

# MASTER THESIS

## The contribution of incubation services to the development of academic spinoffs



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## **Abstract**

Nowadays, more and more academic spinoffs receive incubation services in their development process to bridge the gap of resources. However, little attention in scientific literature has been paid to the contribution of these incubation services from the perspective of tenant firms. Therefore, this research gained insights into the contribution of incubation services to the development of academic spinoffs. Three incubator firms and seven academic spinoffs have been included in the study. The data collected through interviews was based on the operationalization of the core concepts: incubation services and the development of academic spinoffs. According to scientific knowledge in this field, three main incubation services provided by incubators are infrastructural facilities, business support and networks. The dimensions of the development of spinoffs consist of strategic, economic, social and human capital. The results showed that all three services have a contribution to the development of academic spinoffs by solving problems related to the four types of capital.

***Key words: incubation services, development of academic spinoffs, developmental problems***

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## Chapter 1 – Introduction

### 1.1. Background

Academic spinoffs have gained an important place in the global economic landscape since the Bayh-Dale Act in 1980, especially in the United States (Shane, 2004). These technology transfer mechanisms consist of commercialization activities transforming university findings through firm formation. The process of commercialization activities by universities can be defined as “the processes that transform an academic idea into a market-ready product or process innovation” (Bathelt, Kogler, & Munro, 2010). Spinoffs are widely known as important phenomena in economic wealth creation by exploiting research (Candelo, Sorrentino & Cantino, 2016).

Research to the financial contribution of spin-offs in the United States shows that academic spinoffs have generated an amount of \$33.5 billion during the period 1980-1999. This implies that the average spinoff generated \$10 million which has in total a high economic value (Shane, 2004). Also, in other countries, the significant interest in spin-off activity is observable. A survey conducted in France among spin-off enterprises showed for example that 40 percent of the high technology companies established between 1987 and 1997 were university spinoffs. This implicated that the French technology industry depends moreover on university spinoffs (Mustar, 1997). Besides that, another research to the economic impacts of academic spin-offs shows that these firms have incremental contributions to Gross Domestic Product in Canada (Vincett, 2010).

The economic importance of university spinoffs led to an increase in interest by university administrators, policy makers and would-be entrepreneurs which resulted in significant resource investments by universities. In the same period there can also be seen a growth in the number of patents and licences of university inventions. This growing interest caused a focus on establishing incubators, capital funds and supportive tools to guide new entrepreneurs in their process of commercialization of university inventions (Shane, 2004).

The development process of spin-offs requires certain resources and skills to be executed properly. However, new ventures as spinoffs face lack of resources, uncertainty in technological development, market acceptance and limited entrepreneurial knowledge and skills as the primary formers of obstacles during their development (Gredel, Kramer & Bend, 2012). In the field of entrepreneurship, an incubator is an entity assisting new ventures during their idea realisation and growth by providing services in the form of physical facilities and

support. A way to overcome these problems, formed by lack of resources, is to benefit from an incubator that delivers a support environment for new companies in which they get access to a portfolio of incubation services (Bergek & Norrman, 2008).

During the 1990s, the role of incubators changed from an office facilitator to one providing coaching and networking. This is caused by the lack of experience as barrier to success in firm development. Incubators started to deliver services designed to accelerate the learning process within new firms. Networking has been added most recently. This resulted in an extended list of services from which incubators can choose to provide to incubates (Bruneel, Ratinho, Clarysse, & Groen, 2012).

Several studies are available in literature examining the performance of the incubator. Most of these used performance measures as survival rates of tenant firms, number of firms graduated, or number of jobs created to determine incubator-incubation impacts. The incubator is the unit of analysis within all these cases (Bergek & Norrman, 2008; Hacket & Dilts, 2004). However, few studies have examined the potential of incubation services from the perspective of the incubated firms who are the primary users (Roseira, Ramos, Maia, & Henneberg, 2014; Xu, 2009). Ahmad and Ingle (2011) make the following judgement: “the ultimate judges of the value of business incubation are the client firms and the entrepreneurs who run them – the incubator customers (p. 15)”. Therefore, the aim of this research is to investigate the contribution of incubation services, from the perspective of academic spinoff companies.

## 1.2. Research question

Academic spin-offs contribute to the economic development of countries (Salem, 2014; Shane, 2004). In order to create these new ventures, entrepreneurs need both tangible as intangible resources (Clarysse, Wright, Lockett, Van de Velde and Vohora, 2005). However, new businesses do not always have the necessary resources which are valuable for business success (Abduh, D'Souza, Quazi, & Burley; Scarborough and Zimmerman, 2000).

Accordingly, the lack of services results in problems during business development processes (Abduh, et al., 2007). In this situation, the incubator forms an important entity within the process of spinoff development since it provides services which is frequently mentioned as stimulating spin-off creation processes (Nicolaou & Birley, 2003; Schein, 2010). In literature, an extensive amount of studies is focusing on the performance of incubators as measuring the number of firms created or jobs created (Bergek & Norrman, 2008; Hacket & Dilts, 2004). However, little is known about the performance of incubation services from the perspective of the tenant firms, thus the firms receiving the incubation services (Soetanto & Jack, 2016; Xu,

2009). Since incubators are one of the main mechanisms supporting the creation of academic spinoffs, it is interesting to investigate how, and which business incubation services contribute to the development of academic spinoffs.

Based on these findings, the following research question is formulated:

*‘‘How do provided incubation services contribute to the development of academic spin-off companies?’’*

To formulate an answer on the research question, the types of incubation services provided to the spinoffs need to be identified. Furthermore, based on scientific literature the dimensions of the development process will be determined. In addition, the model of Ratinho (2011) will be used that contains the problems related to the types of capital that occur during the development process of new ventures. Therefore, the contribution of incubation services will be measured by examining if the provided incubation services help overcome the problems during the development process. This relation between the provided incubation services and the development of academic spinoff will be further explained in section 2.3.

The following sub questions are formulated:

- *Which incubation services are provided to academic spinoffs?*
- *Which problems faced in the process of academic spinoff development are solved by the incubation services provided?*

The figure below shows the corresponding conceptual model:

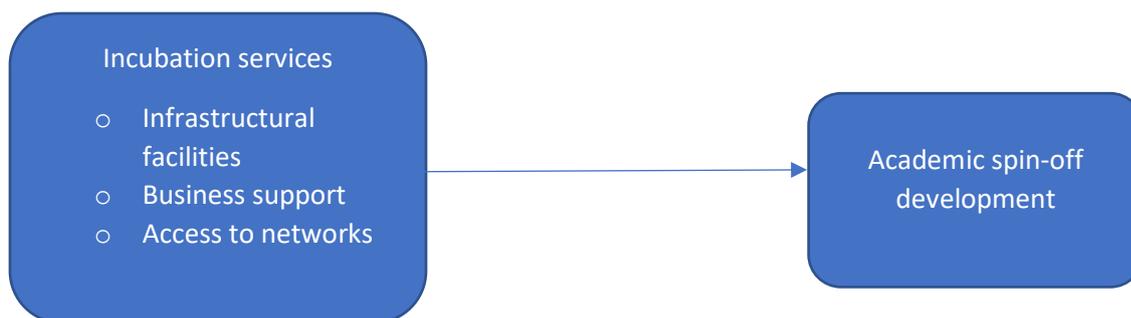


Figure 1: *Conceptual model*

### 1.3. Theoretical and practical relevance

Much scientific literature has focused on the provided incubation services and the performance of these analysed from incubator’s perspective (Bergek and Norrman, 2008; Lalkaka and Bishop, 1996; Peters, Rice, & Sundararajan, 2004). However, little literature is

available about the contribution of incubation services from the perspective of the clients, thus the receivers of the services (Abduh et al., 2007; Dowlin, 1997; Xu, 2009). This research will be conducted to enhance the understanding of the contribution of provided incubation services from taking the perspective of the incubators' tenants. Furthermore, most studies focus on the established firms as receiving external support in the form of incubation services. Little attention is paid to small firms and especially spin-offs as stated by Soetanto and Jack (2016). The context of this research consists of academic spinoffs in order to gain insights in the role of incubation services within these types of firms.

Moreover, the practical relevance of the study can be discussed. Certain Dutch universities have a higher rate of academic spinoff creation than others (U-Multirank, n.d.). This research will give universities insights into which incubation services contribute to the development of their academic spinoffs. This will enable them to revise the services provided by the incubators and if these are relevant in solving the problems perceived by their academic spinoffs. Especially, universities with a low spinoff rate can use these insights to observe if the low rate is caused by the failure of their spinoffs due to problems observed. Moreover, problems that cannot be solved with the incubation services provided by their incubator.

#### 1.4. Structure

In the next chapter the theoretical framework is presented. The methodology of the research is illustrated in the third chapter. The fourth chapter presents the analysis of the results. The last chapter contains the conclusion and discussion.

## Chapter 2 – Theoretical framework

In this chapter, the theoretical concepts of incubation services and the development of spinoffs are discussed. This research focuses on the relation between incubation services and the development of academic spinoffs. To examine this relation, this chapter will be used to review the theoretical background. In section 2.1, there will be elaborated on the concept of academic spinoffs and the development of spinoffs. Section 2.2 is used to explain the concept of incubators and the types of incubation services they provide. Lastly, section 2.3 is used to describe the relation between incubation services and the development of academic spinoffs.

### 2.1. Academic spinoffs

Spin-offs are defined as ‘‘new firms created by individuals breaking off from existing ones to create competing companies of their own’’ (Garvin, 1983). Spin-offs can be exploited from different organizations like R&D laboratories, private companies and universities (Perez & Sanchez, 2003). The employees leaving their organisation, take the knowledge and intellectual capital with them to create a new company (Gübeli & Doloreux, 2005).

In literature, spin-offs can be categorized depending on which organisation they stem from and the source of the entrepreneur’s experience, such as private companies or research institutes (Gübeli & Doloreux, 2005; Perez & Sanchez, 2003). Lindholm (1997) makes a distinction between academic spin-offs and corporate spin-offs. These types have much in common, however it is known that university spin-offs are more active in technology transfer. In literature, university spin-off is defined as a type of spin-off that has the aim to commercially create, discover and exploit certain knowledge, technology, or research outcomes from a university (Pirnay F., Surlemont B. & Nlemvo F, 2013; Van Burg, Romme, Gilsing & Reymen, 2008).

A new firm is categorized as an academic spin-off if it meets three conditions, namely the company founder must come from the university as students or employees, the operation of the company must be focused on the technical ideas developed within the university and there must be a direct transfer from university to company (Gübeli & Doloreux, 2005). These characteristics give a clear distinction between academic spin-offs and corporate spinoffs as other types of newly established firms mentioned in literature like start-ups.

Many universities take a proactive approach to facilitating the creation of academic spinoff companies since it encourages job creation and the economic development of a certain region.

Academic spinoffs are perceived as the most effective form of technology transfer from universities to market. To conduct this process in an effective way, academic spinoffs need strong support during their development phases (Palumbo & Dominici, 2013). This because of resource endowment of these types of new ventures. According to the Resource Based View the process of new venture creation consists of acquisition and recombination of resources and expertise. This refers to the need of both tangible and intangible resources to exploit a business idea (Wernerfelt, 1984). The university context is perceived as being conducive to the creation of spinoff ventures, because of the available mechanisms that support the creation and contribute to the development of new companies. One of these mechanisms are incubators who aim to bridge the gap of resources by providing services. In section 2.2 there will be elaborated more on incubators and the incubation services they provide (Smilor, Gibson, & Dietrich, 1990).

#### 2.1.1. The development of spinoffs

This research focuses on the contribution of incubation services to the development process of academic spin-off companies. Therefore, it is important to elaborate on the process of developing spin-offs to determine what the process consists of.

As mentioned earlier, an academic spinoff consists of the process of technology transfer from a university to a new entity (Bathelt et al., 2010). According to Groen, Wakkee and De Weerd-Nederhof (2008) entrepreneurs of these businesses often have a one-sided focus on their specialist knowledge and less focus on other success factors in business. These success factors are covered by the 4S model of Groen et al. (2008). The 4S model, based on the social system theory, acts as a framework to explain how a social system starts and continues to exist. The framework consists of four types of capital which need to be accumulated by entrepreneurs to make the development of a firm possible. According to Groen et al. (2008) the following types of capital can be distinguished:

- Strategic capital
- Economic capital
- Social capital
- Cultural capital

In this research, three of the four types included within the model will be used, namely strategic, economic and social capital. Cultural capital will not be used as a dimension within this research. In existing literature, cultural capital is defined as ‘‘the set of values, norms,

beliefs, assumptions, symbols, rule sets, behaviours and artefacts that define the actor in relation to other actors and environment'' (Groen et al., 2008). This symbolic system forms the identity and culture of a firm and creates a context for learning and change. It is important to mention that culture evolves over time and that a longitudinal research is needed to map the cultural capital obtained in the presence of incubation services. However, the time frame of this research is limited and therefore it is not possible to observe this dimension.

Besides the three dimensions distinguished by Groen et al. (2008), human capital is added to the framework of this research based on scientific literature that proves the importance of this capital for the development of new ventures (Bosma, Van Praag, Thurik, & De Wit, 2004; Fatoki, 2011). The study of Cooper, Gimeno-Gascon and Woo (1994) delivers evidence that human capital is significantly related to new venture success. The importance of this dimension and the related problems will be described below.

The study of Ratinho (2011) contains an overview of problems that new firms face during their development process. The study states that the problems faced by new ventures are generic. According to the study the constraints are related to the types of capital distinguished by Groen et al. (2008). Solving these problems results in obtaining the types of capital within a firm (Ratinho, 2011). Besides that, other studies are used to derive the problems related to human capital since the model of Groen et al. (2008) does not cover this dimension. Below, there will be elaborated on the four types of capital and the problems related to them.

### **Strategic capital**

Strategic capital can be defined as the ability of an actor to mobilize the available resources and actors to attain certain goals. It covers the strategy of a firm which explains how a firm will create value for its customer base and fulfil their demand (Groen et al., 2008). One of the problems related to strategic capital is writing a business plan (Bruno, Leidecker, & Harder, 1987; Groen et al., 2008; Ratinho, 2011) The business plan is an important part of the strategic capital, because of its role in attracting investors. Another element is the credibility of a company which is often low at early stages of development due to the newness of new ventures (Storey, & Tether, 1998). Increasing the credibility is crucial for new ventures to attract external parties which believe in their idea and want to provide them financial resources. Furthermore, gaining advantage over competitors can also be a problem that occurs when firms want to increase their strategic capital. Entrepreneurs with a patent for their technology minimize the risk of disadvantages caused by their competitors. However,

ventures may face this problem due to the high costs of attaining advice from experts for example about patent regulations (Ratinho, 2011).

### **Economic capital**

Economic capital is defined by Groen et al. (2008) defined as ‘‘set of mobile resources that are potentially usable in exchange relationships between the actor and its environment in processes of acquisition, disposal or selling’’. New ventures often face the need for financial tools in their development (Honjo, 2000; Ratinho, 2011). Financial capital is needed by new ventures to obtain physical resources (Fatoki, 2011). However, because of their newness new ventures lack an established network that gives them access to financial resources. Besides, they lack collateral and are dependent on their personal capital. Therefore, obtaining finance is distinguished as a developmental problem. Moreover, hire personnel is also a problem related to this type of capital. The ability of new firms to pay salaries is limited caused by the insufficient amount of financial resources they have. Financial constraints may hinder new entrepreneurs to hire the needed amount of salaried personnel (Colombo, Delmastro, & Grilli, 2004). Lastly, saving on equipment costs is related to this type of capital (Ratinho, 2011). Expenses that firms make are independent of the revenue which is often low at the start of a new firm. Due to this, overhead costs will have a great impact (Brüderl, Preisendörfer, & Ziegler, 1992). The opportunities to save costs will be limited, because these expenses are needed for further grow.

### **Social capital**

Social capital refers to the capital that a firm has access to in presence of networks. Groen et al. (2008) mention in their study that this type of capital overlaps with the other capital dimensions. Therefore, the researchers narrow the term by defining it as ‘the set of network relation through which actors can utilize, employ, or enjoy the benefits of capital that is controlled or owned by other actors’ (Groen et al., 2008). The assumption made here is that new ventures do not only need tangible resources to develop successfully, but also a proper network. These networks provide entrepreneurs access to the information and advice needed during all stages of their development. Moreover, the study of Van Burg et al. (2008) describes certain practices to build a spinoff. One of these is obtaining social capital by creating a network to access and use opportunities quicker (Van burg et al., 2008). Establishing suppliers contacts and establishing alliances with other firms are problems related to social capital. These problems occur caused by the lack of experience and capacity within new ventures that are important to establish a trustful relationship. Due to this limited

amount of resources, network relations with new ventures goes along with more risk than with existing partners (Tötterman, & Sten, 2005). Another problem implies the building and expanding of the market base of the firm (Ratinho, 2011).

### **Human capital**

Human capital can be defined as ‘‘a unit-level resource that is created from the emergence of individuals' knowledge, skills, abilities, or other characteristics’’ (Ployhart & Moliterno, 2011). The experience, education and competencies of employees are referred to as a stock of resources that can be leveraged for organizational benefit. Human capital does not make part of the model established by Groen et al. (2008), however this type of capital will be used as well in this research. Human capital is added to the research framework, because scientific literature shows that entrepreneurs of new firms are strong in their knowledge of technology, but often lack the needed management skills and experience to overcome the barriers for the early development of a new venture (Bruneel et al., 2012; Smilor, 1987; Tötterman, & Sten, 2005). The study of Stuart and Abetti (1990) shows a positive correlation between the firm performance and entrepreneurial experiences of founders. Besides that, another study examining the relation between entrepreneurial experience and the growth of start-up provides evidence that the lack of professional experience has a negative influence on growth (Almus, Nerlinger, & Steil, 1999). The problems related to this type of capital consists due to lack of entrepreneurial experience and education. The first problem distinguished implies the lack of entrepreneurial skills. Furthermore, compliance with administrative regulations is also derived from literature. Small businesses face regulatory burdens caused by the time and costs needed to spend on compliance. New entrepreneurs often lack knowledge in the field of legislation (Chittenden, Kauser, & Poutziouris, 2002). The lack of knowledge and the complexity of the regulatory environment increases the risk of non-compliance Hampton, 2005).

Table 1 below gives an overview of the problems related to the different types of capital and the studies in which these problems are mentioned.

Capital dimensions	Problems perceived	Mentioned in literature by
Strategic	<ul style="list-style-type: none"> <li>• Write business plan</li> <li>• Increase credibility</li> <li>• Get advantage over competitors</li> </ul>	<ul style="list-style-type: none"> <li>• Bruno et al., 1987; Groen et al., 2008; Ratinho, 2011</li> <li>• Ratinho, 2011; Storey, &amp; Tether, 1998</li> <li>• Ratinho, 2011</li> </ul>
Economic	<ul style="list-style-type: none"> <li>• Obtain finance</li> <li>• Save on equipment costs</li> <li>• Hire personnel</li> </ul>	<ul style="list-style-type: none"> <li>• Honjo, 2000; Ratinho, 2011;</li> <li>• Ratinho, 2011</li> <li>• Colombo et al., 2004; Ratinho, 2011;</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Ally with enterprises</li> <li>• Establish suppliers contacts</li> <li>• Build market base</li> </ul>	<ul style="list-style-type: none"> <li>• Ratinho, 2011; Van Burg, 2008</li> <li>• Ratinho, 2011</li> <li>• Ratinho, 2011</li> </ul>
Human	<ul style="list-style-type: none"> <li>• Enhance entrepreneurial skills</li> <li>• Compliance with administrative regulations</li> </ul>	<ul style="list-style-type: none"> <li>• Bruneel et al., 2012; Ratinho, 2011; Roseira et al., 2014; Tötterman, &amp; Sten, 2005; Smilor, 1987;</li> <li>• Chittenden et al., 2002; Hampton, 2005; Ratinho, 2011</li> </ul>

Table 1: *Overview of the developmental problems perceived by new firms and existing studies involving these.*

## 2.2. Business incubation

During the 1980s incubators begun to win popularity within the process of developing successful new ventures (Bergek and Norrman 2008). Incubators are designed to assist entrepreneurs in their development process, mostly in the early stages of development. Incubator firms are important for new venture development and aim to assist firms in this process by providing a variety of services and link effectively technology, capital and know-how in order to support the commercialization and foster the development of new firms (Smilor, 1987b; Wonglimpiyarat, 2010). Firstly, these actors were mostly known for providing office space and work facilities to reduce the disadvantages of resource gaps. This changed simultaneously with the addition of other incubation services as trainings and network facilities to reduce entrepreneurial gaps which will be elaborated on in section 2.2.1 (Peters et al., 2004).

The study of Hacket & Dilts (2004) focused on providing a literature review of business incubation. By gaining insight from different articles they offer the following formal definition: “A business incubator is a shared office space facility that seeks to provide its incubates (i.e. “portfolio-” or “client-” or “tenant-companies”) with a strategic, value-adding intervention system (i.e. business incubation) of monitoring and business assistance” (Hacket & Dilts, 2004, p. 3). This system controls and links resources with the objective of

facilitating the successful new venture development of the incubates while simultaneously containing the cost of their potential failure.

In addition, Hackett and Dilts (2004) emphasize the importance of a shared office space within the provisions of incubators (Hackett and Dilts, 2004). However, multiple studies contradict this definition, because they do not mention resource sharing as a fundamental component of incubation (Grigorian, 2010; Von Zedtwitz, 2003). Therefore, in this research is chosen for the definition provided by The National Business Incubation Association (NBIA). The NBIA defines it as “an economic development tool designed to accelerate the growth and success of entrepreneurial companies through an array of business support resources and services. A BI’s main goal is to produce successful firms that will leave the program financially viable and freestanding” (NBIA, as cited in Grigorian, 2010).

There are multiple studies focusing on the difference between an accelerator and an incubator. These two phenomena overlap in the services provided. Both help firms develop, however they differ in which stage in life they provide the services to a new venture (Sepulveda, 2012). Since this research focuses on the services provided and does not elaborate on the different stages in life of a new venture, the distinction between these two will not be maintained within this study. This broadens the scope of firms which can be approached to attain knowledge about incubation services.

### **Dutch incubators**

During the 1990s incubators gained more recognition in the Dutch economy caused by the government which stimulated the growth of new technology ventures. The Dutch government, universities and businesses began to realise that incubators are essential to set up new high-quality companies. These companies are necessary to make the Dutch economy competitive within the global area (Dutch Incubation Association, 2019).

The Dutch Incubation Association (2019) is a network of consisting of several Dutch incubators and accelerators. It is concerned with the professionalization and positioning of incubators on national and international level. It stands out that several Dutch incubators are associated with universities. With the support of government and industry, universities undertook actions to involve support policies – such as business incubators- to amplify the newly developed spin-offs (Soetanto and Jack, 2016). In each city that has a large university can be found a form of support for new starters anyway (Investeerdere, n.d.). These university-linked business incubators are similar to the traditional business incubators, but

they focus more on providing knowledge, know-how and technology transfer from the academic field to the market society. They enable scientists and students in conducting activities to commercialize their ideas developed within the university and start their own companies, thus spinoffs (Skurczyński, 2008). Since this research focuses on the development of academic spinoffs, university-linked incubators will be approached during the data collection to gain knowledge about the incubation services provided.

### 2.2.2. Incubation services

Incubators provide incubation services in order to assist and support new ventures in their development process (Abduh et al., 2007). These services contribute to overcome the barriers caused by lack of resources and knowledge that new ventures deal with during their development (Gredel, Kramer & Bend, 2012). Much scientific literature is available about the types of incubation services provided. In general, the service mix provided by business incubators consists of infrastructural facilities, business support services and networking (Bergek & Norrman, 2008; Bruneel, et al., 2012; Peters et al., 2004).

According to the study of Bruneel et al., (2012) the value proposition of incubators has gradually evolved. The first generation of incubation services consisted of infrastructural facilities like office space and coaching. The portfolio of incubation services changed with the addition of business support services as training and coaching to accelerate the learning process of new firms. Lastly, access to networks is added to the portfolio as part of the value proposition of incubators (Bruneel et al., 2012). Next, the types of incubation will be explained in more detail.

#### **Infrastructural facilities**

Primarily, incubators were known as providers of office space and shared resources, thus an infrastructure (Martin, 1997; Vaidyanathan, 2008). Infrastructure is the core of the value proposition and is identified as the most beneficial feature of incubators (Chan & Lau, 2005). Office space is rented in favourable conditions, often together with shared resources as clerical services, meeting rooms or conference rooms (Bergek & Norrman, 2008; McAdam & McAdam, 2008). According to Von Zedtwitz and Grimaldi (2006) the physical infrastructure implies services like office space, desk and telephone amenities. Laboratories and research equipment of universities can also be part of the infrastructure provided which belong among the more specialized resources (Grimaldi & Grandi, 2005). The provision of these infrastructural services gives tenant firms the opportunity to grant an office space together with the facilities for reduced costs (Bruneel et al., 2012).

## **Business support**

It is widely known that new entrepreneurs often lack the experience and a full range of management skills required during the development stages of their firms (Bruneel et al., 2012; Clarysse and Yusubova, 2014). Incubators have the ability to prepare new entrepreneurs by providing them entrepreneurial education in order to extend their own abilities and stand on their own (Smilor, 1987a). Therefore, the value proposition evolved by incubators providing business support services towards speeding up the learning process of new ventures (Bruneel et al., 2012).

Colombo and Grili (2005) refer to coaching and training sessions as part of business support services provided by incubators. Incubators differ often in the way of providing these services. Coaching can be described as one-to-one business support to contribute to the learning and skill development processes of tenants. It gives new entrepreneurs the possibility to reflect on their actions and when needed modify their future actions. Coaches deduce the process of trial and error and thus makes quick learning possible. New ventures are therefore able to make better decisions in a shorter time which causes better strategies (Bruneel., 2012). It begins with assigning coaches to the incubated companies who have expertise in both scientific as managerial areas. Existing literature delivers evidence of the positive impact of coaching services on firm development (Ratinho, 2011).

Training is also often provided by incubators and positively influencing the performance of tenants. Training sessions are more general in content compared to coaching sessions. Multiple studies are available elaborating on the types of subjects that can be discussed during training sessions. Some of these topics are in the field of marketing, finance and legal assistance (Bruneel et al., 2012; Clarysse and Yusubova, 2014).

## **Access to networks**

Another addition to the value proposition made, is the provision of access to networks through incubators which is crucial for development of tenant companies. Established networks by incubators makes tenant firms no longer dependent on their own networks and connects them with clients, partners, employees and investors. These types of actors are found in several studies (Bøllingtoft & Ulhoi, 2005; Clarysse and Yusubova, 2014; Collinson & Gregson, 2003; Soetanto and Jack, 2013). This provide incubates the opportunity to acquire the needed resources, expertise and learning opportunities (Bruneel et al., 2012).

In existing literature, there is made a distinction between internal and external networks. The external network consists of professional services and finance (Soetanto and Jack, 2013; Tötterman and Sten, 2005). New ventures often face constraints during their development due to the lack of financial capital. Incubators form institutionalized networks giving tenants for example access to potential investors. Next to the funding, incubators can also give access to professional services in the form of external advisors to expand or enhance the entrepreneurial skills and knowledge of the entrepreneurs. In addition to that, the networks enable ventures to approach actors in the field of legal advice, consulting and patent attorneys (Bruneel et al., 2012)

Moreover, incubators provide an internal network consisting of connections between tenants by offering clients common workplaces, thus a common environment (Abduh et al., 2007). The internal networking among tenant firms enables resource pooling and minimalizes the problems caused by unavailability of resources. The relation evolving is of formal or informal nature, joint ventures or simple information transfers (Tötterman and Sten, 2005). This stimulates them to closely communicate, learn from each other and share resources and experiences within the network of clients (Abduh et al., 2007).

Above, several studies examining the types of incubation services are outlined. The three main services are infrastructural facilities, business support and access to networks. When looking at incubators worldwide, there are different range and level of services provided (Stefanović, Devedžić, & Eric, 2008). Thus, incubators can differ in the range of services that belong to one of the three main categories. Since incubators can differ in the services provided, the incubation services provided by the business incubators included within this research need to be determined after the data is collected.

### 2.3. Relation between incubation services and the development of spinoffs

Academic spin-off firms contribute to the extent of job creation and the economic development of a certain region (Shane, 2004; Smilor, Gibson, & Dietrich, 1990). As other types of new ventures, these spinoff firms face liabilities as a consequence of being new and small which increases the chance of failure (OECD, 1997; Scarborough and Zimmerman, 2002; Xu, 2009). Studies show that new ventures face lack of initial capital, insufficient managerial skills and lack of access to assistance (Abduh et al., 2007; Van Auken, 1999). They do not own all of the tangible and intangible resources needed during their development process (Abduh et al., 2007). Related to this, a number of critical problems occur during their development (Cromie, 1991; Ratinho, 2011; Terpstra and Oslon, 1993). The main problems

perceived during the development process of new firms are derived from scientific literature and described in section 2.1.1 Incubators are known for their provision of incubation services to fill the gaps of resources and subsequently accelerate the successful development of new ventures.

Based on what is stated above, it is interesting to investigate the contribution of these incubation services to the development of academic spinoffs from the perspective of academic spinoffs. This can be done by evaluating if and which incubation services help overcome the problems related to the four types of capital. Below there will be elaborated on each type of capital and the incubation services that can play a role in solving the problems related to these types of capital.

As described in section 2.1.1 strategic capital can be obtained by increasing the credibility of the firm, by writing a business plan and getting advantage over competitors according to Ratinho (2011). A business incubator is known as provider of incubation services that consist of coaching and training. The study of Colombo and Grili (2005) state that incorporating training and coaching sessions increases the knowledge base of ventures and positively impacts their development. Training can be provided in writing the business plan of a company which is of importance to acquire investors (Ratinho, 2011). In addition, tenant firms can increase their credibility by being located within the incubator. New firms often lack legitimacy when they start to compete with existing firms in the market. All incubators have selection criteria, thus being accepted as a tenant firm gives potential clients and investors a signal of quality (Ratinho, 2011). Lastly, the access to networks enables new ventures to get in contact with different parties with among them connections to gather patents for their technology (Bruneel et al., 2012). The established network of an incubator gives spinoffs access to the needed expertise on this field, get a patent and thus gain advantage over their competitors in the same market (Ratinho, 2011).

Economic capital is defined as ‘set of mobile resources that are potentially usable in exchange relationships between the actor and its environment in processes of acquisition, disposal or selling’ (Groen et al., 2008). The obtaining of finance, saving on equipment costs and hire personnel are distinguished as problems related to economic capital. New firms often need financial tools to make the creation of their business possible. Incubators are able to provide them with access to their established networks that give tenant companies the opportunity to get in touch with for example investors. Subsequently, the spinoffs can obtain finance of these parties which belongs to economic capital. Besides that, incubators can play a

role in saving on equipment costs, because the infrastructural facilities are provided for reduced prices. Spinoffs can profit from reduced costs when renting office space and corresponding shared resources (Bruneel et al., 2012). Moreover, the access to financial resources increases the ability of new firms to pay salaries of the needed number of employees (Colombo et al., 2004).

Social capital is defined as ‘the set of network relation through which actors can utilize, employ, or enjoy the benefits of capital that is controlled or owned by other actors’ (Groen et al., 2008). This type of capital consists of actors with whom the firm can ally and establish suppliers contacts. An incubator tries to select the appropriate partners who can fulfil the needs of the new firms, both in their internal and external networks. These networks can give the opportunity to broad the sources of information, transmit information between entrepreneurs and build markets. These opportunities to access networks with potential partners might not have existed without an incubator (Hansen, Chesbrough, Nohria, & Sull, 2000).

Human capital implies the knowledge and experience of the firm and the entrepreneurs. As stated before, new entrepreneurs are strong in their knowledge of technology, but lack skills and experience needed during the early development of a new venture (Bruneel et al., 2012; Roseira et al., 2014; Smilor, 1987). The need occurs to enhance their business skills. The under-developed internal resources could be complemented by incubators giving access to services as coaching and specific training courses (Roseira et al., 2014; Soetanto and Jack, 2013). The coaches and training sessions deliver knowledge in specific areas of expertise to make learning possible. These areas differ often from basics of entrepreneurship to more specific knowledge areas as marketing and finance. Moreover, networking with other companies gives organizations also the possibility to share knowledge and develop new capabilities. Therefore, there can be stated that problems related to the human capital of firms can also be solved by providing access to networks (Bruneel et al., 2012). Furthermore, entrepreneurs of new firms are often unfamiliar with administrative regulations (Hampton, 2005). Incubators provide their tenants with coaching in this field and access to networks with experts in the field of legal requirements (Ratinho, 2011). Besides the access to networks, infrastructural facilities provided by an incubator are shared by all tenant firms. This can enable spinoffs to get in touch with each other and enables them to share knowledge and experiences.

### Proposition

Based on the findings above, the proposition is that all three incubation services help in overcoming problems occurring during the development of academic spinoffs.. It is important here to consider, based on scientific literature, that incubator firms differ in their services provided and the needs of spinoffs are diverse. Therefore, this study aims to evaluate the services provided by different incubators and if these play a role in solving the problems perceived by the academic spinoffs related to each type of capital. Furthermore, the aim is to find underlying aspects which influence if and how the problems related to the types of capital are solved by the incubation services provided. To examine this, the next chapter will elaborate on the methodology of this research.

## Chapter 3 – Methodology

In this chapter, the research strategy is explained (3.1). Furthermore, section 3.2 comprises the operationalization of the core concepts. The data source selection is reviewed in section 3.3, where after the data collection method (3.4) and data analysis (3.5). The last section contains the discussion of the research ethics (3.6).

### 3.1. Research strategy

In order to find an answer on the research question, the research design spans a qualitative research approach. Earlier studies deliver evidence about the effectiveness and appropriateness of the case study method for incubation evaluation (Chan and Lau, 2005). The qualitative method of research gives the opportunity to conduct intensive interviews with a certain number of respondents to gain detailed information about their perspectives related to a certain situation (Boyce & Neale, 2006). Qualitative researchers gather information that deepens understanding about certain phenomena involved and their interactions by focusing on ‘‘how’’ and ‘‘why’’ rather than ‘‘what’’ questions (Woodside & Wilson, 2003). However, quantitative research focuses more on numerical data and does not clarify the underlying meanings of the responses (Bruneel et al., 2012).

Multiple in-depth case studies will be conducted to collect data from the incubator firms and academic spinoffs to investigate the contribution of incubation services to the development of academic spinoffs. The case study method is a qualitative research method since it enables to describe, understand and explain a phenomenon in different settings. Questions starting with ‘how’ and ‘why’ are more likely to select the case study method. This enables to get an in depth understanding of ‘‘how’’ and ‘‘why’’ a phenomenon works in real life situations (Yin, 2018). In this research there will be looked at the contribution of incubation services provided by three incubators that differ in their incubation programmes, thus a multi-case design will make it possible to compare the cases and look if there could be found differences based on contextual factors. Besides that, the study of Soetanto and Jack (2003) delivers evidence for the assumption that incubated firms differ in their needs for tangible and intangible resources. Based on what is stated above, it can occur that the selected incubator firms differ in their incubation services provided and that the academic spinoffs differ in the problems perceived. To cover this, each case will be evaluated separately. Thus, it will become clear which incubation services are provided by each incubator and how these contribute to the development of spinoffs, thus if and what problems related to the types of capital are solved

by which type(s) of incubation services. It is important to consider that the results derived from the case studies are not generalizable to populations, but to theory (Saunders, Lewis, Thornhill, Booij & Verckens, 2011).

Furthermore, the nature of this study will be a combination of deductive and inductive. A deductive approach is chosen, because there will be used existing theory to derive the dimensions of incubation services which will be used as operational measures for the coding process. Besides, the model of Groen et al. (2008) will be used which consists of four dimensions which constitute the development of spinoffs. The dimensions derived will be discussed in the section 3.2. The advantage of deduction is the fact that the dimensions derived from existing theory give a solid basis to compare different cases with each other (Van Lanen, 2010). Based on these general theories, induction will be used to determine how these concepts occur in a specific case or context and if there can be find patterns to make generalizations to theory (Vennix, 2011).

### 3.2. Operationalization

Before conducting the analysis, the core concepts of this research need to be operationalized. This makes it possible to measure these variables within the analysis procedure (Van Thiel, 2007).

Incubation services are defined as provisions by incubators to ‘properly incubate the incubates’ (Hackett, & Dilts, 2004). To operationalize incubation services, a literature review is conducted. Several researchers make a distinction between three forms of services provided as can be derived from table 2.

<b>Incubation service</b>	<b>Mentioned in literature by</b>
1. Infrastructural facilities	Allen and McCluskey (1991); Bergek & Norrman (2008); Grimaldi (2006); McAdam & McAdam (2008); Smilor (1987b)
2. Business support	Abduh et al. (2007); Colombo & Grilli (2005); Pena (2004); Smilor (1987a)
3. Networks	Abduh et al. (2007); Clarysse et al. (2005); Collinson & Gregson (2003); Hansen et al. (2000)

Table 2: *Overview of scientific literature about incubation services*

Infrastructural facilities, business support services and networking are the main categories that can be distinguished based on the outcomes of the literature review. These categories will also be used in this research to measure the contribution of incubation services. These types of services can be further divided into more specific services in order to get operational measures. Table 3 below gives an overview of the distinction of each type of service into specific elements. These are derived from section 2.2.2.

<b>Incubation services</b>	<b>Indicators</b>
Infrastructural facilities	<ul style="list-style-type: none"> <li>• Office space</li> <li>• Shared facilities</li> </ul>
Business support	<ul style="list-style-type: none"> <li>• Coaching</li> <li>• Training</li> </ul>
Networks	<ul style="list-style-type: none"> <li>• Internal network</li> <li>• External network</li> </ul>

Table 3: *Operationalization scheme incubation services*

To operationalize the process of the development of spin-offs along which incubation services can have a contribution, a review of existing literature was undertaken. By using the stage model of Groen et al. (2008) and the literature examining the importance of human capital, four dimensions covering four types of capital are derived, namely strategic, economic, social and human. Therefore, the operationalization of the development of academic spin-off companies can be made by using these four types of capital divided. This gives the opportunity to examine which types of capital are obtained by the different types of incubation services. As described in section 2.1.1 new ventures face problems related to these types of capital. These problems will be used as the operational measures of the different capitals as operationalized by Ratinho (2011). The operational definitions and measures derived will also be used in this research to evaluate if and which incubation services provided help in solving the problems related to the four types of capital. This distinction will make it possible to derive which dimensions of the development process will be advanced. The table below gives an overview of the four types of capital and the problems related to these capitals which is established based on the study of Ratinho (2011).

<b>Capital dimensions</b>	<b>Problems perceived</b>
Strategic	<ul style="list-style-type: none"> <li>• Write business plan</li> <li>• Increase credibility</li> <li>• Get advantage over competitors</li> </ul>
Economic	<ul style="list-style-type: none"> <li>• Obtain finance</li> <li>• Save on equipment costs</li> <li>• Hire personnel</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Ally with enterprises</li> <li>• Establish suppliers contacts</li> <li>• Build market base</li> </ul>
Human	<ul style="list-style-type: none"> <li>• Enhance entrepreneurial skills</li> <li>• Compliance with administrative regulations</li> </ul>

Table 4: *Operationalization scheme development of a spinoff*

### 3.4. Data collection method

Multiple in-depth interviews will be useful to gain in-depth information about the thoughts and behaviours of the respondents (Boyce & Neale, 2006). The interviews will be semi-structured which are well suited for gaining information about the perceptions and opinions of the interviewees by probing for more clarification on answers. This type of interview consists of questions related to the phenomenon examined, however it also provides space to ask further questions during the interview. Furthermore, it enables participants to ask if anything is unclear (Barriball, & While, 1994).

To investigate the incubation services provided, business incubator firms are approached to conduct interviews. Since the research is focused on academic spinoffs as the unit of analysis, the incubators are selected by considering whether being related to a university and thus provide incubation services to academic spinoffs. The website of the Dutch Incubation Association is used to find the incubators and their contact details. The incubators are approached via e-mail and telephone. Two program managers of two incubator firms and one manager of the knowledge and technology transfer department of the third incubator participated in this research, because of their knowledge about the incubation services provided. The interviews with the program managers of the two incubator firms were held at

their office and the interview with the manager of knowledge and technology transfer is conducted via telephone.

Furthermore, the entrepreneurs of each academic spinoff company that have received incubation services from the selected incubator firms are interviewed. The spinoff firms as incubates of the incubators are found on the website of the incubator firms. Besides, the interviewees from the incubator firms are asked for sharing contact information of their incubated academic spinoff firms. In addition, there is paid attention to the following criteria in order to make the selection of academic spinoffs: a) the company founder must come from the university b) the operation of the company must be focused on the technical ideas developed within the university c) there must be a direct transfer from university to company (Gübeli & Doloreux, 2005). The entrepreneurs of the academic spinoffs who met the criteria are approached via e-mail and telephone to conduct an interview. The entrepreneurs of these firms are most useful for this research, because entrepreneurs are often from the beginning of the development process aware of the services received and will have an overview on how these have contributed to the whole process. Two entrepreneurs of spinoffs which have received incubation services from Incubator 1, three entrepreneurs of the spinoffs which have received the services from Incubator 2 and two entrepreneurs of the spinoffs that have received incubation services from Incubator 3 are interviewed. The interview guides used during the interviews can be found in appendices 1 and 2. Table 5 summarizes the interviews and makes clear which spinoffs have received the services from which incubator firm.

Incubator firms	Function	Academic spinoffs that received incubation services	Function
Incubator 1	Program Manager	Spinoff A	Entrepreneur
		Spinoff B	Entrepreneur
Incubator 2	Program Manager	Spinoff C	Entrepreneur
		Spinoff D	Entrepreneur
		Spinoff E	Entrepreneur
Incubator 3	Manager knowledge and technology transfer office	Spinoff F	Entrepreneur
		Spinoff G	Entrepreneur

Table 5: *Overview incubator firms and academic spinoff companies*

### 3.5. Data analysis

To analyze the collected data, all the recorded interviews will be transcribed. Thereafter, the transcriptions will be coded by linking the collected data to a set of previously defined concepts and codes derived from the theoretical framework. The coding will be done based on the operationalization schemes included in section 3.2. Thus, the transcriptions will be used to select pieces of text that illustrate the indicators and dimensions summarized in the operationalization schemes. In addition to this deductive way of analyzing, other findings which have a contribution to this research will also be considered. This makes it possible to look for certain underlying patterns. Appendix 3 refers to the transcripts and the coded interviews.

### 3.6. Reliability and validity

Reliability and validity within a qualitative research are often used to measure the extent of objectivity. These two measures are useful to consider the biases occurred and their possible impact. Reliability is the absence of biases occurred by accident. Reliability within qualitative research method can be divided into internal and external reliability. The internal reliability refers to whether biases are present caused by an individual researcher. A way to increase the internal reliability is including multiple researchers and methods within the research. The use of different methods within research is called data triangulation (Bryman, 2006; Van Zwieten & Willems, 2004). In addition to the interviews, there will be collected data via secondary sources as websites, organization brochures and newsletters to complement the data derived from the interviews. Moreover, the external reliability refers to whether other researchers will reveal the same outcomes in the same research setting (Van Zwieten & Willems, 2004). To ensure the external reliability of this research, the context of the research and the methods used will be explicitly described. Besides that, the conducted interviews will be completely and correctly analyzed and documented. There will be given access to these documents on request.

Internal validity concerns whether the researcher has researched what was aimed to research. Therefore, it is important to consider whether the used method and results concern the researched phenomenon. A bias may occur as result of selectively added notes unconsciously included by the researcher. To ensure the internal validity, it is important that sources of bias are described within a study. This study will give a clear description of possible causes of biases and the way of minimizing the influence of these. External validity refers to the extent of generalizability of the research outcomes to the population. Within qualitative research,

generalizability is not a central concern. The reason is that random selection does not often occur, however randomly selecting is the best way to generalize results to the population. Therefore, it is not applicable in order to generalize to populations. However, the results can be generalized based on similarity. This refers to the extent of similarity between the people and circumstances of the particular research study and the ones you want to generalize. In this study information about the researched organizations will be explicitly reported in order to give readers the chance to consider to whom the outcomes may be generalized (Johnson, 1997).

### 3.6. Research ethics

To conduct the study in an ethical way, it is important to handle the data sensitively. The researcher needs a sense of solicitude for the collected data of the participants. Therefore, the data need to be anonymized which makes sure that the participants are not traceable. This increases also the chance that participants speak openly about their ideas and opinions. One type of bias that can occur is interviewer bias referring to non-verbal behaviour of the interviewer that can cause bias in the way of responding. Therefore, it is important to remain objective as a researcher and avoid imposing your own beliefs through the questions. Besides that, the participants are free to choose if they want to participate and they should be given the right to withdraw (Symon & Cassell, 2012). Lastly, it is necessary to inform the participants about the purpose of the research, the level of their involvement, effects of their involvement and how the collected information will be used (Symon & Cassell, 2012). All this is included in the e-mails sent to the participants. After the study, all participants will be informed about the results.

## Chapter 4 – Results

This chapter implies the results of this research. The results are delivering knowledge to answer the previously formulated sub-questions. In section 4.1 there is elaborated on the incubation services provided by Incubator 1. Besides that, the problems perceived by spinoff A and spinoff B are defined and described if these are solved by the incubation services they received. In section 4.2 the incubation services provided by Incubator 2 are defined. Moreover, the problems related to the development of spinoffs C, D and E and if these are solved by the incubation services are described. Section 4.3 contains a discussion of the incubation services provided by Incubator 3. In addition to that, there is described which problems are perceived by spinoffs F and G and if these are solved by the incubation services they received.

### 4.1. Incubator 1 and spinoffs A & B

#### Which incubation services are provided to academic spinoffs?

Incubator 1 is launched in 2009 with the aim of guiding entrepreneurs who want to advance, want to growth, and utilise their potential as stated in their company brochure. Their program is available for both new businesses as existing companies that have expansion plans. As the interviewee said:

*'In principle, we do not make a selection based on ideas, but mainly motivated entrepreneurs. We do have a lot of expertise in the field of health and energy. So, we can offer more support in that direction, so we see more companies in that direction. But in principle all motivated entrepreneurs who want to build a business based on growth are welcome'*

The incubator provides a one-year programme available for entrepreneurs in which they can receive training and coaching from experts. The program is focused on personal development, team building and expansion plans. Every participant is assigned a coach which has a central role within the programme. These coaches are experienced entrepreneurs who will help them with network building, answering questions and protecting them from making mistakes. The personal coaches are assigned based on the requirements of the participant. Moreover, the incubator offers access to business and knowledge networks and workspaces. The

infrastructural facilities are in the form of flex spaces which are offered for free. In addition, there are office spaces together with associated facilities that can be rented for a low price.

According to the program manager, most companies that are part of their program need financial resources. New businesses approaching them often lack the access to networks with parties offering these financing. These connections can be provided by the incubator firm as the interviewee said:

*'But the greatest value that we deliver is really a huge network because building it yourself is very difficult. It takes a lot of time to build which entrepreneurs usually do not have. We can easily make contacts with investors'*

The external network consists of potential partners, knowledge resources, customers and financiers. The incubator organizes business events and pitch sessions to provide the tenant firms access to these actors. The incubates of the incubator mainly meet each other during the trainings. Besides that, the incubator is not very active in providing access to internal networks.

The incubator also maintains control over the services used. The companies are asked to fill in their digital diaries every week which enables the incubator to follow the process of the spinoff within their program and call in the right help in problem situations. Furthermore, the companies participating in their program have to present their business plan three times a year. These moments give the incubator and the companies a reflection on the contribution of the services provided.

Which problems faced in the process of academic spinoff development are solved by the incubation services provided?

### **Spinoff A**

The entrepreneurs of spinoff A founded the company in 2016. It appears that spinoff A had a great need for strategic assistance during their development process. The entrepreneurs had knowledge about the development of their technology, however it was unclear how to transfer their technology to the market. This is illustrated as follows by the interviewee:

*'We were in that phase of being unconscious and incompetent. From the start we felt like an entrepreneur, but we were totally unaware of the things that we missed, for*

*example in a team, as a person or as a plan. What had to be arranged at all. We were really in an exploratory phase.'*

The firm required knowledge about the appropriate business plan (strategic capital) and knowledge about who they needed within their team (human capital), because of their lack of experience in entrepreneurship. Besides that they missed an office space due to high prices (economic capital) that they could not afford in the early stages of their development. Lastly, they were striving for obtaining finance in the form of an investment (economic capital).

In this stage Incubator 1 provided the entrepreneurs with incubation services in the form of access to networks. The incubator introduced them to investors and other experienced entrepreneurs by organising events as pitch sessions and business evenings. This gave them the opportunity to establish contacts with investors and subsequently obtain financial resources (economic capital). In addition, the presence of experienced entrepreneurs enabled them to ask questions and exchange ideas about their business plan (strategic capital) to avoid mistakes.

The training and coaching, as part of business support, helped the entrepreneurs develop their entrepreneurial skills (human capital) since they began as students with little knowledge in the field of entrepreneurship. This is described by the interviewee as follows:

*'At a certain moment you grow from a student to an entrepreneur. Is really a different mindset that you get.'*

They participated to training sessions focused on the basics of entrepreneurship such as learning how to ally and establish a team, but also to specific trainings in the field of marketing and finance (human capital).

The entrepreneurs of the spinoff did not have an office space at the start of their company in 2016. Incubator 1 provided them with a workspace free of charge (economic capital). This workplace was within a building with other spinoff firms which enabled them to get in touch with other spinoff companies and share experiences (human capital). Next to this, the entrepreneur mentions that being located within the incubator increased their credibility (strategic capital), because it provided investors information of their participation to the programme of the incubator which indicated that they had potential to grow.

## **Spinoff B**

After the idea development of spinoff B in 2018, the entrepreneur began to search for cooperation partners (social capital) interested in the idea to collaborate with. This was the main reason to approach Incubator 1. Furthermore, the entrepreneur had no previous entrepreneurial experience and therefore lacked entrepreneurial skills and knowledge about building a team (human capital). The interviewee mentions that there were no problems related to economic capital, because in their stage of development they were not in need of economic capital.

Incubator 1 helped the spinoff with building a network (social network) by giving them access to their own network of partners. The following quotes of the interviewee illustrate this:

*'Most partners and most people we talked to and the network we built, was actually created after Incubator 1. Thus, Incubator 1 as an introducer'*

In addition to this, the entrepreneur communicated with an expert coach of Incubator 1 which helped him define the needed stakeholders and find the appropriate partners (social capital). The training sessions supported the entrepreneur by thinking about who to acquire for the team and how to find the needed expertise (human capital).

Next to this, the interviewee mentioned the increased credibility (strategic capital) caused by his participation to the incubator program. The entrepreneur suggests that this reveals investors that you are seriously working on your business and that you have a network which supports you.

## **Contribution of incubation services provided by Incubator 1**

Summarizing, there can be stated that the problems faced by spinoff A are solved by the incubation services provided by Incubator 1. Incubator 1 provided the firm access to its own network, business support as coaching and infrastructural facilities. These helped overcome problems related to their strategic, economic and human capital. The incubator did not contribute to the social capital, because spinoff A did not have problems related to this type of capital. Besides that, there can be stated that the incubation services of Incubator 1 were relevant to overcome the problems of spinoff B. The spinoff perceived access to the network of the incubator and business support in the form of training and coaching. The incubation services played a role in obtaining strategic, social and human capital.

#### 4.2. Incubator 2 and spinoffs C, D & E

##### Which incubation services are provided to academic spinoffs?

Incubator 2 started in 2009 as an organization with the aim of supporting new ventures younger than five year in turning their idea into a business. The incubator supports start-ups as spinoffs in the domains of Food and Agriculture which is mentioned in their mission:

*‘Our mission is to foster entrepreneurship in food and agriculture, and support entrepreneurs and their teams as they build their innovative business ideas into global enterprises with a lasting impact.’*

Another important criterion is that the start-ups which want to participate in the program must have completed the idea stage. This means that their technology needs to be ready to transfer to the market as stated by the interviewee:

*‘Only from the point that a venture can actually go to the market. So, in the phase before that, when a spin-off has made a discovery, the university is looking at what we will do with it. It may take two or three years of research before something is really ready to, for example, be sold in a supermarket or sold to a large company. And that is something that we do not immediately play a role in.’*

Start-ups can receive the incubation services by applying for the incubation program. This one-year during programme offers start-ups multiple services. Some of these incubation services belong to infrastructural facilities in the form of office spaces and flex spaces together with office facilities. Besides that, business support services are provided both in the form of coaching and trainings. The training sessions focus on developing and enhancing entrepreneurial skills, choosing the market base, building a team with the needed expertise. In addition, personal coaches are assigned to enable spinoffs to have direct contact with someone when they have questions and who can provide them also with knowledge on different areas. Lastly, the core service provided by the incubator consist of the access to a network in the food and agriculture sectors. As the interviewee said:

*‘In Agrofood, unlike in many other sectors, you need a lot of partners. If you do not have it then you have a problem. So, I think we may differ from other parties by providing that connection with the market.’*

New ventures get the opportunity to get in touch with investors and partners belonging to the network of the incubator. This is provided by organizing meet-and-greets where start-ups get in touch with these parties. The partners of incubator 2 can be seen as feedback mechanisms that deliver businesses knowledge about demands of the clients in those sectors. New businesses can use this information to enhance their business plans. Furthermore, the incubator has partners in the form of marketing, design and patent agencies which can be approached by tenant firms. Access to their internal network is provided by organizing meetings with all start-ups participating in the program. During these meetings all start-ups work on their business and get the chance to connect with others to exchange ideas and experiences about their development process.

Control over the services takes place in the form of survey that is sent to all companies participating in their program. The survey consists of questions about how they experience the content of the program.

Which problems faced in the process of academic spinoff development are solved by the incubation services provided?

### **Spinoff C**

Spinoff C faced the need for a business plan (strategic capital) to achieve governmental grants and finance (economic capital). Next to the needed strategic and economic capital, they also needed knowledge in the field of entrepreneurship (human capital). Both entrepreneurs of spinoff C were scientists and had no previous experience with starting a company. This can be derived from the following quotes

*'In the beginning we were primarily scientists, not entrepreneurs. We did not know how to do that. We had no intrinsic motivation. If you want something, you really have to do something. It was not clear how we had to do it. You cannot get anywhere without money, we needed money and incubator 2 was an important source of information there.'*

Incubator 2 provided them with a coach, however there was no match between the entrepreneurs and the coach. Therefore, the incubation service had no value in developing their business plan (strategic capital). However, the incubator played a role in finding their current investor and other ties with investors and parties to acquire financial resources (economic capital). As the interviewee said:

*'Prior to incubator 2, we did not know that the investor existed'*

Next to this, another provided coach helped them with legal affairs (human capital), because the entrepreneurs lacked knowledge on starting their own private company.

### **Spinoff D**

The entrepreneur of spinoff D referred to the need of specific expertise at the start of his company. He knew that the area of expertise was too specific and could not be delivered by an external party. However, there were different options to fill his knowledge gap in the field of entrepreneurship (human capital) during the development of his spinoff company.

Furthermore, he strived for expanding his network to get external advice and obtain financial resources (economic capital) as a starter.

The provision of an experienced coach by the incubator, enabled the entrepreneur of spinoff D to exchange ideas about the future development of his spinoff and write a suitable business plan (strategic capital) to attract investors and subsequently acquire financing (economic capital). The contribution of this incubation service is described as follows:

*'I think when creating the business plan Incubator 2 has had a lot of influence, because Incubator 2 argued for not writing a comprehensive business plan. They argued in favor of working in schemes and writing your goals and what you needed on paper as short as possible. I learned a lot from that. It had to be very to-the-point. That also made sense, because the incubator at least influenced that you actually write a business plan for a potential investor. These are people who must be able to see in one table what you want and what you need.'*

Furthermore, the coach had guided multiple spinoffs in their development and thus experience in learning new entrepreneurs the basics of entrepreneurship (human capital). This is illustrated in the following quotes of the entrepreneur:

*'At Incubator 2 there were mainly professional coaches who have long experience in entrepreneurship. They can advise on all the things that are needed during the start-up.'*

The entrepreneur participated to events organized by the incubator. These events brought people with different functions together as marketing or finance specialists. This enabled the entrepreneur to attain knowledge (human capital) and advise about available grants (economic capital). As is mentioned by the interviewee, these incubation services in the form of access to

networks also reduced his costs (economic capital) of finding other external parties as consultants for advice.

Besides that, Incubator 2 organized a business event every month which gave the entrepreneur the possibility to get in touch with other entrepreneurs and expand his network. Other incubation services that contributed to the expansion of his network, were the workspaces and flex spaces accessible for personnel of spinoff companies. Next to the advantage of meeting other entrepreneurs, these spaces together with facilities were provided for reduced costs (economic capital).

### **Spinoff E**

The entrepreneurs of spinoff E already had business experience before starting their current company. Therefore, they did not face much problems related to lack of knowledge or entrepreneurial skills, because of the knowledge they had acquired earlier. However, the entrepreneurs faced problems in acquiring funding (economic capital) at the start of their company. Besides that, they wanted to have an external advisor to exchange ideas.

The entrepreneurs received a coach from Incubator 2 with whom they had a number of conversations to exchange some ideas. However, they noticed that they were limited to the knowledge, experience and network of that coach. The incubation service did not contribute to the creation of human capital. Therefore, the entrepreneur searched for other external advisors.

Besides that, the problem related to economic capital is solved by the incubator firm, because the incubator gave the entrepreneurs the possibility to pitch their idea to a team of investors and subsequently achieved financing (economic capital). Moreover, the meetings organized by Incubator 2 enabled the entrepreneurs to get in touch with other spinoff companies and collaborate (social capital). Another incubation service that played a role in attaining economic capital, is the flex space used by spinoff E. This resulted in saving costs on office space and facilities (economic capital).

When the entrepreneurs talk about their company, for example during business events, they mention the support from Incubator 2 to their company. According to the entrepreneur of spinoff E this increases the credibility (strategic capital) of their company, because of the internationally known quality of the incubator. This is illustrated in the following quotes of the entrepreneur:

*'I have found out that Incubator 2 is internationally regarded as a quality stamp. For example, if I mention 'I participate in the program of Incubator 2' in London at a food event, they find it good to hear. So, a kind of credibility check. That is also the positive.'*

### **Contribution of incubation services provided by Incubator 2**

Summarizing there can be stated which problems are solved by the incubation services received. The incubation services, business support and access to networks, have contributed to the creation of economic and human capital within spinoff C. However, a mismatch occurred between the entrepreneurs and the first coach assigned. Therefore, business support in the form of a coach did not help by writing their business plan and thus obtaining strategic capital. Moreover, Incubator 2 helped spinoff D overcome the problems faced by providing the appropriate services. The incubator played a role in obtaining economic and human capital by providing infrastructural facilities and access to its network. Another mismatch occurred also between the spinoff E and the coach assigned by Incubator 2. This formed a barrier to the creation of human capital. However, the services in the form of business support and access to networks helped the spinoff solving problems related to their strategic, economic and social capital.

### **4.3. Incubator 3 and spinoffs F & G**

#### Which incubation services are provided to academic spinoffs?

Incubator 3 is established in 2009 by five co-founders including the municipality and the university in the region. The aim of the incubator is described by the interviewee as:

*'They established incubator 3 with the aim of speeding up business in this region. Ultimately, ensuring more jobs in the region.'*

The incubator provides services to help existing companies innovate and new ventures in their development process. An important criterion is that the companies have innovative business cases, thus only companies that want to innovate can approach them. As the interviewee said:

*'But it must be about innovative business cases. We are not available for the bakery around the corner, we cannot help him. Unless he is going to come up with something completely new, a very innovative business idea, but if he just wants to roll out his daily business, we are not for that. We are there for companies which want to innovate, which want to do new things, enter new markets'*

The incubation services needed are selected in consultation with the companies by evaluating their needs. The main services provided by Incubator 3 are business support services in the form of coaching and training. The training sessions are planned monthly and focused on subjects as team building and writing grant proposals. In addition, the coaches are selected based on the expertise and experience that they have in entrepreneurship. The tenant firms can approach these coaches whenever they have questions or face problems. This helps the starters build entrepreneurial competencies and hire knowledge in different areas of a business as illustrated by the interviewee:

*'When I look at the spin-offs that come from the knowledge institutions, so researchers who are going to start a company, you almost always see that the technical knowledge of the product is all right. But on marketing, sales and finance, we have to look for reinforcement for the team, because those competencies are missing. That is what we see from the spin-offs as standard.'*

Another incubation service belonging to the service portfolio of Incubator 3 is the access to networks. The incubator organizes networking events that give companies access to their network consisting of investors which can be approached for financing questions. Besides that, scientists are part of their network as a knowledge source for tenant firms. In order to enable tenant firms to meet each other, the incubator organizes content specific clusters. This gives companies the opportunity to meet other incubated firms within the internal network of the incubator to share information about their focus area or establish alliances. Incubation services in the form of infrastructural facilities are not provided by the incubator.

Incubator 3 is not active in monitoring the provided services. The only way of is asking entrepreneurs about their experience with the training and coaching sessions. This is done in an informal way.

Which problems faced in the process of academic spinoff development are solved by the incubation services provided?

### **Spinoff F**

At the early stages of development, the entrepreneurs of spinoff F did not have an entrepreneurial attitude. They were interested in transferring their technology to the market but lacked knowledge on how to do that (human capital). The first need of the entrepreneurs was to have an appropriate business plan (strategic capital), a team and knowledge in legal

affairs (human capital). Besides that, they were in need for acquiring financing in the form of grants and loans (economic capital), because they were not selling products and due to that did not have operating income.

Incubator 3 delivered business support in order to setting up the company structure (strategic capital). As the interviewee said:

*'That group of people actually helped us set up the right structures in the beginning, so how do you get start-up funding, how do you get other good people on board. We succeeded. We have collected a number of scholarships with that. We were able to set up the company with that and we finally received an investment last year.'*

As can be derived from the citation, the business support in the form of coaching resulted in the acquirement of scholarships and an investment (economic capital). That investment enabled them to expand the capabilities of their management by hiring an experienced managing director (human capital). Furthermore, the business support resulted in attaining knowledge about the basics of entrepreneurship and in the field of legal regulations (human capital) to start their private company. Another coach was provided by the incubator to support the entrepreneurs in establishing a business plan. However, due to the mismatch between the coach and the entrepreneurs the coach did not help by writing their business plan.

Another service provided consisted of the access to networks. This gave them the opportunity to get in touch with banks and investors (social capital) for acquiring finance (economic capital). Spinoff F found their current investor (social capital) for example through the network provided by the incubator. Another party that the incubator introduced to them was a firm analysing the investor readiness of start-ups and helping start-ups by writing a grant proposal. The access to networks resulted also in alliances with other external firms (social capital). The entrepreneurs of spinoff F were unaware of the existence of these firms and investors before approaching Incubator 3.

### **Spinoff G**

The entrepreneur of spinoff G had repeatedly experienced what comes into play at starting a company. However, he lacked some knowledge in the legal field (human capital). Moreover, there was need to get in contact with investors and subsequently acquire finance (economic capital) to expand his business.

The incubator gave access to investors (economic capital) by organizing events where investors came to listen to business plans that could be invested in. These events made it possible for the entrepreneur to get in touch with the needed parties, however he did not find an investor to acquire the needed finance. A coach assigned by the incubator helped him arrange a loan application (economic capital). Moreover, a coach was assigned to overcome the barriers caused by lack of knowledge in the field of legal issues (human capital). The services that the entrepreneur has received are limited, because according to the interviewee his business model is not difficult. The entrepreneur approaches the incubator whenever he needs as can be derived from the following quotes:

*'You are always welcome and that is nice. If you have a legal question, you can simply ask it there.'*

### **Contribution of incubation services provided by Incubator 3**

Business support in the form of coaching solved the problems related to economic and human capital within spinoff F. However this service did not help by overcoming the problem of writing an appropriate business plan due to a mismatch. Furthermore, the access to the network of incubator 3 helped them finding an investor and resulted in alliances. Spinoff G perceived incubation services in the form of access to networks. However, no investor was found within this network to obtain finance. Besides that, coaches assigned by incubator 3 helped the entrepreneur to obtain finance and knowledge in the field of regulations.

#### **4.4.Overview**

The first sub-question: *Which incubation services are provided to academic spinoffs?* is answered with the collected data from the incubator firms. All three incubators provide incubation services in the form of business support and access to networks. Incubator 1 and Incubator 2 also provide incubation service in the form of infrastructural facilities, however the service portfolio of Incubator 3 does not contain this type of service. By looking at the specific services belonging to the main three categories of services, there can be found differences. These differences are most evident in the business support and access to networks services. The infrastructural services provided by Incubator 1 and Incubator 2 are both in the form of office space and flex spaces together with the provided facilities.

Besides the infrastructural facilities, in the operationalization section of this research, there was made a distinction between coaching and training belonging to business support services. All three incubators provide both coaching and training, however the spinoffs included within

this research did not participate in many trainings. Therefore, no clear distinction can be made into which subjects are covered by a coach and which by the provision of trainings.

Considering the descriptions of the trainings and coaching given by the incubator firms, the subjects covered during trainings and coaching sessions are comparable. A main difference is that the coaches can give more firm specific advice.

By looking at the access to networks that the incubators provide, there can be seen a clear distinction between the internal and external networks of the incubators. The internal network of all incubators consists of the tenant firms. Furthermore, the incubators differ in the actors within their external networks. Incubator 1 has an external network that consist of potential partners, knowledge resources, customers and financiers. The external network of Incubator 2 contains investors and partners. Other actors within the external network are marketing, design and patent agencies which can be approached by the tenants themselves. Incubator 3 has an established network of investors and scientists.

Three aspect were identified from the results which can play a role in what contribution the provided incubation services have. 1) The first aspect is the selection of the companies by the incubator to which they provide incubation services. Incubator 1 and Incubator 3 do not have a sector focus and deliver incubation services to both start-ups and existing companies. However, Incubator 2 selects only companies active in the food and agriculture sector which may participate to their program. The sector focus is also reflected in the incubation services provided, because the program manager of Incubator 2 mentioned that they provide access to networks which consists of actors in the food and agriculture sector. 2) The second aspect is the control which is carried out by the incubators. Incubator 1 has a clear way to control the services provided and how these help their tenant firms during their development. Incubator 1 monitors by asking companies to keep a digital diary. Besides, the incubator asks the companies to present their business plans. Incubator 2 sends a survey to all tenant firms to map their experiences with the program. Incubator 3 does not have comparable control tools. The monitoring takes places in an informal way by asking entrepreneurs about their experiences with the program. 3) The third aspect refers to the way access is provided to the networks. The way of providing access to external networks is broadly similar, however there is a difference in the way the academic spinoffs receive access to the internal network of their incubator firm. Incubator 1 is not active in providing these connections. Incubator 2 provides access to the internal network by organizing meetings in which the participating ventures get the opportunity to exchange ideas and experiences. Internal networking is provided by

Incubator 3 among tenant firms by establishing content specific clusters. The firms belonging to a cluster have comparable business ideas and get the chance to share specific knowledge and form alliances with firms in their own cluster.

The table below summarizes the provided services by the incubators. Moreover, there can be derived which types of capital are obtained by solving the related problems to these types of capital with the help of the received services.

<b>Incubators</b>	<b>Provided incubation services</b>	<b>Solved problems related to</b>
<b>Incubator 1</b>	Infrastructural facilities	Economic capital
		Human capital
	Business support	Social capital
		Human capital
	Access to networks	Strategic capital
		Economic capital
<b>Incubator 2</b>	Infrastructural facilities	Economic capital
		Strategic capital
	Business support	Strategic capital
		Economic capital
		Human capital
	Access to networks	Economic capital
		Social capital
		Human capital
<b>Incubator 3</b>	Business support	Strategic capital
		Economic capital
		Human capital
	Access to networks	Economic capital

Table 6: *Overview of provided incubation services and types of capital obtained by solving related problems*

The second sub-question: *Which problems faced in the process of academic spinoff development are solved by the incubation services provided?* is answered with the collected

data from the academic spinoffs. As can be derived from the results three spinoffs that have received infrastructural facilities in the form of office space and facilities mentioned all a reduction in equipment costs, thus the obtaining of economic capital.

The incubation services in the form of business support helped five spinoffs in obtaining human capital in the form of enhancement of their entrepreneurial skills. The coaching and training sessions on entrepreneurial subjects fulfilled their gap of knowledge. Besides that, three spinoffs faced problems with legal affairs as part of human capital. These problems, operationalized as compliance with administrative regulations, are solved by the coaches assigned. In addition to that, the coaches provide coaching in writing a business plan. One of the spinoffs did advantage from this coaching, because the coaching enabled them to establish their business plan. However, as can be derived from the results there was a mismatch between spinoff C and the coach assigned by Incubator 2. A comparable situation occurred within spinoff F. Due to this mismatch, the problem of the spinoffs in writing a business plan was not resolved by the business support provided. Besides that, spinoff E received also a coach to exchange ideas about their business. However, the entrepreneurs mentioned that they were limited to the knowledge, experience and networks of these coach which were not relevant for the spinoff.

Lastly, there is evaluated what types of capital are obtained by the provision of access to networks. Five of the seven spinoff companies faced the problem of obtaining finance which is solved by the networks of their incubators. These incubators provide all access to investors which are part of their network. It also appeared in two cases that the access to networks resulted in alliances, thus obtaining social capital. Moreover, a spinoff solved the problem of writing a business plan with the help of experienced entrepreneurs within the network of the incubator firms. Besides that, spinoff D faced problems illustrated as lack in knowledge in marketing and finance. The entrepreneur of this firm did overcome this problem with the help of a specialist belonging to the network of its incubator.

Three aspects are derived from the results. 1) The first one is the experience of the entrepreneurs of the academic spinoffs. Two entrepreneurs had previous experience in entrepreneurship. It is remarkable in these cases that they had no problems related to the lack of entrepreneurial skills. The unexperienced entrepreneurs all faced problems due to their lack of knowledge and skills in this field. 2) The second aspect is the indirect obtaining of capital. As can be derived from the results the solving of certain problems by the incubation services provided, resulted in obtaining other types of capital. One of these is that spinoff F received

access to an investor which resulted in the obtainment of finance and subsequently this enabled the firm to hire a managing director, thus obtaining human capital. Another example is that the coach assigned to spinoff D helped in solving their problem of writing a business plan. Subsequently, this business plan enabled the firm to attract finance of an investor. 3) The last aspect is the finding that the credibility of the academic spinoffs not only increases when physically located within an incubator firm. Two entrepreneurs referred to their increase in credibility caused by the fact that they participated in the incubation program. According to the entrepreneurs of the spinoffs, external parties with whom they get in touch know the incubator firms and this gives a signal of quality. Thus, participating in an incubation program can also be distinguished as an aspect influencing the attaining of capital.

## Chapter 5 – Conclusion and discussion

First of all, the conclusion of this research is presented. In the discussion, the theoretical and practical implications are discussed. Besides that, there is elaborated on the limitations of this study and on future research directions.

### Conclusion

The aim of this research was to contribute to the knowledge about how provided incubation services contribute to the development of academic spinoffs. Three incubator firms and seven academic spinoffs are included. The research question is as follows: *How do provided incubation services contribute to the development of academic spinoffs?*. In order to answer these question, two sub-questions were formulated and answered. The first sub-question is: *Which incubation services are provided to academic spinoffs?* and the second: *Which problems faced in the process of academic spinoff development are solved by the incubation services provided?*. The results show that both infrastructural facilities, business support and access to networks contribute to the development of spinoffs by solving problems related to the four types of capital.

Firstly, the results showed that the incubators differ in the incubation services provided. Incubator 1 and Incubator 2 provide all three types of services, however Incubator 3 does only provide two of these and does not provide infrastructural services. In the cases, describing the spinoff firms which have received infrastructural facilities, it emerges that these services play a role in solving the problems related to strategic, economic and human capital. Therefore, it can be stated that Incubator 3 lacks a service that contributes to solving problems related to these two types of capital.

One of the incubation services that contribute to the development of spinoffs are infrastructural facilities. From the results can be derived that the spinoffs which have received infrastructural facilities from their incubator in the form of office space and facilities saved on costs of renting a space elsewhere for higher costs. This contributes to economic capital. Besides that, the credibility of a spinoff that made use of infrastructural facilities of its incubator firm increased, thus this type of service plays a role in overcoming the problem of low credibility that spinoffs face due to their newness in the market. Lastly, shared infrastructural facilities increase the chance of tenant firms meeting each other and subsequently share knowledge and experience.

Secondly, the incubation services in the form of business support also have a contribution to the development of spinoffs. As can be derived from the results the training and coaching sessions contributed to obtaining human capital. In five of the seven cases, the entrepreneurs missed experience in entrepreneurship and had the need to fill this knowledge gap. The coaches helped the entrepreneurs enhance their entrepreneurial skills which is an aspect of human capital. The problem of compliance with administrative regulations is also solved with the business support received by three spinoff firms. One spinoff facing the problem of writing a business plan, related to strategic capital, solved this with the help of a coach. Furthermore, the entrepreneurs of spinoffs C, E and F were introduced to coaches which resulted in a mismatch.

Lastly, the access to networks played also a role in solving the problem of obtaining finance. Besides that, the provision of access to networks to two spinoffs resulted in alliances between the spinoffs and external firms, thus obtaining social capital. Furthermore, in one case occurred that the incubator provided a connection between a spinoff and an external specialist belonging to the external network of the incubator. This helped overcoming the problems of lack in entrepreneurial skills as part of human capital.

Six aspects are derived from the results. The first one is the sector focus of the incubator firms. As stated, Incubator 1 and Incubator 3 do not have a sector focus and deliver services to a broad range of businesses. However, Incubator 2 is focused on the food and agriculture sector and do not work with firms outside this sector. This sector focus is also reflected in the services provided since they provide sector specific incubation services. There can be assumed that an incubator with a sector focus can provide more specific services and thus knowledge sources in the form of coaching and training related to the needs of firms active in their sector. As stated earlier, the networks provided by Incubator 2 are also sector specific and consists of actors belonging to the food and agriculture sector. This research delivers no direct findings of the influence of this aspect, however this can be considered in future research. The second aspect is the control that incubators maintain over their services provided. Incubator 1 actively maintains control over the services provided, however Incubator 2 and Incubator 3 have less control. There can be assumed that this can play a role in the mismatches that occurred in spinoffs C, E and F. Spinoffs C and E received the services from Incubator 2 and spinoff F from Incubator 3. Maintaining control over the incubation services provided and the tenant firms can give incubators the chance of evaluating problems in an early phase and deliver more targeted services. Furthermore, another aspect derived is

how there is provided access to the internal networks of the incubators. Incubator 1 is not active in providing connections between tenant firms, however Incubator 2 and Incubator 3 provide these connections by organizing meetings and clusters. These meetings and clusters give tenant firms the opportunity to work together. There can be assumed that the chance of developing alliances, thus social capital, will be higher when incubators actively support these connections. The fourth aspect derived is the entrepreneurial experience of entrepreneurs. As can be derived from the results, two entrepreneurs did have entrepreneurial experience before approaching an incubator. It is remarkable in these cases that they had no problems related to the lack of entrepreneurial skills. Therefore, this aspect can play a role in what problems are perceived. The fifth aspect is described as the indirect obtaining of capital. There can be derived from the cases that the incubation services provided solved a problem and subsequently resulted in obtaining another type of capital. Therefore, it can be assumed that the four types of capital are also in interaction with each other. The last aspect derived implies the increase of credibility by participating in an incubation program. Two entrepreneurs mentioned that the credibility of their spinoff increased by mentioning that they participate in an incubation program.

In conclusion, there can be stated that all three types of incubation services contribute to the development of academic spinoffs by solving problems related to the four types of capital. No direct relation can be stated between an incubation service and a type of capital, because the results show that all incubation services contribute by solving multiple problems related to different types of capital. Missing one of these incubation services, can hinder incubators in overcoming certain problems related to the development process of academic spinoffs. Besides, the wrong match between a coach and entrepreneurs seem to result in a barrier to solve problems related to strategic and human capital. Moreover, six aspects derived from the results seem to play a role in if and how problems related to the development process are solved by the incubation services provided. However, future research is needed to deliver evidence for the significant role of these.

## **Discussion**

This section contains a discussion of theoretical and practical implications. Lastly, the limitations of the research are described and some future research directions are proposed.

### **Theoretical implications**

This study contributes to scientific knowledge by providing insights into the contribution of incubation services to the development of academic spinoffs. Much literature is available about the performance of incubator from the perspective of the incubator, but little literature can be found from the perspective of the firms receiving the incubation services (Roseira, et al., 2014; Xu, 2009). This study delivers insight from the perspective of academic spinoffs. The research shows that academic spinoffs perceive problems related to their development process and it gives insights in which problems can be solved by which incubation service. Instead of measuring the performance of these services from the incubators' perspective, it is evaluated by examining if the problems perceived by academic spinoffs are solved.

Besides that, the research focused on analysing academic spinoffs which is different from existing literature that is mainly focussed on large firms or general small firms. The findings are relevant in this field, because spinoffs often lack the needed resources during their development process which results in constraints during their development (Gredel, Kramer & Bend, 2012). This study provides insights into the relevance of external support for spinoffs to overcome these constraints, because the results show that all three types of services help in solving problems related to their development process.

### **Practical implications**

First of all, the three incubation services involved within this research help overcoming problems related to the development of spinoffs. Incubator firms can use these insights to select the appropriate services to solve a certain problem faced by a tenant firm. This gives them the opportunity to consider more specifically which service is needed to solve a particular problem.

Moreover, it can help incubator firms enhance their service portfolio. The research shows that all three types of incubation services help solving certain problems related to the four types of capital. The unavailability of one of the incubation services examined within this research, can hinder spinoffs in overcoming these problems thus hinder them in obtaining certain capital. The underdevelopment increases the chance of failure, because entrepreneurs need sufficient capital in each dimension to create a sustainable firm (Groen, 2005). Therefore, incubators which lack one or more of these services may consider to add a certain service examined within this research to their portfolio. This ensures that they have the necessary services to help new businesses during their development.

In addition, the mismatch between a coach and the firm perceiving the assistance of the coach seems to hinder the solving of problems. This gives incubators insights in the need to ensure the match between knowledge sources and the knowledge receiving companies. A mismatch can cause spinoffs to miss out on development in strategic and human capital.

Besides, this study delivers insight from the perspective of spinoff companies that often lack the needed resources during their development process and search for external parties to fulfil their resource gaps (Gredel, Kramer & Bend, 2012). This study can encourage spinoffs to approach an incubator in those situations, because the results deliver evidence for the contribution of the incubation services to solve problems faced by new ventures during their development process.

Lastly, universities are the parent organizations of academic spinoffs and deliver a context conducive to the creation of spinoff ventures. Universities support spinoff creation by making mechanisms such as incubators available for their academic spinoffs. Therefore, universities can also use these insights to review the incubation services provided by their available incubators and look if the needed incubation services are available that solve problems related to the development process. This helps them decide if there are more support mechanism needed to help their spinoffs during their development process.

### **Limitations**

The data of this research is collected by interviewing the manager of knowledge and technology transfer of one of the incubator firms, two program managers of incubator firms and seven entrepreneurs of academic spinoff companies. Due to time restrictions it was not possible to include more participants. Therefore, the research is too small and thus not generalizable to all incubator firms and academic spinoff companies. This decreases the external validity of the research. As stated by Saunders et al. (2011) the results of a case study can only be generalized to theory.

Besides that, it was not possible to transcribe one of the interviews, because the participant did not accept the recording of the interview. Instead of transcribing, the answers of the participant are noted during the interview. This can be of influence on the internal validity, thus on how well the meanings of the participants are interpreted. In order to reduce the biases, a member check is conducted for the interview that was not recorded. The notes are sent to the interviewee. Based on the check, small changes were made to the notes. Besides that, the interviews are not all conducted in the same setting. Some of the interviews are

conducted face-to-face while a certain amount are conducted via telephone. This can also be of influence on the internal validity

Moreover, the research is conducted by one researcher. Each researcher has other opinions and interprets data in a different way (Peshkin, 2000). Therefore, there could be occurred biases which influence the reliability of the research. Therefore, attention is paid to formulate the questions unambiguously to prevent interpretation mistakes. Another option is to involve more researchers in future research to reduce these types of biases.

The model of Groen et al. (2008) makes a distinction between four types of capital. During the research, there is decided to bypass the cultural dimension because of time restrictions. However, the study of Groen et al. (2008) delivers evidence for the importance of cultural capital for the development of new ventures. Therefore, a limitation of this study is that it does not cover this dimension. Longitudinal research needs to be conducted involving this type of capital to cover the whole model established by Groen et al. (2008).

Another limitation is that the problems of getting advantage over competitors, establishing supplier contacts and building a market base are not experienced by the academic spinoffs involved within this research. Therefore, the findings are limited and no findings are implied about the solution of these problems with the help of perceived incubation services.

Lastly, the developmental problems used as indicators within this research are derived from existing studies. It is possible that other types of developmental problems are perceived among the academic spinoff companies involved. However, due to the limited time for this research existing findings are used to derive the indicators for this research. Therefore, it may be possible that the set of indicators could be extended.

### **Future research directions**

Future research about the contribution of incubation services to the development of academic spinoffs is recommended. This research investigated this subject within three incubator firms and seven academic spinoff companies, but in order to generalize there could be conducted a research among more incubator firms and academic spinoff companies.

Besides that, not all problems operationalized are evaluated, because not all problems were perceived by the academic spinoffs as mentioned in the limitations section. Therefore, it was not possible to state that all problems related to the four types of capital can be solved by the three incubation services. Future research can expand the number of academic spinoffs

involved. This increases the chance that there are companies involved that have experienced problems which are not evaluated within this study.

Furthermore, the operational measures of incubation services and the development of spinoffs are derived from scientific literature, so there could be factors that have not been derived and thus not been included in this research. Future research can extend or enhance the operational measures of incubation services and the types of capital.

Moreover, a distinction is made within this research among the main incubation services. The first one is the distinction between coaching and training. This distinction is used to formulate the indicators and questions in order to evaluate if business support is provided and perceived by incubates. However, this research does not deliver findings for these specific types of business support services. The second example is the distinction between internal and external networks to measure the access to networks provided and received. The results do not deliver specific findings for these. Therefore, future research can be conducted to map also the difference in contribution of these specific types of incubation services.

Lastly, six aspects are derived from the results that can play a role in solving the problems related to the development process of academic spinoffs. One of these aspects is the sector focus of the participating incubator firms. For future research, it could be investigated if the specific incubation services provided by sector focused incubators are more effective in solving problems perceived by academic spinoffs than incubator firms which are not sector focused. Another aspect derived was the control maintained by incubator firms. It can be investigated if actively monitoring the incubation services provided, helps in reducing the mismatches that may occur. The third aspect consist of the way of providing access to internal networks. The results showed that two incubators were more active in providing these connections and one incubator not at all. It could be interesting for future research to investigate if actively ensuring these connections increases the chance of alliances. The fourth aspect derived is the experience of entrepreneurs. This aspect can be involved in future research to examine if the extent of experience of an entrepreneur plays a role in what problems are perceived. The fifth aspect derived is described as indirect obtaining of capital. Future research can focus more on the interaction between the four types of capital. The last aspect implies the increase of credibility by participating in an incubation program. This aspect can be involved within future research to evaluate in which extent this is of influence on credibility.

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## Appendices

### Appendix 1: Interview guide incubator firms

#### General information

**Name participant:**

**Company:**

**Function:**

#### Introduction

- Introducing myself
- Ask permission to record the interview
- Explain the research question and purpose
- Ask interviewee to introduce him or herself

#### Interview questions

- Hoe worden de bedrijven gekozen aan wie de incubation services worden geleverd?
- In welke mate verschillen de bedrijven aan wie de services worden aangeboden?
- Zijn er bepaalde criteria waaraan bedrijven moeten voldoen om in aanmerking te komen voor de incubation services? Zo ja, welke criteria?
- In welke fase van het ontwikkelingsproces kunnen bedrijven bij jullie terecht voor het ontvangen van incubation services?
- Welke incubation services worden door jullie aangeboden?
  - ➔ Infrastructurele faciliteiten
  - ➔ Business support
  - ➔ Netwerken
- Welke services behoren tot jullie kern services?
- Waar bestaan de infrastructurele faciliteiten uit?
- Waar bestaat de business support services uit?
- Waar bestaan jullie netwerken uit?
- Op wat voor manier worden deze services aangeboden?
- Hoe wordt bepaald welke services de bedrijven nodig hebben?

- Hoe vaak worden de services aangeboden?
- Wie worden ingezet om deze services aan te bieden?
- Hoeveel contact is er tussen uw bedrijf en de incubated bedrijven?
- In wat voor vorm vinden de contact momenten plaats?
- Hoe wordt er controle gehouden op het gebruik van de services?
- Hoe worden de behoeften van de bedrijven in de gaten gehouden?
- Is er sprake van een exit policy? En zo ja, wat houdt dit in?
- In welke mate denkt u dat uw geleverde services bijdrage aan de ontwikkeling van academische spinoffs?
- Hebben sommige services meer waarde voor de ontwikkeling van academische spinoffs dan andere services? En zo ja, welke en waarom?

<b>End</b>
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- Thank you for participating
- Ask for documents + contact details academic spinoffs
- Questions and comments
- Ask for sharing of results

## Appendix 2: Interview guide academic spinoffs

### General information

**Name participant:**

**Company:**

**Function:**

### Introduction

- Introducing myself
- Ask permission to record the interview
- Explain the research question and purpose
- Ask interviewee to introduce him or herself

### Interview questions

- Hoe is het idee van uw bedrijf ontstaan?
- Heeft u eerder ondernemerschapservaring gehad?
- Tegen welke problemen liep het bedrijf aan tijdens de ontwikkeling?
- In welke fase van het ontwikkelingsproces kwam de incubator in beeld?
- Wat was de reden om een incubator in te schakelen?
- Wat voor services ontvangen jullie/hebben jullie ontvangen van de incubator?
- Zijn er naast de incubator ook andere bedrijven waarvan jullie vergelijkbare services (hebben) ontvangen? Zo ja, welke bedrijven en wat voor services?
- In wat voor mate is er behoefte aan contact met de incubator?
- In wat voor mate is er contact met andere academische spin-off bedrijven?
- Aan welke services hebben jullie behoefte gehad gedurende de ontwikkeling van de spin-off (dus verschilt dat per ontwikkelingsfase?)
- In hoeverre speelt de incubator een rol bij het oplossen van problemen gerelateerd aan strategisch kapitaal?
  - ➔ Schrijven businessplan
  - ➔ Credibility
  - ➔ Verkrijgen van voordeel ten opzichte van concurrenten

- In hoeverre speelt de incubator een rol bij het oplossen van problemen gerelateerd aan economisch kapitaal?
  - ➔ Behalen van financiële middelen
  - ➔ Besparen op kosten
  - ➔ Aannemen personeel
- In hoeverre speelt de incubator een rol bij het oplossen van problemen gerelateerd aan sociaal kapitaal?
  - ➔ Samenwerkingen met bedrijven
  - ➔ Contact met leveranciers
  - ➔ Uitbreiden van de markt
- In hoeverre speelt de incubator een rol bij het oplossen van problemen gerelateerd aan menselijk kapitaal?
  - ➔ Ontwikkelen ondernemende skills
  - ➔ Voldoen aan administratieve voorschriften

<b>End</b>
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- Thank you for participating
- Questions and comments
- Ask for sharing of results

### Appendix 3: Extra appendices

There are extra appendices available which are not included within the Master thesis. The following appendices can be provided on request:

- Appendix a: Interview transcripts
- Appendix b: Codebook