place for business meetings, and location is important, it is a part of your business identity."

A startup from Utrecht adds to that:

"The incubation facilitator gave us more credibility by our customers (other Universities and professors)."

Other physical resources that are used are workshops and laboratories from universities. This seems to be more important for technical start-ups. Two technical academic start-ups have used laboratories or the workshop from the university. They also indicated that this was important for their survival, since it was very expensive to buy their own equipment. There was no relation found between hiring a unit / desk at the university and survival. A startup from Rotterdam stated:

One of the most important services from incubators to startups are giving access to a laboratory and lab services. It is hard to finance them by yourself, and it is very nice if an incubator can give you access to a service lab. For a lot of people in these service labs, you are not a priority. It is nice that an incubation could facilitate this.

5.3 Network capabilities

Network capability is about interacting with the right people to get the right knowledge and expertise and connect to potential customers. It is a strong asset from incubation facilitators but is also important for academic start-ups. An interviewee from an incubator in Rotterdam even argued that when a start-up fails, it probably didn't use enough of its network. "Network" was identified 137 times in all interviews. Using their network is one of the most important factors for entrepreneurs and the survival and profitability of their start-up.

5.3.1 Network capabilities at start-ups

Almost all start-ups stated that the usage of their network depends on in which phase the start-up is. At the orientation and validation phase, much research will be done. This means interacting with potential customers, experts in the field, and maybe potential investors. This increases the variety of interactions within their network. However, in the building phase, which usually means developing a prototype, there will be less interaction. According to a participant from an academic (technical) start-up, the network has major influences on the survival odds of the start-up. He said:

"The challenge of your start-up is to survive. The chance to succeed will increase when a start-up survives the first three years. One important factor is network. In three years, you get acquainted with so many people that this will increase the odds to succeed."

This shows that the interaction of an academic start-up with its network is crucial to survive. This network usually includes potential investors, customers, coaches, experts, and employees.

5.3.2 Network capabilities at incubation facilitators
Interviews show that incubation facilitators can make a difference in the performance of an academic start-up with their network. They commonly have a large extended external network, for instance a diversity of experts, coaches, professors, researchers, banks, insurance companies, capital investors, business angels, study associations, facility managers of universities, funding foundations, governmental institutions, corporations, smaller businesses, potential employees, and start-ups. Academic startups can ask to Incubation facilitators certain questions, for getting the right support, influencing growth, creating turnover, learning entrepreneurial skills, and reducing the time to react in the market. An interviewee from one incubator said:

"I think that it helps start-ups to react faster. I think also that access from the network is a serious core value of an incubator."

Incubators mention that a broad network is an important asset. However, some incubation facilitators don't collaborate with other University incubation facilitators to share their network While incubation facilitators see the potential of sharing a broad network, there are also some boundaries.

For example, a person from one of the incubation facilitators mentioned difficulties for sharing their network with other incubation facilitators because they are in a competitive environment. He said:

"*It is a competitive market. If you make it more transparent, then a lot of competitors are looking over your shoulder. I know at least some start-ups that don't like to work that way. You don't want to share the successes and the financing of several start-ups. It happens. A start-up starts at our incubator, and then the good people leave to another incubator. That is not optimal.*"

However, most of the university incubation facilitators don't feel the same, and they even see

it as an opportunity. More university incubation facilitators think that they could interact more closely with others, as another interviewee said:

"It's not about the incubator but about the start-up. More cooperation between university incubation facilitators could lead to better performance of start-ups. For instance, I can imagine if a start-up is signing up at our incubator, that we might think, 'this start-up could, regarding its topic, better be served in Wageningen.' Then I call my colleague in Wageningen and tell him, 'We have a nice start-up for you,' and vice versa."

Interviews show that the problem is that it often takes too much time to interact with other incubation facilitators and they often do not have this time. However, there is consensus about the intention to share information and networks between university) incubation facilitators. An interviewee from a university incubation facilitator said:

"*Cooperation between incubators is absolutely necessary, but we weren't focused on this. We don't meet each other that often, not that it's a disinterest, but we are currently working on our start-ups. I rather have our start-ups joining a high-tech acceleration program in Eindhoven, if they have a better chance than here in our regular program. The start-up will be much better. They have the knowledge and expertise, so that exchange should be there. Everyone wants the best for their own start-ups, but we don't have the time to refer to another incubator."*

All start-ups that were interviewed see the potential when incubators share their networks with each other, since a broader network might enhance their odds of survival and improve their profitability.

5.3.3 Network and geographical aspects

Interviews reveal that the level of network capabilities is also influenced by geographical coverage. According to academic start-ups geographic coverage could be important since they need to be close to their customers. An example is that a start-up in Groningen has some difficulties finding right partners and customers because of the distance to the center of the Netherlands. Further an incubation facilitator states that being close to other facilities, partners and other incubators is important; the distance to a partner incubation facilitator might be a barrier for a start-up in costs or valuable time.

5.4 Performance of universities and academic start-ups

In this research, the performance of two actors was studied: university incubation facilitators and academic start-ups. Those actors were asked which performance indicators were important for academic startups, and to what extend these tools and elements related to these performance indicators.

5.4.1 University incubation facilitators and performance

The performance of university incubation facilitators can be measured by several indicators, accordingly: "creating entrepreneurial awareness, knowledge transfer (valorization), increase survival odds for startups, and economic growth". These interviews reveal that incubation facilitators indeed can be identified with these goals. Goals that were formulated by incubation facilitators were: like stimulating entrepreneurship, teaching entrepreneurial skills, creating awareness, image building / awareness for universities, generating growth for start-ups, creating certain turnover for start-ups, connecting a start-up with an investor / stimulating valorization, and supporting innovation. The importance of knowledge transfer is clearly reflected in the goals of incubation facilitators. What also should be mentioned is that many incubation facilitators do make some form of profit. For instance, they often work with a success fee: when an academic start-up makes a certain amount of profit or turnover, they need to pay a small percentage of this back to their incubation facilitator. In some cases, incubation facilitators offer their services also to external businesses and/or corporations. The advantage is that they can make profit out of workshops, training, and sharing certain expertise. However, academic start-ups are commonly low in resources, so startups prefer to pay a success fee in the end or give workshops or training in return like workshops or coaching.

5.4.2 Academic start-ups and performance

Academic start-ups can be differentiated into technological and non-technological start-ups, and they often have different needs and different goals. In general, academic start-ups formulate the following goals: making volume / growth / revenue / turnover, having fun, surviving, creating networks, and having customers. These goals reflect almost all aspects of performance, namely growth, survival, profitability, and knowledge transfer.

5.4.3 Most attractive elements and / or tools

According to ten respondents, assembling the right team is the most important factor that influences the performance of academic start-ups. A participant from an incubation facilitator stated:

"In the end, the people have to make it work."

He explained that within a team, not only the motivation and attitude are important but also the diversity of the team. An academic start-up needs someone with expertise about the sector, someone who can do public relations, and someone who can do the financial calculations. Currently many startups choose their team based on experiences from events or projects they had done together at the University, they were usually class mates with an idea. Some startups choose their team and select friends they know. A disadvantage is that these teams are less diverse, since they commonly had the same education in the same discipline. Incubation facilitators offer different tools to get the winning team. For instance, they offer internships or match making events for students from diverse backgrounds and offer these to startups. They also organize entrepreneurial (student) courses that combine different disciplines of education and let them work on certain entrepreneurial projects. Which is interesting to note is that less effort was done to take assessments within this recruitment tool. More research should be done to find out if this would make a difference to assemble the winning team.

The second important tool and/or method according to the respondents is the network (named by six respondents). Which people you need from the internal or external network depends on the phase an academic start-up. A custom-made program for each start-up is therefore the most appropriate, although not realistic for many incubation facilitators and academic start-ups, since it is too expensive. The access to coaching and experts seems to be a very important factor for academic start-ups. Many of these start-ups do not have any knowledge of to bring the product to the market, and a coach or expert can support them with this issue. A variety of experts are useful if not too expensive. When an academic start-up has gathered its own network and customers, the network of an incubation facilitator will be less important.

5.4.4 Other attractive tools and/or elements according to the respondents

The answers of the other respondents differ. They mentioned several attractive elements together, including selection procedure and pre-seed program as attractive tools and/or elements that influence the performance of an academic start-up.

Selection procedure

Most incubation facilitators have a selection process before they support academic start-ups. Since a university incubation facilitator needs to invest in resources, they better focus on high-potential academic start-ups. One Incubation facilitator stated about selection criteria:

"We should be convinced that there is market for their service / product, the presenter should be convincedly present about his / her product or service. The entrepreneur should have a large degree of initiative capabilities, perseverance. His idea should be scalable, the entrepreneur should be willing to listen, (coachable), and if he wants to use / hire our facilities."
Next to this he should have a concept business plan"

The academic start-up can usually pitch their idea in front of a jury, which can be made up of, depending on the subject, coaches, mentors, investors, and/or certain experts. Some incubation facilitators are stricter than others, but overall, the following criteria could be a requirement to enter an incubation facilitator program: full-time commitment, a clear business plan, scalable / viable business model, technical or innovative idea, a link to a university, specific topics or themes, entrepreneurial skills, motivation and ambition, a curriculum vitae, and long-term planning. Some Incubation facilitators ask a startup to pitch their idea in front of several experts, like business angels, coaches, investors, and entrepreneurs themselves. In my research I didn't find evidence that they do this according to a checklist or a validated assessment. It seems that this is more based on experiences from this selection team. However, some incubation facilitators are stricter and decide to test certain academic startups by asking already feedback from potential customers. Usually, the incubation facilitator will select a certain variety of academic start-ups to invest in. After they have successfully ended the selection procedure, they can enter the incubation or pre-seed program.

Pre-seed program
According to a respondent from an incubation facilitator, not all incubation facilitators have a pre-seed program. Some incubation facilitators work closely with other incubation facilitators to offer this as a service to their academic start-ups. A pre-seed program regularly consists of three or four phases. The first phase is the orientation or discovery phase; this phase is to discover how the idea could fit the market. Some incubation facilitators bring students from different disciplines that are interested in entrepreneurship together and form teams to brainstorm about an innovative idea, while other incubation facilitators only select start-ups that already have an idea on paper. According to a participant from an incubation facilitator, academic start-ups can have two approaches in the first phase. The first approach is finding a solution for an existing problem in the market. The other approach is that people create a product or service without validating the market fit and adjust their business case to it, which

usually happens to technical start-ups. The first phase, which generally takes two to four weekss commonly consists of a full program with training, coaching, workshops, approaching potential customers, and master classes about value proposition canvas, sales, marketing, development, venture financing, road mapping, intellectual property, website optimization, and the lean start-up approach (minimal viable product).

The second phase is more intense, takes five to ten weeks, and is called the validation phase. This is a phase to validate the product market fit, and the goal is to find potential customers. An exception for this can be made with medical and biotechnical solutions, which often have a long testing process. The second phase usually ends with a pitch, which can result in getting funding for the next phase.

The third phase is the prototype phase, which is basically a proof of concept that validates the actual need of the customers. This prototype doesn't have to be 100% completed. An interviewee from a university incubation facilitator explained that if 70% of the product satisfies demands but some functions are not yet available, the product can be brought to the market with a new edition later.

The last phase is the pre-launch phase, which takes another two to five months. This phase focuses on the business structure and trying to find potential investors to accelerate the start-up to the next level. The start-up will be evaluated on the financial business case and growth potential, while the academic start-up is selling their products to their first customers.
While the first two phases in a pre-seed program are usually given in groups, the last phases are more customized for academic start-ups. The product or service is then often too complicated and doesn't fit in a standardized program. Individual coaching is more desirable in this case. Some incubation facilitators only give a customized program. This is ideal for start-ups but very costly for incubation facilitators.

6. Discussion

Within this research the most attractive elements and / or tools were found for incubation facilitators and startups that related to performance. In this research, the literature and findings overlap to a large extend.

Bruneel et al. (2012) compared best practices from incubation facilitators in Europe. He found that incubation facilitators developed themselves within three generations. The third generation of incubation facilitators offered a wider range of services for startups compared to the first generation, which was more based on sharing facilities and offering minor support. Incubation facilitators developed over time, but there is still much divergence in policies between University incubation facilitators. Many incubation facilitators offer different tools and have different approaches to their startups. While certain incubation facilitators are trying to figure out what policies might work most effective, other incubation facilitators are well organized. This has direct influence on the performance of academic startups. There are three different elements that influence the performance of academic start-ups and university incubation facilitators: accessibility of knowledge (Frencesco et al. 2017), accessibility of resources (Clarck,1998; Lichtenstein and Brush, 2001), and access to an internal or external network. Delmastro, (2002) and Phan et al. (2005). According to the literature study, these elements are required to increase the performance of start-ups. However, literature does not give "most attractive practices for incubators". Since the findings call for a more qualified judgement. For instance, many academic start-ups have different needs at different phases in their start-up. For example, when they need to build their own prototype, other information and resources are needed than when they want to bring their product for the first time on the market. However, according to literature, the incubator should have all the information on demand to support academic start-ups. This can be confirmed with the findings of this study, where networks are one of the most important assets of an incubator. In practice, it is almost impossible for incubators to facilitate in finding the right expertise. For instance, when an incubator supports all sorts of start-ups, like a nutritional start-up and a high-tech robot start-up, they need to have a very wide range of experts, coaches, and investors in all kind of areas. Without this wide range of networks, the incubator becomes unable to give the start-up the right tools and network to succeed. At a certain moment, a start-up needs to have a custom-made approach to be successful in the market. This custom-made approach might already be vital (usually with very high technological start-ups) in the prior phases from the academic start-up, before the start-up reaches an accelerator. Some incubators are specialized in certain types of start-

ups. For instance, StartLife focuses highly on agriculture and food start-ups. If start-ups are referred to the right specialized incubator with the right network and expertise, the odds for performance would likely increase. More research should be done as to what the effect on those start-ups would be if they were supported by incubators that are specialized in certain themes compared with non-specialized incubators.

Another finding through literature (Lichtenstein and Brush, 2001) and the interviews is that the makeup of a team is one of the most important elements that increases the odds of performance of an academic start-up. Many start-ups assembled their teams in programs from universities or with friends / acquaintances who believe in the idea. However, according to the respondents, this might not be the best way. The interviewees said that academic start-ups should have all kinds of expertise within one team. Some incubation facilitators mentioned that within the best scenario, all kinds of disciplines are involved (even with disciplines from other universities).

Together with a qualified HRM assessment, the right people can be selected to form a good team. This does indeed appear to be a better way to select the right people for a team. However, one concern is that this would also create problems. For instance, working together with other universities could create difficulties with location. If all team members are spread over the Netherlands, this might demotivate team members to work together. Also, it would still be difficult to predict behavior from people and therefore the liability of these assessments.

Other interesting findings have been found within the interviews that are worth mentioning. Many incubators have different views as to how to make this support for start-ups affordable. According to Jongbloed (2012) and some incubators universities with governmental subsidies should pay the bill for valorization. As they see it, it should be a service for society. It seems to be difficult to create a revenue model on this, since some incubators are registered as foundations instead of as companies. However, some universities also have different policies for this. For instance, they created a success fee or shared Intellectual Property. It would be worthwhile to find new mechanisms to create a revenue model for this. Since I am a cofounder of a start-up myself, I believe that a success fee or a membership fee is totally accepted from an incubator. Providing shares is still difficult, since they are the most valuable asset of a start-up. Many incubators also find shares a difficult issue, since minor shares can be worth much more in the future compared with the service a start-up gets in its starter period. However, there are also other creative solutions for revenue sharing. As was mentioned by interviewees

from several incubation facilitators, Stanford University has a different method to realize revenue from start-ups. One thing that was mentioned was that universities have a large amount of IP that is not being used. The idea is that entrepreneurial teams work with this IP and try to create valuable products out of it. Teams that have found a market fit solution may use this patent, while the university will receive a royalty from it. This has two advantages: valorization becomes more optimized, and academic start-ups do not have high expenses of applying for a patent. Existing start-ups could also use some of this IP. It might be interesting to have an overview about the existing IP from the university that can lead to new products or services, which in the end could lead to larger service for society. This research contributes to the literature about incubators, like Lichtenstein and Brush (2001) and Bruneel (2012) showed that tangible and intangible assets provide support to startups. This research shows to what extend elements and tools influence the performance of academic startups, which fills the gap for the importance in recruitment, assessments and team selection.

7. Limitations

There are some factors that might influence the reliability and validity of this research. First, the research sample consisted of only eighteen interviews, which makes it difficult to generalize the results, even more so because the respondents answered the questions from their own point of view and they examine the most attractive elements and/or tools specific to their academic start-up or incubation facilitator. The coaches and managers from the incubation facilitators have different backgrounds and different experiences. Some of the managers were newly employed, which may have caused an incorrect view about their actual policies. It is possible that wrong conclusions are made because of this. Also, it might be possible that incubation facilitators might brag about their successes. This could be a potential threat in the validity of this research. To reduce this threat, incubation facilitators were asked for examples about startups to increase the liability of their answers. Furthermore, the research question contains an assumption that there is an overall most attractive method and/or tool, while the study shows that this really depends on the type and phase of the academic start-up. Since they were not the same by nature (technical start-ups and non-technical start-ups), they could differ in opinion and therefore influence the results. One point in the conclusion states that non-academic start-ups might be less attracted by financial resources. This is based on their experience that they didn't have access to resources and they survived based on customers, but there were no interviews done with start-ups that did not succeed in the market since this research was focused on startups that were still active.

Another limitation of this research is that the first interviews did not contain the most high-quality data. Each respondent was different; some were more specific than others, even with follow-up questions. The duration of the interviews also varied between 30 min – 110 minutes. It seemed that more experienced incubation facilitators had more to say, then less experienced ones. In some interviews, the respondent arrived later to the appointment, which caused a lack of time to get all answers. Also, some respondents gave longer answers. They commonly answered some of the follow-up questions, and it was therefore sometimes difficult to track if all questions were asked. This may have affected the quality of the questions of the semi-structured interview. Also, incubation facilitators might have polished their own answers, to show off to the rest of the incubation facilitators. This could lead to mis interceptions within this analysis. The analysis also has limitations. For instance, while "network" was the most mentioned keyword, it is also highly dependent on how many times a question on this topic was asked. Network includes many different areas, like experts, coaching, and investors.

These elements of a network differ in the rate of importance for each academic start-up. When an academic start-up mentioned a certain expert, such as a professor, it could have a high value for this start-up, while for other start-ups, information on professors was not important at all. In theory, it could be seen that professors are less important, while maybe other academic start-ups might also be more dependent on this kind of expertise. A quantitative study should be done to validate which elements of networks are the most important for academic start-ups.

8. Conclusion

In this research, the following research question has been studied: *Which elements and/or tools are the most attractive for incubation facilitators and academic start-ups in terms of performance?* It can be concluded that specific most attractive incubation elements and/or tools are complicated to find, which is in congruence with the view of most of the respondents. It seems to depend on the actual phase in which the academic start-up is. Knowledge transfer is more important in the orientation phase, and access to financial resources is more important in the last phase.

Literature and the interviews confirm that survival and growth were the most important performance indicators for academic start-ups. For university incubation facilitators, the most important indicators are creating entrepreneurial awareness, valorization / knowledge transfer increase the survival odds for startups and provide economic growth. One of the most important elements that could influence the survival rate or growth rate from academic start-ups is human resource management. Analysis of the interviews show that having the right team is the most important factor with more than half of the respondents explicitly mentioning this as the most important factor for the survival or profitability of an academic start-up. This is remarkable, since interviews show that many incubation facilitators do not offer a well-organized policy for this. There is an increasing awareness that the selection of a team should get more attention and that it is important to bring multiple disciplines together to create ideal teams. This selection includes professional team assessments and personal feedback mechanisms to find out which people should be attracted to the academic start-up. It would be recommended for incubators to focus more on team selection and assessments, since the team is apparently a crucial aspect in terms of performance of the start-up.

Other important factors are network capabilities and knowledge transfer. As mentioned in theory and in the results of the interviews, the interaction skills and the availability of coaches, experts, potential customers, and investors seems to lead to higher survival and growth rates. A broader network of an incubation facilitator could even lead to a certain competitive advantage, since academic start-ups may have the impression that this facilitator provides better opportunities. This prevents academic start-ups from leaving this incubation facilitator and attracts other start-ups to this facilitator. Several incubation facilitators mentioned that there was a wish to work more closely together. This seems an important factor, because this could extend the size of their network availability and therefore the performances of academic

start-ups. Practical issues and underestimating the value seem to obstruct the close collaboration.

Based on the interviews, it can be concluded that financial resources are another important factor but are not seen as the most important for survival. Technical start-ups that were interviewed depended more on this type of resources since their prototype and research is usually expensive. Non-technical start-ups might better focus on their first customers and selling their product or service as soon as they can.

Finally, other interesting elements and tools that have been mentioned and influence performance are a strict selection criterion and a pre-seed program, which is basically a full-time program to support an academic start-up step by step from product idea to scale up.

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Appendix I

Interview questions incubation facilitators (DUTCH)

THEMA: Achtergrond van incubatie facilitator?

1) **Kunt u meer vertellen over de geschiedenis van de incubatie facilitator?**

   Welke bedrijfsvorm heeft de incubatie facilitator? Stichting / BV / anders..

2) **Wat is het doel van jullie incubatie facilitator?**

3) **Hoeveel academischer startups heeft de Incubator facilitators momenteel?**

4) **Hoelang blijft een gemiddelde startups bij jullie ingeschreven staan?**

Thema aanmelding

5) **Wat zijn de selectie criteria voor de Universiteit om samen te werken met een startup**

6) **Wat zijn de selectie criteria voor een startup**

Thema methodes en tools

7) **Kunt u het proces uitleggen vanaf het punt een startup bij jullie aangemeld heeft?**

8) **Bieden jullie een programma aan?**

9) **Welke middelen biedt de Incubatie facilitator momenteel aan academische startups?**

   Welke soorten expertise kunnen worden gebruikt door academische startups?

   Hoe verloopt de communicatie / samenwerking tussen Expertises/professoren en

   Academische Startups? Hoe komt de academische startup in contact met een professor

   /expertise?

10) **Komt u problemen tegen met betrekking tot de interactie van professoren/expertises en**

    startups om informatie te winnen?

11) **Wat voor verschillende resources bieden jullie aan academische startups?**

    Financiële resources / humanresources/ technologische resources / faciliteiten

12) **In hoeverre wordt het netwerk van Universiteiten onderling gebruikt?**

    is dit belangrijk? Of in mindere mate?

Invloed op de prestatie

13) **Wat voor invloed heeft expertise op de prestatie van de academische startup?**

    Groei/ innovatie / winst / kennisdeling **/** of andere zaken..

14) Wat verstaat u onder de prestatie van een academische startup?

Doorvragen: wanneer heeft een academische startup succes?

15) Wat voor invloed hebben resources op de prestatie van de academische startup?

Groei/ innovatie / winst / kennisdeling **/** of andere zaken..

16) Wat voor invloed heeft het netwerk op de academische startup?

Groei/ innovatie / winst / kennisdeling **/** of andere zaken..

17) Wat kunt u vertellen over de netwerk capabiliteit van de academische startup?

Belangrijk? Waarom?

18) In welke mate komt innovatie voor bij academische startup?

Wat voor invloed heeft dit op de prestatie van de academische startup?

19) In welke mate ziet u dat "nieuwe" informatie vanuit de wetenschap wordt gebruikt door start-ups?

20) **Wat is de succes rate van uw incubatie faciliteit?**

Waar ligt dat aan denkt u?

21) Wat is het rendement van de incubatie facilitator?

Hoe zorgen jullie voor rendement?

22) In hoeverre is valorisatie belangrijk voor de incubatie facilitator?

23) Welke elementen / middelen die u aanbiedt zijn het belangrijkste voor de prestatie van een academische startup?

24) Welke factoren zijn het meest aantrekkelijk / belangrijkste voor de prestatie van een academische startup?

25) Ziet u dat start-ups die gefaciliteerd worden door de incubatie facilitator ook een hogere mate van innovatie meenemen in hun product/service?

In hoeverre bent u bekend met andere valorisatie methodes van Universiteiten?

26) Heeft u zelf nog aanvullingen op het interview die interessant kunnen zijn voor dit onderzoek?

Appendix II

Interview questions academic startups (DUTCH)

THEMA: Background

1) **Kunt u meer vertellen over de geschiedenis van de academische startup?**
2) **Wat is het doel van jullie academische startup?**
3) **Hoe oud is de academische startup?**

Thema aanmelding

4) **Wat waren de selectie criteria voor jullie om deel te nemen aan de incubatie facilitator?**
5) **Hoe hebben jullie dit ervaren? Streng?**

Thema methodes en tools

6) **Kunt je het proces uitleggen wat jullie hebben gedaan bij incubatie facilitator?**
7) **Hebben jullie gebruik gemaakt van een programma?**
   Hoe hebben jullie dit ervaren?
8) **Van welke <u>resources</u> hebben jullie gebruik gemaakt? (bij de incubator)**
   Financiële resources / humanresources / technologische resources / faciliteiten
9) **Van welke soorten <u>expertise</u> hebben jullie gebruik gemaakt?**
10) **Hoe verloopt de communicatie / samenwerking tussen Expertises/professoren?**
    Hebben jullie problemen / moeilijkheden hierin ervaren?
11) **In hoeverre wordt het netwerk van Universiteiten onderling gebruikt?**
    Is dat belangrijk voor jullie als academische startup?
12) **In hoeverre is het netwerken belangrijk voor jullie?**
    (netwerk capabiliteit:
13) **Hebben jullie zelf andere incubators of Universiteiten geraadpleegd voor informatie?**

Wat voor Invloed op prestatie

14) **Wat verstaat u onder de prestatie van een academische startup?**
    Doorvragen: wanneer heeft een academische startup succes?

15) **Wat voor invloed heeft** <u>expertise</u> **op de prestatie van de academische startup?**

Groei/ innovatie / winst / kennisdeling **/** of andere zaken..

16) **Wat voor invloed hebben** <u>resources</u> **op de prestatie van de academische startup?**

Groei/ innovatie / winst / kennisdeling **/** of andere zaken..

17) **Wat voor invloed heeft het** <u>netwerk</u> **op de academische startup?**

Groei/ innovatie / winst / kennisdeling **/** of andere zaken.

18) **Wat kunt u vertellen over de** <u>netwerk capabiliteit</u> **van de academische startup?**

Belangrijk? Waarom?

Hebben jullie nieuwe informatie gebruikt van een externe partij?

19) **In welke mate komt** <u>innovatie</u> **voor bij academische startup?**

Wat voor invloed heeft dit op de prestatie van de academische startup?

20) **In hoeverre is valorisatie belangrijk voor de academische startup?**

21) **Welke elementen / middelen die de incubator aanbiedt zijn het belangrijkste voor de prestatie van een academische startup?**

22) **Welke factoren zijn het** <u>meest aantrekkelijk / belangrijkste</u> **voor de prestatie van een academische startup?**

23) **Hebben jullie als startup een hogere mate van innovatie in jullie product/service?**

24) **In hoeverre bent u bekend met andere valorisatie methodes van Universiteiten?**

25) **Heeft u zelf nog aanvullingen op het interview die interessant kunnen zijn voor dit onderzoek?**

Apendix III

Definitions and concepts for interview

Innovation: the application of ideas that are new to the firm, whether the new ideas are embodied in products, processes, services, in work organization or marketing systems, (Rogers, 1998 and credited to Gibbons et al, 1994)

Academic start-up: An academic start-up can be explained as "start-up that emerged from a University or Research Institution" (Clarysse et al., 2005).

Intellectual capital: "An asset that consists intellectual material, which considered to be knowledge as asset which could use to create wealth" (Stewart, 1998).

Valorisation: "Commercialization of knowledge" (Jongbloed, 2012)

Tool: Something that helps you to do a particular activity:
(Cambridge directionary online (2018)

Appendix IV

All interviews have been conducted in a semi-structured manner with pre-scripted questions and more in depth questions will be asked in reaction to given answers. The pre-scripted questions are based on the outcomes of previous literature study, as shown in table 1. The questions from the two groups will be analyzed to find congruence in tools and/or elements that have a positive relation with performance.

Appendix V

TEAM startups (HRM) (131)	Team is important (14) Selection with interns (7) External assistant incubator (2)
Network **(175)**	**Internal Network (16)** Coaching (36) Expertise(17) **External Network (25)** Uses Expertise / coaches (15) Entrepreneurs (12) Universities (11)
Financial resources (28)	Investors: (11) Foundation: (10) Bank (8) Business angels: (8) Subsidy (5) Family friends (2)
Performance indicators (24)	Team (14) Network (10) Availability of financial resources (6) Growth (6) Location important (6) Availability of financial resources (4) Right product for the market (3)
Selection startups (32)	Selection by team professionals (10) Informal process (10) Formal with pitch (3)
Pre-seed program (20)	Originated from University (10) Feasible Idea (10) specific type of startup (7) Innovative idea (5) survived pre scan / selection criteria (3)
Accessibility of facilities (20)	Offering offices (9) Facilitating use from Universities (8) Offering flex space (6)
Knowledge transfer (21)	Universities & IP (21) Startups & IP (16) Other available expertise University (14) Professors & researchers (11) Valorization important (7)

Appendix VI

See USB stick with (data)