Unpacking Incubation:
Factors affecting incubation processes and their effects on new venture creation

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Abstract

Despite the increasing recognition of the importance of the incubation process for new venture creation, the main focal point for scholars has been on other areas such as the outputs of incubation. Little attention has been given to unpacking how the incubation process functions and the variables associated with the incubation process. In this thesis, five important questions central to this gap in understanding are addressed: (1) how does the incubation process function?; (2) how do incubation processes differ?; (3) how does an incubator's objectives and resources affect how the incubation process functions and influence potential new venture creation?; (4) how does an entrepreneur's experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affect their ability to start a new venture in the context of the incubation process?; and (5) how and in what ways do the principal elements of the regional innovation system (RIS) play a role in the incubation process and influence potential new venture creation? These questions are addressed in two steps. First, key literatures on incubation, technology transfer, entrepreneurship education, entrepreneurship and RIS are integrated to position the study and form a conceptual framework for the investigation. Second, in-depth qualitative empirical investigations of three different incubation processes (a regional incubation process, a student incubation process, and a university incubation process) within the same RIS (the North East of the UK) are utilised to unpack these central issues and address the research questions.

The thesis' central contribution is to the incubation literature providing new insights on how the incubation process functions. By adopting an integrated approach, which includes analysing how the process is affected by the objectives and resources of the organisation offering the incubation support, the experience and background of the entrepreneur, the role of the RIS, and the process components, the empirical analysis presents key findings. The empirical analysis highlights the importance of the degree of involvement of incubator managers and the importance of using multiple selection criteria in the effective selection of incubatees to improve the likelihood of new venture creation. It was also found that the broader range of co-production modalities utilised by incubator managers who themselves had entrepreneurial experience, the more effective

the business support process, and the more likely new venture creation. In relation to objectives and resources, the findings suggest that the higher degree of resources the incubation process provides to achieve its objectives, the more effective the business support process, and the more likely new venture creation. Entrepreneurial characteristics such as prior entrepreneurial experience, industrial experience, education and family background were found to positively affect the entrepreneur during the incubation process and increased the likelihood of new venture creation. In relation to the RIS, it was found that its principal elements, specifically regional organisations and actors and the socio-economic and cultural setting, play a role in the incubation process and influence potential new venture creation. It was also found that there are clear differences between different incubation process types. Five other inductively-derived constructs (e.g. risk aversion, incubator management learning, duty of care, entrepreneurial knowledge and social capital) were also found to further explain how the incubation process functions which also represents a main contribution of the study.

A theoretical model of incubation is presented that better specifies the inter-relationships between the internal and external constructs relating to the form of the incubation process, the entrepreneurs themselves, and the RIS. These insights are articulated as a series of propositions to guide future research. Policy implications are also discussed to provide practitioners with the means to improve the incubation process.

To Emmanouil Tranos, who makes me want to be a better person.

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Glossary

BDMs	Business development managers
CAQDAS	Computer-assisted qualitative data analysis software
CDA	Confidentiality agreement
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CVC	City Venture Corporation
EIR	Entrepreneurs in residence
ERDF	European Regional Development Fund
GDP	Gross domestic product
HEI	Higher education institutes
IP	Intellectual property
IRQ	Invention record questionnaire
ISI	International systems of innovation
KIBS	Knowledge intensive business services
LIS	Local innovation systems
NIS	National innovation systems
NSC	Newcastle Science City
RIS	Regional innovation system
RQs	Research questions
SBA	U.S. Small Business Administration
SI	Systems of innovation
SIS	Sectoral systems of innovation
SMEs	Small and medium-sized firms
TEA	Total Entrepreneurial Activity

TIM	Territorial innovation models
TIS	Territorial systems of innovation
TTOs	Technology transfer offices
UKBI	U.K. Business Incubation
US	United States

Chapter 1: Introduction

1.1 Context

New venture creation is important to the growth and competitiveness of economies, industries and regions. Some of the positive effects include contributing to job creation, the regional knowledge stock and amplifying innovation in a region (Fritsch and Mueller, 2004). For instance, in the United States (U.S.), without new start-ups, there would have been no net job increase for most of the years from 1977 to 2005 (see Figure 1.1). In this period, net job creation in the U.S was always positive for new start-ups while this is not the case for existing businesses. In the U.K., the number of small and medium-sized firms (SMEs) has increased by 50% in the last 25 years and they are now responsible for more than half of the all the jobs and contribute towards 35% of gross domestic product (GDP) (Beaver and Prince, 2004:34).

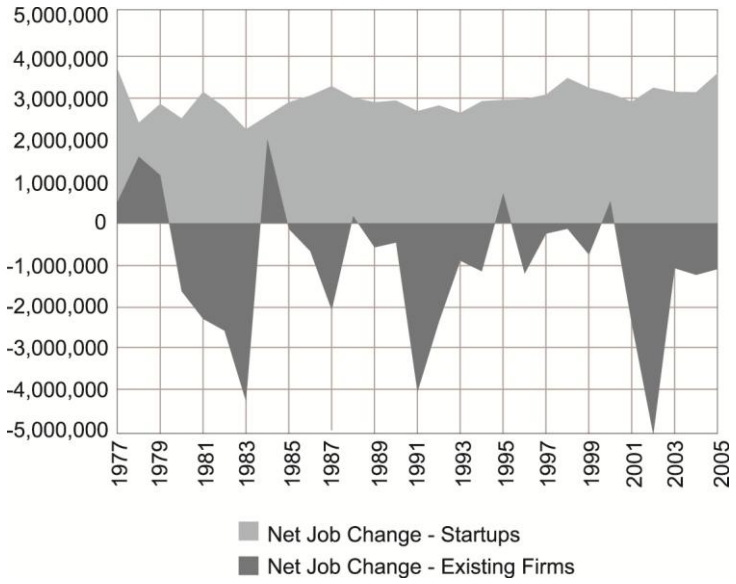

Figure 1.1: Start-ups and new job creation in the U.S. (Kauffman Foundation, 2010: 2)

As a result of the impact of small and medium-sized enterprises, support for new venture creation and small businesses is a source of significant investment by governments. In the United Kingdom, total public expenditure on supporting small business is estimated to be £10-£12 billion, or over 2% of all Government expenditure (Richard, 2008). Prior to October 2012, the Business Link Advisory Service, a government-funded business advice and guidance service in England, was funded by

government funds representing £154 million per annum to support new start-ups and to provide advice to existing small enterprises (Department for Business and Innovation & Skills, 2012).

However, the failure of new ventures is a common occurrence (Timmons and Spinelli, 2007). According to Shane (2008), based on data from the Bureau of the Census produced for the Office of Advocacy of the U.S. Small Business Administration (SBA), from 1992 to 2002, half of businesses closed within five years, and two-thirds are no longer operating ten years after being formed (see Figure 1.2). The OECD (2002) also suggests that on average, one in three European enterprises fails before the second year of its existence. While there is no consensus in the literature on the reason why failure occurs, suggested factors include the lack of entrepreneurial experience and managerial skills, poor opportunity evaluation and product design and lack of access to human resources, financial resources and marketing resources (Gulst and Maritz, 2009).

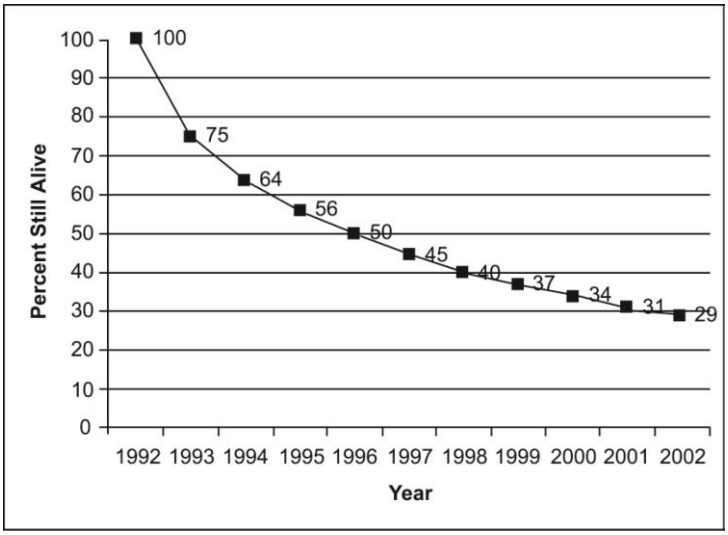

Figure 1.2: Proportion of new businesses founded in 1992 still alive by year (Shane, 2008: 99)

This issue of new venture failure has also been taken up by governments who are committed to creating environments to help entrepreneurs start and grow businesses (Department for Business and Innovation & Skills, 2011). Government intervention is deemed appropriate because of the market and systemic failures that limit the ability of entrepreneurs to overcome the uncertainty and obstacles associated with the early stages of new venture creation (Patton et al., 2009). Various policies and mechanisms have been established such as business support organisations, venture funds, training schemes, awareness raising programmes and incubators among others. Incubators are

one of the oldest and most significantly invested in policies by local governments and policymakers as they facilitate entrepreneurship and business start-ups by providing business support to entrepreneurs (Aernoudt, 2004, Carayannis and Zedtwitz, 2005).

From the 1980s onwards, there has been significant investment in the incubator concept. In the U.S., since 1998, the number of incubators has nearly doubled (NBIA, 2012a). In the U.K., in 2001, the government announced a £75 million 'Incubator Fund' to be operated under the Small Business Service (DTI, 2001). Most recently, in 2012, a 'social incubator fund' was introduced including up to £10 million to help increase social venture start-ups through incubation support and the attraction of new incubators in the market (Big Fund UK, 2012). The National Business Incubation Association estimates that there are about 7,000 business incubators worldwide (NBIA, 2012a).

In particular, two main types of non-profit incubators have dominated the incubator landscape: regional incubators and university incubators. The reason for this domination is that non-profit incubators are usually established and funded by local governments or organisations with similar political and economic interests such as regional development (vonZedtwitz, 2003) or goals related to global competitiveness through the facilitation of technology transfer (Reid and Garnsey, 1998). Universities, mostly from government pressure, have developed a third mission of commercialisation and the support of new venture creation alongside their core responsibilities of conducting research and teaching (Etzkowitz et al., 2000). This has led to the increase in the establishment of university incubators and technology transfer offices (TTOs) within universities.

Most recently, student incubators as a sub-category of a university incubator have gained momentum supporting the development of student/recent graduate spin-offs. This is because there has been a large increase in the number of start-up companies initiated by students/graduates (Politis et al., 2012). Table 1.1 demonstrates the increase of student spin-offs from U.K. higher education institutes (HEIs) since 1999. While in 1999, only 179 student spin-offs were established, eleven years later 2,848 spin-offs were established – an increase of 1,491%.

	Graduate Spin-offs
2010 - 2011	2,848
2009 - 2010	2,357
2008 - 2009	2,045
2007 - 2008	1,961
2006 - 2007	1,508
2005 - 2006	1172
2004 - 2005	974
2003 - 2004	512
2002 - 2003	489
2001 - 2002	337
2000 - 2001	238
1999 - 2000	179

Table 1.1: Student spin-offs from UK HEI (HEFCE, 2012)

Since the establishment of incubators as a policy tool in the early 1980s, scholars have focused their research increasingly on topics related to incubation. Broadly speaking, the existing incubation literature can be grouped around approximately nine themes: studies that focus on the incubator facility (e.g. tangible factors such as physical space, staffing and management) (vonZedtwitz and Grimaldi, 2006), incubator outputs (e.g. jobs created and/or rates of firm survival) (Campbell, 1989, Wynarczyk and Raine, 2005), incubators and new venture creation (Cooper, 1985, Grimaldi and Grandi, 2005), evaluation of incubators (Colombo and Delmastro, 2002, Chan and Lau, 2005), incubators and policy implications (Hannon and Chaplin, 2003), incubators and networks (Hansen et al., 2000, Bollingtoft and Ulhoi, 2005), incubators and firm learning (Patton and Marlow, 2011), incubation literature reviews (Hackett and Dilts, 2004b, Phan et al., 2005) and the incubation process (Hackett and Dilts, 2004a, Campbell et al., 1985).

From these themes, the incubation process has arguably received the least attention despite increasing recognition that it is essential for contributing to incubator outcomes (Patton et al., 2009). The incubation process, which is delivered by an incubator, is a process that involves the selection of entrepreneurs and the delivery of an array of business support and resources to entrepreneurs by internal and external regional actors to help them develop their ideas into new ventures. Studies have found that the survival rate of incubator tenants (80–90% still exists after 5 years) is significantly higher than

the business success rate amongst the wider SME community (30-50% over a 5 year period) (European Commission, 2002). Those studies that have looked at the incubation process (e.g. Campbell et al., 1985, Smilor, 1987, Rice, 2002, Hackett and Dilts, 2008, Hackett and Dilts, 2004a) tend only to offer superficial insights into how it functions internally and what affects it. There are various reasons for this. First, as will be extensively discussed in Chapter 2, most existing studies utilise different terms to discuss the components of the process, which means there is little consensus in the literature on the incubation components and how they function. Second, there is a failure of existing studies to account for how the incubator's objectives and resources affect the incubation process, despite the suggestion that objectives and resources may directly affect the incubation process and how it functions including the amount and type of resources it provides to its incubatees (Clarysse et al., 2007, Hackett and Dilts, 2004b). Third, even though entrepreneurs have a particularly important influence on the ability of ventures to spin-off from the incubation process (Phan et al., 2005), few studies have investigated individual entrepreneurs' perspectives; most studies instead concentrate on the incubator management perspective of the managers operating incubators (Scillitoe and Chakrabarti, 2010). Linked to this point, there is also a failure to consider the experience and background of incubated entrepreneurs and how it affects their ability to start a new venture during the incubation process. The entrepreneurship literature highlights that it is important to consider the heterogeneity of entrepreneurs as certain entrepreneurial characteristics can positively affect new venture creation (Ucbasaran et al., 2008, Shane and Khurana, 2003). Fourth, existing studies fail to account sufficiently for the incubation process within its regional context despite the recognition in the literature that the process is 'geographically anchored', drawing on external organisations to function (Bollingtoft and Ulhoi, 2005: 267, Hackett and Dilts, 2004b, Bergek and Norman, 2008) and may be influenced by the socio-economic and cultural setting it is based within (Clarysse et al., 2005). This is a particularly important point, as the entrepreneurship literature has suggested that engaging the 'context' (e.g. spatial dimension) in researching topics of entrepreneurship is essential (Zahra and Wright, 2011, Zahra, 2007) as the context "simultaneously provides individuals with entrepreneurial opportunities and sets boundaries for their actions" (Welter, 2011: 165). Finally, existing studies do not account for the heterogeneity of incubation contexts and pose problems for theorisations of incubation processes. All of these points have stunted the progression of research on the incubation process and the formation of effective policy.

1.2 Aims, research questions and literature framework

In order to address this gap in understanding, the main aim of this thesis is to provide an understanding of how the incubation process functions by undertaking an integrated approach. This includes accounting for the above factors (e.g. the objectives and resources of the organisation offering incubation support, the experience and background of the entrepreneur, the role of the RIS and the process components) and how they interact to influence the effectiveness of the incubation process. The research seeks to address the following five research questions (RQ):

RQ1: *How does the incubation process function?*

RQ2: *How do incubation processes differ?*

RQ3: *How does an incubator's objectives and resources affect how the incubation process functions and influence potential new venture creation?*

RQ4: *How does an entrepreneur's experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affect their ability to start a new venture in the context of the incubation process?*

RQ5: *How and in what ways do the principal elements of the RIS play a role in the incubation process and influence potential new venture creation?*

By exploring these questions, the purpose of the investigation is to construct a theoretical model of incubation that better specifies the inter-relationships between the internal and external constructs relating to the form of the incubation process, the entrepreneurs themselves, and the RIS. As a starting point, an initial theoretical framework will be constructed from extant literatures to provide the basis for comparing different cases and approaches to incubation. It draws upon and integrates previously unconnected literatures: the incubation literature, entrepreneurship literature, RIS literature, technology transfer literature and entrepreneurship education literature (see Figure 1.3). The rationale for selecting this literature framework is further explained below.

First, the *incubation literature* provides the fundamental theoretical and empirical background for the first three research questions. It supplies the literature around incubators, incubation process models and incubation process components which are necessary to develop a conceptual framework for analysing the incubation processes within this thesis. Second, the *technology transfer* and *entrepreneurship education* literature provide the literature around university and student incubation processes

which represent two of the three incubation processes analysed in this thesis. Third, the *RIS literature*, which is used to approach the fifth research question, provides the theoretical background to link the incubation process to its regional context. More specifically, the RIS literature supplies the literature around regional organisations/actors and their interactions as well as the socio-economic and cultural setting of the RIS and how it affects new venture creation. Finally, the *entrepreneurship literature* is used to provide the theoretical and empirical background to address the fourth research question. It supplies the literature around how an entrepreneur's experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affects new venture creation.

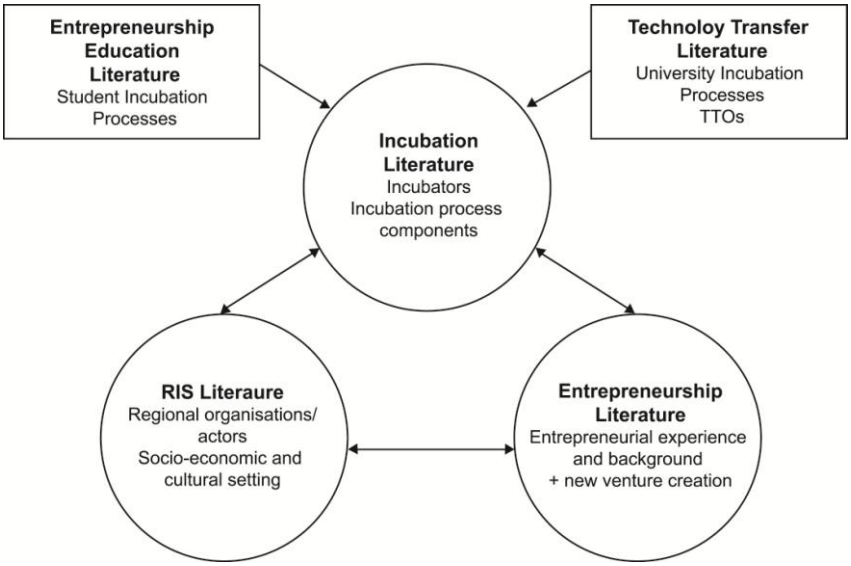

Figure 1.3: Literature framework for the thesis

The integration of these literatures provides an initial over-arching theoretical framework for conceptualising how the incubation process functions. The RIS literature in particular helps to conceptualise interactions between the incubation process and the context within which it occurs. The integration of the entrepreneurship literature with the incubation literature provides a better understanding of the incubation process as it brings to the fore the entrepreneur and their experience and background which has been largely ignored by the incubation literature. Finally, the integration of the technology transfer literature and entrepreneurship education literature with the incubation literature brings together studies on different types of incubation processes which have remained relatively separate.

In order to address the above research questions, this empirical study uses a qualitative research strategy and a multiple case study research design. Primary data were collected utilising semi-structured interviews from entrepreneurs with different levels of experience and backgrounds who had spun-off from the process and were currently going through the incubation process. The entrepreneurs were selected from three incubation process types (a regional incubation process, a university incubation process and a student incubation process) in order to compare the differences between incubation models across fours constructs identified by other researchers (the incubation process, the incubator's objectives and resources, the role of the RIS and entrepreneur type) (Hackett and Dilts, 2004b, vonZedtwitz and Grimaldi, 2006, Bergek and Norman, 2008, Westhead et al., 2009). In addition, the study inductively found new theoretical constructs (risk aversion, entrepreneurial knowledge, social capital, incubator management learning and duty of care) which were also found to be important for explaining how the incubation process functions. This will also be discussed in the individual incubation model sections and to compare differences between the processes. Incubator management actors who deliver and support the process were also interviewed for triangulation purposes and to obtain a robust understanding of the incubation process. Qualitative data analysis methods and tools were utilised to analyse the primary data within and across cases including the 'framework' approach and NVivo. The next section sets out the structure of the thesis.

1.3 Structure of the thesis

Chapter 2 provides a review of the literature outlined above and forms an initial theoretical framework to investigate further the research questions. At the end of Chapter 2, the literatures are integrated to provide a preliminary conceptual framework for the research.

Chapter 3 elucidates the research methods and approach utilised in this thesis. As mentioned above, to approach the research questions, a qualitative research strategy and a multiple case study design were used. Apart from discussing the research strategy and research design in-depth, this chapter explains the rationale for the selection of cases for the study, the sample and data collection methods, the data analysis process and how research ethics were embedded into the research process.

Chapter 4 provides a within-case analysis, comparing the four extant constructs (the incubation process, the incubator's objectives and resources, the role of the RIS and

entrepreneur type) and five inductively developed constructs that proved important to the incubation process (risk aversion, social capital, incubator management learning, entrepreneurial knowledge and duty of care). Interactions between these constructs provide the richness that informs the study and lay the foundations for comparing the incubation models in Chapter 5.

Chapter 5 presents results of a cross-case analysis and uses the constructs to explain the differences between the nature of incubation within each of the incubation models.

Chapter 6 presents the discussion of the empirical findings in regards to how they address the research questions and how they compare to previous research. The chapter also provides an enhanced theoretical model from the one developed in Chapter 2 with a set of propositions based on the empirical findings.

Chapter 7 concludes the thesis by explaining the contributions of the research to the relevant literature. Managerial and policy implications stemming from the findings from the empirical results are also discussed. Additionally, the limitations of the research, comments on the personal development of the author during the PhD and suggestions for further research are made by way of a conclusion.

Chapter 2: Contextualising Incubation

In Chapter 1, the context, aims, research questions, literature framework and structure of the thesis were explained. The purpose of this chapter is to review the literatures (the incubation literature, technology transfer, entrepreneurship education, RIS literature and entrepreneurship literature) in greater depth to provide an initial theoretical framework to investigate further the research questions. The incubation literature is the main literature essential for addressing the first three research questions concerning the incubation process, while the RIS literature will be utilised to address the fifth research question relating to the context within which the incubation process is embedded. The entrepreneurship literature is used to support the fourth research question providing the framework for understanding how the experience and background of entrepreneurs affects new venture creation. All three literatures are then integrated to provide a preliminary conceptual framework that will be elaborated in the discussion Chapter 6 with additional constructs developed inductively from the field data. Apart from the general incubation literature, RIS and entrepreneurship literature, the review also discusses university incubation processes and student incubation processes which are based in the technology transfer literature and entrepreneurship education literature as these represent two of the incubation process types that will be analysed in the thesis.

2.1 Incubation literature

When looking at the overall incubation literature, the incubation process has arguably received the least attention, despite increasing recognition that it is essential for contributing to incubator outcomes (Patton et al., 2009). Broadly speaking, the existing literature on incubation topics can be grouped into nine themes: studies that focus on the incubator facility (e.g. tangible factors such as physical space, staffing and management) (vonZedtwitz and Grimaldi, 2006), incubator outputs (e.g. jobs created and/or rates of firm survival) (Campbell, 1989, Wynarczyk and Raine, 2005), incubators and new venture creation (Cooper, 1985, Grimaldi and Grandi, 2005), evaluation of incubators (Colombo and Delmastro, 2002, Chan and Lau, 2005), incubators and policy implications (Hannon and Chaplin, 2003), incubators and networks (Hansen et al., 2000, Bollingtoft and Ulhoi, 2005), incubators and firm learning (Patton and Marlow,

2011), incubation literature reviews (Hackett and Dilts, 2004b, Phan et al., 2005) and the incubation process (Campbell et al., 1985, Hackett and Dilts, 2004a).

This section of the literature review discusses the extant incubation literature as it relates to incubation processes. The review starts out by providing an historical overview of incubators to provide an understanding of why they exist and how they developed over time. Incubators are then defined as there is little consensus in the literature on what constitutes an incubator. Typologies of incubators are discussed as there are various types. Incubation processes are then defined as there is also little consensus on the components of the process. The review continues by critically analysing existing incubation process studies to be able to develop a conceptual framework to analyse the empirical part of the thesis. The review will also discuss studies focused on individual components of the incubation process as they also provide an understanding of how the incubation process functions. Apart from the general incubation literature, the review also discusses university incubation processes and student incubation processes which are based in the technology transfer literature and entrepreneurship education literature as these represent two of the incubation process types that will be analysed in the thesis. What this literature review does not cover is regional incubation processes, the third type of incubation process analysed in this thesis. The reason is because there is no known existing literature focused specifically on a regional incubation process.

2.1.1 Incubators: A historical perspective

The origins of business incubators can be traced back to the late 1950s when the first incubator (the Batavia Industrial Centre) was established in Batavia, New York (Leblebici and Shah, 2004). A privately owned 850,000 ft building too big to lease to one individual company was sublet to various tenants as a place for start-ups and small enterprises (Adkins, 2001). In the early 1980s, as a result of the rise of unemployment from the collapse of traditional industries (CSES, 2001) and the limitations of common economic development strategies that focused solely on industry attraction and large corporate expansions (NBIA, 2012b), the business incubation industry started to emerge. Business incubators were used as instruments to support innovation, technology transfer and entrepreneurship to develop local economies (Wynarczyk and Raine, 2005). In the U.S., according to the NBIA (2012b), three major activities drove business incubator growth during the 1980s:

- The promotion of incubators by the U.S. SBA through a series of regional conferences to disseminate information about incubation. As a result, incubator development grew from about 20 openings annually in 1984 to more than 70 in 1987.

- The enactment of the Ben Franklin Partnership Programme, one of the country's first comprehensive technology and manufacturing agendas. Incubators were a key component of the programme which became an early model for other states' support of business incubation.

- The role of the private sector in societal needs. Control Data Corporation, under the direction of company founder William Norris, became one of the earliest supporters of the business incubation industry. He formed City Venture Corporation (CVC), a Control Data division that developed business incubators in several large and small cities.

Hackett and Dilts (2004b) see it differently and provide three other reasons for the increase of the incubator concept in the 1980s and 1990s: (1) the passage of the Bayh-Dole Act in the U.S. Congress which decreased the uncertainty associated with commercialising federally-funded basic research; (2) the increasing recognition by the U.S. legal system of the importance of innovation and intellectual property (IP) rights; and (3) the profit opportunities from the commercialisation of biomedical research.

In the U.K., from the mid-1970s, business incubators developed from managed workshops[1], enterprise agencies, and industrial estates to Business Innovation Centres[2] (NBIA, 2012b, OECD, 1999). Unlike the U.S., incubators did not take off with the same momentum. While the U.S. established the NBIA in 1985 (Leblebici and Shah, 2004), a U.K. professional incubation organisation was not established until 1998 called U.K. Business Incubation (UKBI). Despite this slower evolution, in recent years, the concept has grown with the support of the government. According to UKBI (2012), the current number of incubators in the U.K. is approximately 300. The U.S. as of 2006 had a total of 1,100 incubators in comparison to 7,000 worldwide (NBIA, 2012a).

[1] Managed workshops developed in the mid 1970s to accommodate new firms. They are a form of property development within which small units and shared business services are provided and easy in/easy out leasing arrangements apply (Lawless and Ramsden, 1992).

[2] BICs are professional organisations providing consultancy, contributing to technology transfers and organising training sessions for small and medium size companies (Aernoudt, 2004).

From the evolution of the incubator concept in the 1970s and 1980s, two broad incubator strategies emerged: (1) incubators that focus on providing entrepreneurs access to space based on an inexpensive rate and (2) incubators that focus on helping companies grow through the leveraging of resources (Smilor, 1987). These separate strategies are also referred to as "first generation" incubators in 1980s and "second generation" incubators of the 1990s (CSES, 2001). As the incubator concept evolved, there has been an increasing emphasis on the second strategy (Smilor, 1987) which places less emphasis on the property and more emphasis on the incubation process and provision of business support and resources to help develop entrepreneurs' ideas into companies. Prior to discussing the incubation process, the next section will first define incubators as the physical space where the incubation process takes place.

2.1.2 Defining incubators

There is no consensus on the definition of an incubator (vonZedtwitz and Grimaldi, 2006). One of the reasons for this ambiguity is the diffusion and repeated adaptation of the original business incubator concept to fit varying local needs and conditions and the tendency to not define the incubation process in relation to incubators (ibid). Others use the term incubator interchangeably with other types of physical facilities like science parks whereby the incubator becomes an umbrella concept utilised to describe an heterogeneous group of institutions (Aernoudt, 2004). This will be further discussed in the typology of incubator section below. The criteria separating incubators from other types of initiatives are also unclear with some following strict guidelines when delineating incubators and other types of initiatives (Carayannis and Zedtwitz, 2005). For example, Carayannis and Zedtwitz (2005) identify criteria on whether an organisation can be called an incubator based on the number of services offered. Organisations that offer fewer than four services, according to Carayannis and Zedtwitz (2005), lack too many elements required for incubation and should no longer be called incubators. Organisations that offer only four services are considered incubators in the weak sense of the term, whereas those offering all five services (access to physical resources, office support, access to financial resources, entrepreneurial start-up support, and access to networks) are incubators in the fullest sense.

When looking to incubator definitions, most studies that use the term 'incubator' utilise a definition that encompasses a physical facility. Hackett and Dilts (2004b:57) define a business incubator as "a shared office space facility that seeks to provide its incubatees

with a strategic, value-adding intervention system (i.e. business incubation) of monitoring and business assistance". Allen and Rahman (1985:12) in their definition of an incubator also include the physical space where an incubator is "a facility that aids the early-stage growth of companies by providing rental space, shared office services, and business consulting assistance". Other definitions of incubators, however, emphasise the role of an incubator and the services they provide. This can be seen in the definition put across on the NBIA (2012b) website: "Business incubators nurture the development of entrepreneurial companies, helping them survive and grow during the start-up period, when they are most vulnerable. These programs provide their client companies with business support services and resources tailored to young firms". Phan et al (2005: 170-171) also discuss the services incubators provide in their definition where incubators are "the intermediate organisations that provide the social environment, technological and organisational resources, and managerial expertise for the transformation of a technology-based business idea into an efficient economic organisation".

Definitions focusing on the roles of incubators and services provide a more effective view of the purpose of incubators and take the focus away from the emphasis on property aspects as incubation does not always have to be property-based (Lockett et al., 2002). This thesis follows this view as these definitions open the door to include other types of organisations into the incubator/incubation discussion that also play a key role in the incubation of ideas leading to new ventures. One such example put across by Lockett et al (2002) is that of the larger university as an incubator characterised not by clearly defined walls but by their interdependence with other institutions. According to these authors, viewing the university as incubators without walls may be fundamental in aiding universities to fulfil the potential of their technology transfer strategies. Another example is from Cooper (1985) who suggests that every organisation may be viewed as a potential incubator influencing its members by making them more or less prepared to start new firms.

One problem that has emerged is the "definitional ambiguity" surrounding the terms incubator and incubation as a result of the two being used interchangeably (Hackett and Dilts, 2004b). This is a critical point because the conflation of terms confounds results from research that need to be addressed in the current study. Before defining incubation processes, the next section will discuss the types of incubators discussed within the literature as this thesis aims to compare three different types of incubation processes.

2.1.3 A taxonomy of incubators

There are different types of incubators. However, there is little consensus in the literature on the incubator types as multiple taxonomies have been developed. One-dimensional taxonomies differentiate incubators based on types of firms they support, incubator components and the incubator's financial sponsorship. Taxonomies based on types of firms supported by incubators include product development firms, manufacturing firms and incubators that support a variety of firms called mix-use incubators. More recent one-dimensional taxonomies focus on conceptualisations of incubators and incubator model components. The incubator model components taxonomy focuses on differentiating incubators based on their selection process, business support and mediation by innovation system. Taxonomies based on financial sponsorship identify incubators based on their sponsors. These span from publicly sponsored incubators at one end (e.g. university incubators and regional incubators) of the spectrum to privately sponsored incubators at the other (corporate incubators and private incubators). Multi-dimensional taxonomies focus on more than one dimension including (e.g. sponsorship, goals and objectives and industry) (Brooks, 1986, Aernoudt, 2004, Smilor, 1987). These taxonomies demonstrate the heterogeneity of the incubator concept and suggest that some incubators incorporate elements of two or even three incubation archetypes (vonZedtwitz, 2003).

For the needs of this thesis, the typology utilised is based on the incubator's financial sponsorship. The two types of incubators analysed in this thesis are two university sponsored incubators and a regional development incubator. While these details will be further explained in the case study section where background information is provided for each incubation process, some time will be spent here discussing some of the characteristics of university and regional incubators. Regional incubators are usually established by local governments or organisations with similar regional, political and economic interests to contribute to regional development (vonZedtwitz, 2003). This is achieved by supporting the start-up of new local businesses (Carayannis and Zedtwitz, 2005). The public mission is stronger than the profit objective (vonZedtwitz, 2003). According to Brooks (1986), this type of incubator serves businesses in the early stage of development that require a greater degree of hands-on assistance. Additionally, the businesses will need access to a more fully developed support network.

University incubators, also called academic incubators, science parks, research parks, and technology parks (Bollingtoft and Ulhoi, 2005), assist in the commercialisation of science and technology produced by university research (Campbell et al., 1985, Grimaldi and Grandi, 2005). While some argue that the primary interest of university incubators is development of new products or technologies as an end in itself (Bollingtoft and Ulhoi, 2005), others who include student spin-offs in their classification, suggest that university incubators nurture and develop entrepreneurial talent through entrepreneurship courses (Steffensen et al., 2000). Along with typical incubator services, university‐related services includes faculty consultants, student employees, access to labs and equipment (Mian, 1996). This will be further discussed in detail in the section on university incubation processes.

An issue with the literature around university incubators is the lack of consensus on the boundary of a university incubator as the term "University" is used interchangeably to mean the wider university institution, the TTO embedded within a university (Lockett et al., 2002) and property-based incubators located close to university campuses (Patton et al., 2009). This thesis follows Lockett et al's (2002) view that university incubation need not always be property-based and universities should be viewed as business incubators characterised not by clearly defined walls, but by their interdependence with other institutions. This perspective was chosen as research demonstrates that property-based university incubators, although often sponsored by universities and/or are located within close proximity to universities, may not often pursue their own commercial agenda even if the larger university allows relatively wide operational latitude as a result of IP belonging to the university (vonZedtwitz, 2003).

Empirically, there are a limited number of studies that have attempted to understand the differences between incubator types. Indeed, one of the main issues with the incubation literature and literature focusing specifically on incubation processes is the failure of many studies to differentiate the incubator type in their methodology sections. This has led to a lack of understanding of how the incubator type affects the outcomes of the incubation process and the differences between types of incubation processes. A study by von Zedtwitz and Grimaldi (2006) is the only known study to test empirically and explain how the service profiles and objectives link to specific incubator types. They highlight that there are clear differences between non-profit and for profit incubators. Not-for-profit incubators (e.g. regional and university incubators) provide physical infrastructure, office support, access to external capital access to local and university

networks and outsourced business support. For-profit incubators provide limited physical infrastructure, internal investment, strong internal business support and a strong industrial network and partnerships. They also found differences between incubator types in relation to their objectives whereby regional incubators focus on developing regional economies while university incubators aim to promote academic entrepreneurship. Others have also suggested that it is important to consider the differences in goals and objectives of different incubator types as the objectives may be indicative of the amount and type of resources that a certain type of incubator provides to its incubatees (Hackett and Dilts, 2004b) and how the incubation process functions (Clarysse et al., 2005).

Lumpkin and Ireland (1988) in a very early study demonstrated the differences between incubator types (delineated by sponsorship) and their screening process. The findings from the study suggest that the incubator type impacts the screening criteria an incubator utilises. They found that most regional incubators and university incubators focused screening criteria based on market and personal factors (e.g. persistence, marketability of product/service, creativity, uniqueness of product/service and age of the management team) whilst private incubators used selection criteria based on financial factors (e.g. profitability, liquidity, price earnings, debt and asset utilisation, personal investment of the management team and current size of firm). The findings from these studies highlight the importance of accounting for the incubator type in incubation process studies. The next section moves away from a discussion around the incubator and begins by defining incubation processes or the process that takes place in the incubator which are under study in this thesis.

2.1.4 Defining incubation processes

As discussed in the above section on the history of incubators, the incubator concept evolved from providing access to space for entrepreneurs to helping entrepreneurs grow their ideas through leveraging of business support and resources (Smilor, 1987). This places more emphasis on the process that takes place within the incubator rather than the incubator infrastructure itself. Recently, it has been recognised that the incubation process is critical for achieving incubation outcomes such as new venture creation (Patton et al., 2009). However, there is little consensus in the literature on the definition of the incubation process and some authors use different definitions across multiple studies (Hackett and Dilts, 2008). When looking to incubation process definitions from

studies focused specifically on the process, all studies use different definitions. This is an issue as it has not helped develop research and understandings on incubation process components and how the process functions. Additionally, the terms "incubation" and "incubation processes" are used interchangeably with other terms such as "incubation strategies" (Grimaldi and Grandi, 2005), "business development process" (Campbell et al., 1985) and "business assistance" (Hackett and Dilts, 2008, Hackett and Dilts, 2004a, Rice, 2002) which has also fragmented the literature.

When looking to the definitions in more detail, some definitions define the process in a generic way. For example, Campbell et al. (1985:46) define incubation as a "complicated and organic process by which valid business ideas and entrepreneurs emerge into real businesses". Other definitions see the process involving actors and relationships between actors. A definition that highlights the relationship between actors states that the incubation process is "to allow entrepreneurs to take advantage of the greater knowledge and experience of the incubator manager" (Rice, 2002:170). Definitions placing emphasis on the support provided within the process are also prevalent as business support is conceptualised as one of the main components of the incubation process (Hackett and Dilts, 2008, Campbell et al., 1985, Hackett and Dilts, 2004a, Rice, 2002, Bergek and Norman, 2008). One example includes the definition from Hackett and Dilts (2004a: 41) where incubation is defined as "a strategic, value-adding intervention system of monitoring and business assistance".

Existing incubation process definitions are limited as they are either too generic, focusing only on the outcomes of incubation (Campbell et al., 1985), or do not include all the components that make up the process focusing only on actors (Rice, 2002) or business support (Hackett and Dilts, 2004a). The review of the process models in the next section will demonstrate that the incubation process involves a selection process, business support, actors and relationships between actors that are both internal and external to the incubator. This suggests that an incubation process definition requires a more holistic definition including all of the components, internal and external actors and relationships between actors. As a result, a new incubation definition was developed for the needs of this thesis. The incubation process in this thesis is defined as the following:

> *A process managed by an incubator to develop business ideas into new ventures that involves a selection process and the delivery of an array of business support and resources to entrepreneurs by internal and external actors.*

The next section will analyse critically existing incubation process model studies to provide an overview of components of the process.

2.1.5 Incubation process studies

There are a limited number of studies focused on the incubation process. Table 2.1 provides an overview of these studies including the perspective, methodology, incubator type they correspond to and research questions. Each of these studies is reviewed in-depth below by discussing the incubation process model the study developed and its strengths and weaknesses. The studies are analysed chronologically as some models are built upon their predecessors.

Representative Citation	Perspective	Incubator Type	Methodology	Research Question(s)
(Campbell et al, 1985)	NA	NA	Conceptual	Not explicitly defined
(Smilor et al, 1987)	Incubator manager	Not specified	Empirical: Mail survey, on-site review, & in-depth interviews	Presents empirical data on the incubator as a system
(Rice, 2002)	Incubator manager and entrepreneur	University incubator and regional incubator	Empirical: Survey and in-depth interviews	How is co-production implemented?
(Hackett and Dilts, 2004)	Incubator manager	NA	Conceptual	To develop a theory of business incubation
(Hackett and Dilts, 2008)	Incubator manager	Mixed use and high tech	Empirical: Cross sectional survey	What is the process of business incubation that occurs within business incubators?

Table 2.1: Existing business incubation process studies (Author's own)

Campbell et al. 1985

Campbell et al. (1985) developed the first known incubation process model (see Figure 2.1). They do not directly refer to the term "incubation process", but rather discuss the process as a "business development process". The incubation definition used in this model is referred to as a "complicated and organic process by which valid business ideas and entrepreneurs emerge into real businesses" (Campbell et al., 1985: 46). According to the process model, there are four elements in the process: (1) the diagnosis of the needs of a new business from the collective experience of a diverse group of business generalists and specialists; (2) the selection, provision and monitoring of the acquisition, implementation and coordination of various business services needed by new businesses; (3) the provision of capital to pay for product development and business services provided by third party professionals; and (4) the provision of access to a network of business development expertise (ibid).

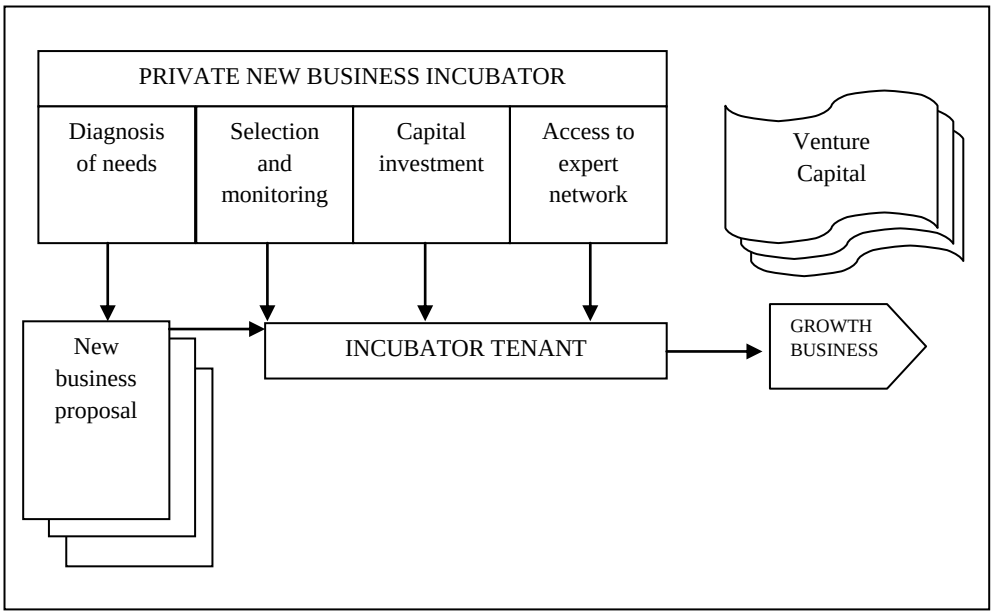

Figure 2.1: Campbell et al incubation process model (Campbell et al., 1985: 46)

Business services is further explained in the study as including physical space, legal, accounting, insurance, personnel, marketing, business consulting, technology advice and training. The network of business development expertise includes local financial institutions, accountants, lawyers, colleges, management consultants, government agencies, local business associations and venture capitalists. Actors such as private business developers and real estate developers provide the necessary expertise, capital

and coordination functions to the entrepreneur in the incubator and encourage synergies among entrepreneurs.

The main strength of the model is that it is the first to distinguish the incubation process components. The principal weakness of this model is that apart from the listing of these four elements, Campbell et al (1985: 46) do not go into any detail to further explain in-depth either how these components function or how they are connected as a process. Apart from the entrepreneur, the other key actors are not included in the model. Additionally, the model is not based on empirical data.

Smilor 1987 Model

Smilor's (1987) model is based on a national survey and in-depth interviews with 50 incubator managers. Conceptualised as 'the incubator system' (see Figure 2.2), the process is defined as "an ability or desire to maintain prescribed and controlled conditions favourable to the development of new firms" (Smilor, 1987: 146). The components of the process include four types of support systems (secretarial, administrative, business expertise and facilities), and incubator affiliation including private sector, universities, government entities and non-profit organisations who also contribute to the process.

The know-how internally available in the incubator is leveraged into tenant companies through actors. These actors include the incubator director or president, a board of directors, an advisory council and a consultant network. The actors also provide access to other individuals, institutions and agencies outside the incubator which offer loans and grants and a link to venture capitalists through introductions. The delivery of business support is best facilitated when there is good chemistry between the incubator manager and entrepreneur. The types of business support offered by the incubator include consulting services, administrative services, secretarial services and shared facilities.

The study also discusses the selection process for admitting entrepreneurs to the incubator which is highlighted as important for successful incubation. The selection criteria utilised by the incubators include the ability for the spin-off to create jobs, pay operating expense, present a written business plan, have a unique opportunity, be a start-up company, be locally owned, have fast growth potential and be high technology related. The selection decision is made by the incubator manager and the rest of the selection committee.

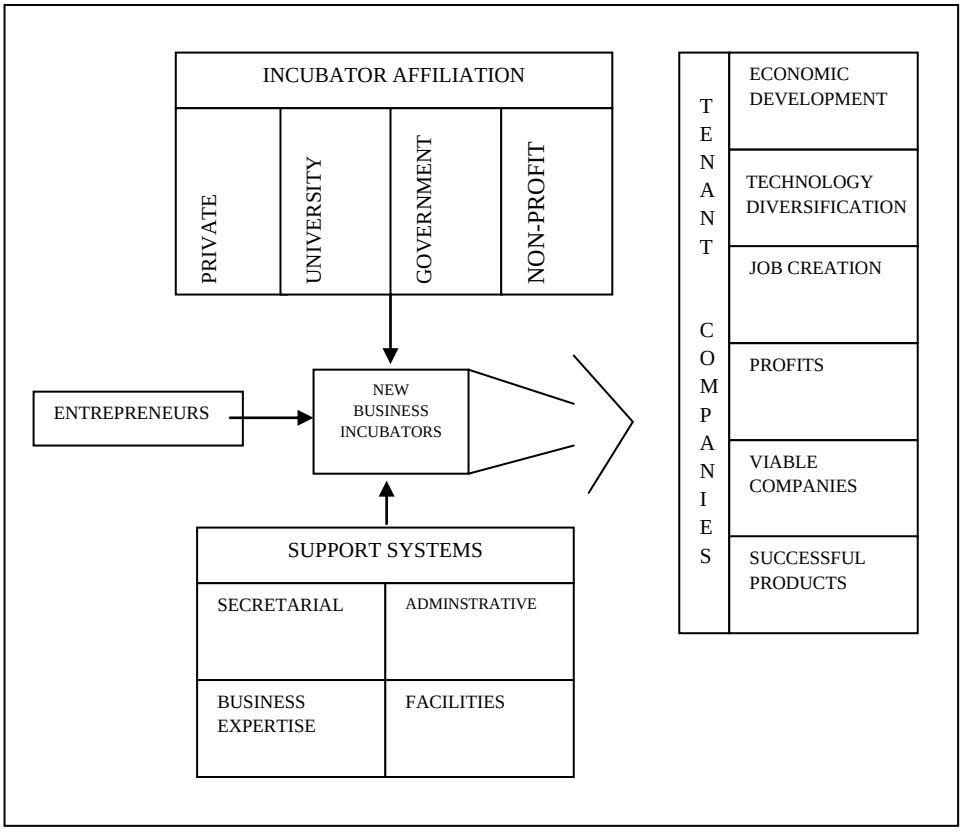

Figure 2.2: Smilor incubation process model (Smilor, 1987:147)

The weakness of this model is that it only captures the perspective of incubator managers and does not account for the perspective of entrepreneurs. The model also does not explain the relationships between incubation components. While the study discusses the selection process and actors involved in the overall incubation process, the process model has not included these components.

Rice 2002 Model

Rice (2002) analyses the relationship between the incubator manager and entrepreneurs. This new model comes 17 years after the first models were developed in the mid-1980s, which represents a large time gap in research on incubation processes. Incubation defined in this study is "to allow entrepreneurs to take advantage of the greater knowledge and experience of the incubator manager" (Rice, 2002: 170). The study is based on a survey and in-depth interviews with four incubator managers and entrepreneurs across eight incubators totalling thirty-two co-production pairs. It is also the only study out of the six existing incubation process studies to capture both the incubator manager and entrepreneur's perspective which demonstrates a gap in the

literature around the entrepreneur's perspective. Rice (2002) also suggests that "other incubatees" are important for interacting with entrepreneurs providing opportunities for informal networking.

The study sheds light on the nature of the co-production relationship between the incubator manager (the "producer of business assistance programmes") and the entrepreneur ("consumers of the programmes") and defines co-production modalities (see Figure 2.3). The process depicted involves actors such as an incubator company, an incubator manager and an external network and is implemented through three modalities *passive environmental intervention*, *counselling* and *networking.* Passive environmental intervention is an indirect form of co-production which does not involve the incubator manager directly such as shared business services (e.g. phone answering, receptionist, security, janitorial service), use of equipment (e.g. phone system, copier, fax machine, internet access), shared facilities (e.g. conference room, lunch room) and co-location in an incubator centre (opportunity for informal networking with other entrepreneurs). Rice (2002) found that while the indirect form of co-production was helpful to firm survival this type of intervention has little impact on the development of the firm.

Counselling concerns the dissemination of knowledge and advice to entrepreneurs and provides the potential for the entrepreneur to have an ongoing and a multi-faceted relationship with the incubator manager. According to Rice (2002), there are three different approaches to counselling: *reactive and episodic*, *proactive and episodic* and *continual and proactive*. Reactive and episodic refers to a mode where the entrepreneur requests help dealing with a crisis or problem which is of a limited duration. Proactive and episodic involves a much more dynamic process between the incubator manager and entrepreneur where the incubator manager engages proactively with the entrepreneur on an episodic basis. Trust and ease of communication are important in this modality. The third type of counselling is *continual and proactive* and focuses on the ongoing developmental needs of the entrepreneur. The final co-production modality discussed in Rice's (2002) conceptualisation is *networking*. Networking enables the incubator manager to connect the entrepreneur to an external network to provide resources which the entrepreneur needs to progress the business. The interaction is a "one-shot referral" by the incubator manager where he/she acts as the intermediary between external actors and the entrepreneur.

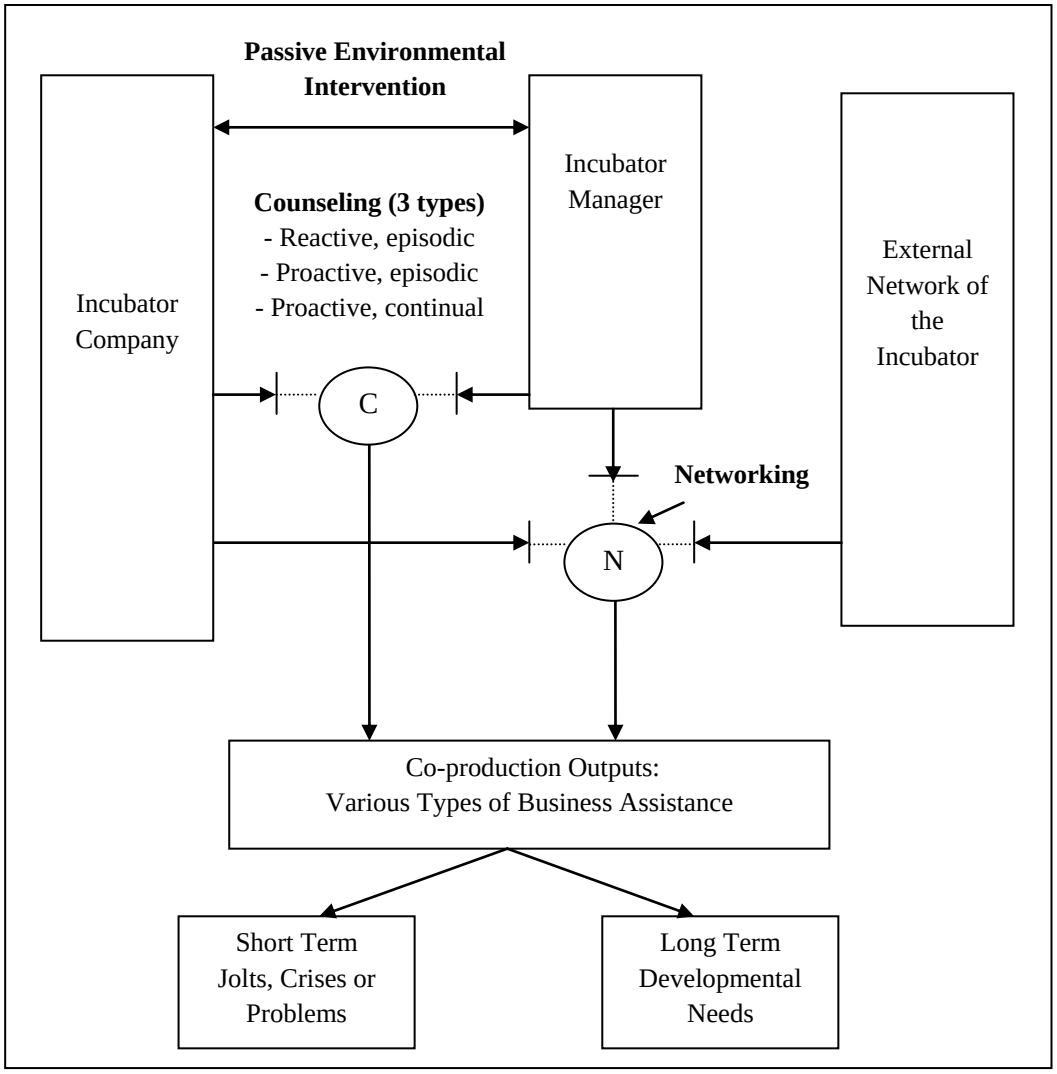

Figure 2.3: Rice Incubation Process Model (Rice, 2002: 170)

The findings from the study suggest that the incubation process is affected by the readiness of the entrepreneur to engage in the support process. This was related to their awareness of the gaps in knowledge, competence and resources, the recognition of the potential of the incubator manager to help fill those gaps and willingness to engage with the incubator manager. The study also demonstrated that the process is also affected by the readiness of the incubator manager to engage with the entrepreneur which is related to time available for engagement and breadth of support deployed. Incubator managers who had a higher support impact invested more time supporting the entrepreneur and engaged in a broader range of support types such as ongoing interactions rather than episodic interactions.

The strength of this model is that it considers the perspective of the entrepreneur, explains in-depth how business support is delivered in the incubation process and is empirically-based. The weakness of the study is that it does not discuss how the type of

incubators (delineated by sponsorship in his study) affects the incubation process despite mentioning that "the kinds of resources available through the incubator network could vary substantially as a function of type of sponsorship" (Rice, 2002: 167). This is important as Rice (2002) is suggesting that there is only one incubation process although the study includes multiple incubator types. Rice (2002) also treats all entrepreneurs the same without taking into account their individual experience and background and how it affects the ability to develop their spin-offs in the context of the incubation process. This is a weakness as the entrepreneurship literature suggests that entrepreneurs are heterogeneous and their prior experience and background positively affects new venture creation (Shane and Khurana, 2003). Additionally, there is a lack of an in-depth analysis on the external network.

Hackett and Dilts 2004

Hackett and Dilts (2004a) study is another attempt to conceptualise the incubation process. They utilise real options-driven theory to explain and predict the likelihood that new ventures will survive the early stages of development. Incubation is defined as "a strategic, value-adding intervention system of monitoring and business assistance" (2004a: 41). Figure 2.4 taken from the study demonstrates the core components of the process model. Summarised by Hackett and Dilts (2002: 41), "incubatees are selected from a pool of incubation candidates, monitored and assisted, and infused with resources while they undergo early stage development". Selection performance is further explained as a propensity to select an emerging organisation for admission to the incubator based on certain criteria: managerial characteristics (prior employment experience and technical expertise), market characteristics (properties of market which incubate intends to enter), product characteristics (properties of product or service incubate intends to commercialise) and financial characteristics (profit potential of the incubatee).

Monitoring and business assistance intensity is "the degree to which the incubator observes and helps incubatees with the development of their ventures, including helping them to learn from low-cost failures and containing the cost of potential terminal failure" (ibid: 50). Dimensions of monitoring and business assistance intensity includes time intensity of assistance provided (percentage of working hours devoted to incubatees), comprehensive of assistance provided (degree to which strategic,

operational and administrative-related assistance is provided) and degree of quality of the assistance provided (relative value of assistance provided to incubatees).

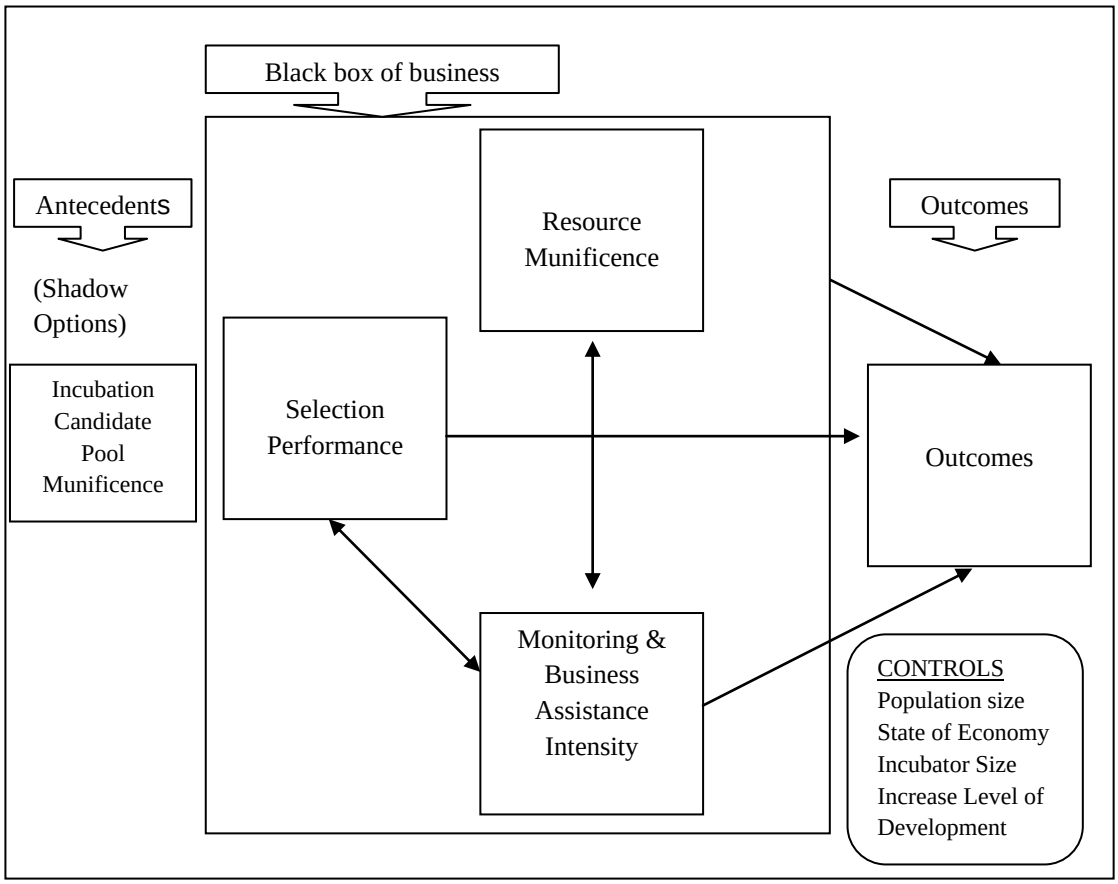

Figure 2.4: Hackett and Dilts incubation process model #1 (Hackett and Dilts, 2004a: 45)

Resource munificence is defined as the relative wealth of incubator resources typified by dimensions including the availability of resources (incubator's ability to provide incubatees with access to resources), the quality of resources (relative value of resources provided) and the utilisation of resources (usage of resources by incubatees). Resources are categorised into internal and external resources. Internal resources are within the incubator including finance, environment, personnel or operations while external resources are outside the incubator such as networks and communities connected to the incubator (ibid).

The weakness of this study is that it is conceptual and is not based on empirical research. This has not enabled an in-depth understanding of how the incubation process functions including relationships between the various process components. Additionally, as will be discussed in the subsequent study by the same authors, many of

the above discussed components were found to be inconsistent with empirical research undertaken for their 2008 model.

Hackett and Dilts 2008

The second Hackett and Dilts (2008) model is based on a follow-up empirical study to that discussed above (Hackett and Dilts, 2004a). Incubation is newly defined in this second study as "a process enacted by business incubators, angels, and venture capital organisations in order to facilitate the entrepreneurial process" (Hackett and Dilts, 2008: 440). This demonstrates an example of the same authors using different incubation definitions which has fragmented the literature. The authors tested their incubation process model quantitatively using a cross-sectional survey of 53 U.S.-based business incubator managers. The incubation process components used in the survey included the same components in their 2004 paper: selection performance, resource munificence and monitoring and business assistance intensity. While the incubation process components remained the same, the results of the study discredit some of the hypothesised constructs under each incubation process component. According to the authors, "much of what we thought we knew about business incubation did not withstand systematic scrutiny" (Hackett and Dilts, 2008: 440). This suggests that empirical research is necessary to gain a robust understanding of how the incubation process functions.

Two of the constructs under selection performance changed from product characteristics (selecting entrepreneurs based on a product or service they intend to commercialise) and financial characteristics (profit potential of incubatee) to selection by differentiation characteristics (uniqueness of the product, whether the product has relative advantage over competitor's products, whether the profit potential of the start-up company is high) and selection by star characteristics (potential to attract investment participation from venture capitalists, whether the start-up company has multiple harvestable exist options, substitutability of the product, whether the product demonstrates defendable competitive position and whether the product has patent protection). One of the constructs under monitoring and business assistance intensity changed from time intensity to strategic management which involves measuring the involvement of the incubator manager in providing support to the entrepreneur. All of the constructs under resource munificence changed from the availability of resources (incubator's ability to provide incubatees with access to resources), the quality of resources (relative value of

resources provided) and the utilisation of resources (usage of resources by incubatees) to incubatee learning and resource utilisation.

There are four main weaknesses to this model. First, the model is only based on the perspective of incubator managers, and omits the entrepreneur's perspective. Second, the model is based on a cross-sectional methodology. A cross-sectional survey entails the collection of data on more than one case at a *single* point in time (Bryman and Bell, 2007). However, the incubation process is a complex process with multiple variables occurring across a period of time, sometimes three plus years. According to O'Gorman et al. (2008) cross-sectional studies of firms in incubators report limited use of many services offered by incubators and lead researchers to question the value of incubation services. However, services are often used sporadically and intensively which a cross-sectional study is not able to capture. It is more appropriate to adopt dynamic methodologies to capture and understand the complex nature of the incubation process such as qualitative research. Third, the authors fail to discuss how the components of the process work together despite suggesting that this is an important aspect of the process (Hackett and Dilts, 2004a). Finally, the model does not account for the external incubation process components such as the external network providers and the regional context.

2.1.6 Key findings and issues from incubation process studies

Based on the above review of the individual incubation process models and a synthesis of each models' findings or descriptions of the process (although there are issues which will be discussed below), some key findings emerge (see Table 2.2 below for an overview). The actors involved in the incubation process include entrepreneurs, incubator management, external organisations and other incubatees. The key relationships between these actors include the relationship between incubator management and the entrepreneur, incubator management, the entrepreneur and other external organisations and the entrepreneur and other incubatees. The core components of the incubation process include a selection process and a business support process. The selection process consists of the use of selection criteria and actors to recruit entrepreneurs to the incubation process. According to different studies, the selection criteria includes ability to create jobs, to pay the operating expenses of the incubator, to present a written business plan, unique opportunity, to be a start-up, locally‑owned, fast

Actors	Literature terms	Relationship between actors	Literature terms	Incubation components	Literature terms
	Incubator tenant (Campbell et al, 1985)		Private business developers and real estate developers and incubator tenant (Campbell et al, 1985)		Selection (Campbell et al, 1985)
Entrepreneur	Entrepreneurs/tenant companies (Smilor, 1987)	Incubator management & entrepreneur	Incubator director and tenant companies (Smilor, 1987)	Selection process	Selection process (Smilor, 1987)
	Incubator company/ entrepreneur (Rice, 2002)		Incubator manager and incubator company (Rice, 2002)		Selection performance (Hackett and Dilts, 2004)
	Incubation candidate pool munificence/incubatees (Hackett and Dilts, 2004)		Incubator and incubatees (Hackett and Dilts, 2004)		
	Incubator director/president /manager (Smilor, 1987)		Incubator manager and external network (Rice, 2002)		Business services, provision of capital and access to network (Campbell et al, 1985)
Incubator management	Incubator director/ president/manager (Smilor, 1987)	Incubator management & external organisations	Incubator and venture capital community, university (Smilor, 1987)	Business support process	Passive environmental intervention, counselling and networking (Rice, 2002)
	Incubator manager/managers of business incubation programmes (Rice, 2002)				Resource munificence, monitoring and business assistance (Hackett and Dilts, 2004, 2008)
					Support systems (Smilor, 1987)

Table 2.2: Key findings from business incubation studies: actors, relationship between actors and incubation components (Author's own)

Actors	Literature terms	Relationship between actors	Literature terms	Incubation components	Literature terms
Incubator management	Incubator network (Hackett and Dilts, 2004)	Entrepreneurs & other incubatees	Entrepreneurs and other entrepreneurs (Smilor, 1987; Rice, 2002)		
	Private business developers and real estate developers (Campbell et al, 1985)		Synergies among resident group of business start-ups (Campbell et al, 1985)		
External organisations	Incubator affiliation/consultant network (Smilor, 1987)				
	External network/know-how network (Rice, 2002)				
	Incubator network (Hackett and Dilts, 2004)				
	Resource networks (Campbell et al, 1985)				
Other incubatees	Other entrepreneurs (Smilor, 1987; Rice, 2002)				
	Resident group of business start-ups (Campbell et al, 1985)				

Table 2.2 Continued: Key findings from business incubation studies: actors, relationship between actors and incubation components (Author's own)

growth potential and high technology‑related (Smilor, 1987), uniqueness of the product, profit potential of the start-up, potential to attract investment, whether the start-up has multiple harvestable exist options, substitutability of the product, whether the product demonstrates defendable competitive position and whether the product has patent protection (Hackett and Dilts, 2008).

The business support process includes the delivery of types of support by internal (e.g. the incubator manager) and external actors (e.g. external organisations). The types of support include entrepreneurial education, access to networking opportunities, business advice and support from knowledge of internal actors, access to venture capitalists, secretarial support, administrative support, business expertise and facilities (Smilor, 1987, Rice, 2002, Hackett and Dilts, 2004a). One study found that business support is delivered in three different ways: passive environmental intervention, counselling and networking (Rice, 2002). Additionally, according to different studies, the quality of the business support process is affected by different elements including chemistry between the incubator manager and entrepreneur (Smilor, 1987), the total amount of time the incubator manager dedicates, the intensity of engagement by the incubator manager, the breath of co-production modalities deployed, the readiness of the entrepreneur to engage in co-production (Rice, 2002, Hackett and Dilts, 2008) and the ability of the entrepreneur to learn and utilise resources (Hackett and Dilts, 2008).

From the process studies reviewed, key issues can also be identified which have left a gap in understanding of how the incubation process functions. First, each process model defines the incubation process differently which suggests there is little consensus or agreement in the literature on where and with whom the incubation process occurs. This has hindered efforts at generalising incubation research results to the incubator population (Hackett and Dilts, 2004b). Second, across incubation process studies and within incubation process studies, there is also a lack of consensus on the terminology used to discuss the incubation process and incubation components (see Table 2.2 above). This is problematic as without a baseline agreement of components of the process, it is difficult to develop the incubation process literature.

Third, most studies except one (Rice, 2002) do not consider the perspective of the entrepreneur as the research is designed around the incubator or incubator manager level of analysis (Scillitoe and Chakrabarti, 2010) (see Table 2.1 above). This is surprising as entrepreneurs are the key actors incubated and have a particularly important influence

on the ability of ventures to spin-off from the incubation process (Phan et al., 2005). Not only is the perspective of the entrepreneur not accounted for, but there is a failure to account for the entrepreneur's background and experience and how this affects new venture creation in the context of the incubation process. This is important to consider as the entrepreneurship literature suggests that entrepreneurs are positively affected by their prior experience and background during new venture creation (Shane, 2000) which can have implications for their incubation success.

Fourth, despite the recognition that the incubation process draws from external organisations which contribute as actors in the process (Campbell et al., 1985, Rice, 2002), there is little consensus on the types of organisations, the geographical orientation of these organisations and a failure to account for other elements of the external regional environment and how they affect the incubation process. This is problematic as the entrepreneurship literature highlights the context-dependent nature of entrepreneurship (Hjorth et al., 2008).

Fifth, the above studies do not consider the objectives and resources of the incubator and how this affects the incubation process. This is an issue as the general incubation literature suggests that the objectives of different incubator types may be indicative of the amount and type of resources a certain type maintains (Hackett and Dilts, 2004b).

Finally, the studies do not explain how the incubator type affects the process suggesting that there is one incubation process and that there are no differences between incubation processes. This is surprising as the larger incubation literature suggests that the different incubator types offer different types of services to their entrepreneurs (vonZedtwitz and Grimaldi, 2006), have different objectives and resources (Hackett and Dilts, 2004b), are incubating different types of entrepreneurs (e.g. academics and student entrepreneurs) that also have different backgrounds and experience (Ucbasaran et al., 2001). This has hindered efforts at generalising incubation research results to the incubator population and specific incubator types. Although the above studies appear to shed light on the incubation process, the problems systemically analysed above highlight the need to research these issues further. The next section (2.1.7) will analyse other incubation literature that has focused on incubation process components rather than the entire process.

2.1.7 Other literature on incubation process components

Apart from studies on incubation process models, there are also other studies focusing on the individual components of the incubation process. These studies are important to review as they are also part of the incubation literature. What research has been done in this area is generally limited to analysing the selection process, types of business support and the business support process. Other studies have analysed the selection component of the incubation process in more detail. Bergek and Norman (2008), through the analysis of applications to a government-funded programme, discuss the "screening practice" of 16 Swedish incubators that were supported by the government VINNKUBATOR programme for incubator support. Selection is defined as the "decision concerning which ventures to accept for entry and which to reject" (ibid: 23). The findings suggest that six incubators had a clear focus on criteria related to the competence and character of the entrepreneur (e.g. entrepreneur focused) while seven incubators primarily focused on criteria related to the innovativeness of the idea (e.g. idea focused). The three remaining incubators placed equal emphasis on criteria related to the idea and criteria related to the entrepreneur/team. The incubator type was not linked to the selection criterion.

Aerts et al. (2007) analysed the "screening practices" of European incubators based on an international survey. The study found that 74% of incubators have a selection committee with the selection decision resting on one individual. "Market factors" is the most important screening factor on average followed by management team and financial factors. When looking to the link between screening practices and incubator performance (tenant failure rate), the study found that a high concentration on one screening dimension (financial factors, team or market) is related to a higher failure rate. Aerts et al. (2007) suggest that a "balanced screening practice" is necessary focusing on multiple factors with multiple decision makers on selection committees. These studies focused on the selection process build upon the findings from the above process models. They suggest that the competence and character of the entrepreneur and innovativeness of the business idea are also selection criterion used as part of the selection process. The studies also suggest that a higher concentration on one screening dimension is related to a higher spin-off failure rate (Aerts et al., 2007).

Other studies have also analysed the business support process in more detail. Von Zedtwitz and Grimaldi (2006) focused on the core "business services" of incubators

delivered during the business support process and the differences between service profiles of incubator types. They employed a qualitative research methodology including face-to-face interviews with incubator managers. The findings from the study highlight that incubators offer a wide range of business services including physical infrastructure, office support, access to capital, business development support (e.g. coaching, mentoring, consulting and legal advice) and access to networks. Bergek and Norman (2008) also discuss the business support component of Swedish incubators. Business support is defined as "coaching/training activities undertaken to develop the incubatees" (ibid: 23). They found three typical forms of business support: "laissez-faire" intervention which involves very little assistance where the entrepreneurs are left entirely to themselves; "strong intervention" or intervention where the entrepreneurs are guided through the incubation process by "the steady hand of the incubator staff and are sometimes even supplied with complete management teams" (ibid: 24); and business support that was in the middle of the two types of support. This suggests that similar to the findings from Rice (2002) business support may be delivered in different intensities.

In another recent study, Scillitoe and Chakrabarti (2010) analysed the role of types of interactions with incubator management during the business support process. Using a web-based survey for a firm-level analysis and interviews with incubator management, they found that business assistance is best enabled through counselling interactions with incubator management while networking interactions facilitated by incubator management enable technical assistance. This study also builds upon the findings from Rice (2002) by highlighting that different co-production modalities should be paired with specific types of business support assistance. These studies build upon the findings from the above process models. They suggest that business support may be delivered in different intensities and that certain information is best obtained through different types of interactions.

2.1.8 Gaps, research questions and conceptual framework

The review of the incubation literature demonstrates that there are gaps in research surrounding the incubation process. Firstly, there is a gap in understanding how the incubation process works. Despite the various studies and existing process models, it is still unclear how the incubation process functions and how the components and actors of the process work together. Some studies include actors such as the incubator manager and entrepreneur in their conceptualisations, while others just include sub-processes

such as the business support process or the selection process. These sub-processes are often not discussed in detail and are defined differently in existing studies. Based on this gap, the first research question has been developed:

***RQ1**: How does the incubation process function?*

Secondly, an understanding of how types of incubation processes differ is missing from the literature. Most authors suggest that there is *one* incubation process despite the recognition that the process takes place in different institutions with varying and dynamic objectives and funders. The separation of university incubation processes in the technology transfer literature and student incubation processes in the entrepreneurship education literature has also not helped with this issue. This thesis addresses this gap by the research design which includes a comparative analysis of three different incubation archetypes. Based on this gap the second research question has been developed:

***RQ2:** How do incubation processes differ?*

Thirdly, within the incubation literature there is a gap in understanding how an incubator's objectives and resources affect the incubation process despite the suggestion that the way the incubation process functions may be the result of different objectives and access to resources (Clarysse et al., 2005, Hackett and Dilts, 2004b). This thesis addresses this gap by gaining an understanding of how each incubation process type's objectives and resources affects how the incubation process functions and by comparing the three incubation archetypes by their objectives and resources. Based on this gap the third research question has been developed:

***RQ3:** How does an incubator's objectives and resources affect how the incubation process functions and influence potential new venture creation?*

Fourthly, the review highlighted that most research is designed around the incubator or incubator manager level of analysis (Scillitoe and Chakrabarti, 2010) despite the recognition that entrepreneurs are the key actors incubated and have a particularly important influence on the ability of ventures to spin-off from the incubation process (Phan et al., 2005). Not only is the perspective of the entrepreneur not accounted for, but there is a failure to account for the differences between entrepreneurs and how their individual entrepreneurial characteristics affects their ability to start a new venture in the context of the incubation process. The entrepreneurship literature highlights the importance of considering the heterogeneity of entrepreneurs as it affects potential new

venture creation (Mosey and Wright, 2007, Westhead, 2005, Westhead and Wright, 1998). This thesis addresses this gap by not only designing the research around the entrepreneur's perspective but also by comparing different entrepreneur types and their experience and background within and across incubation process types. In order to achieve this, a review of the entrepreneurship literature specifically around entrepreneurial characteristics will take place in a following section. Based on this gap, the second research question has been developed:

> ***RQ4:*** *How does an entrepreneur's experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affect their ability to start a new venture in the context of the incubation process?*

Finally, the review of the literature demonstrates that there are a lack of studies that contextualise the incubation process into its larger regional context. No known studies have analysed how the incubation process is affected by the RIS it connects to despite the recognition that the incubation process transcends the incubator (Hackett and Dilts, 2004b). The research undertaken in this thesis aims to contextualise the incubation process by understanding how the RIS and the process are interconnected and how incubation archetypes differ in their connections within the same RIS in which they are based. In order to achieve this, a review of the RIS literature will take place in the next section. Based on the gap discussed above, the fifth research question has been developed:

> ***RQ5:*** *How and in what ways do the principal elements of the RIS play a role in the incubation process and influence potential new venture creation?*

Prior to reviewing the literature around university incubation processes which are the second type of incubation process analysed in this thesis, an initial conceptual framework stemming from the incubation literature will be discussed below (see Figure 2.5). From the review of the incubation literature, it was found that the incubation process components may include a selection process and business support. These two components are included in Figure 2.5. The key actors in the incubation process were found to include the entrepreneur, incubator management, other incubatees and external organisations. External organisations has been termed 'regional organisations' as there is some evidence in the literature that external organisations may be regional (Bergek and Norman, 2008, Campbell et al., 1985). These actors have also been added to Figure 2.5. Incubator management is connected with the selection process and moderating the connection between business support and potential new venture creation as it has been

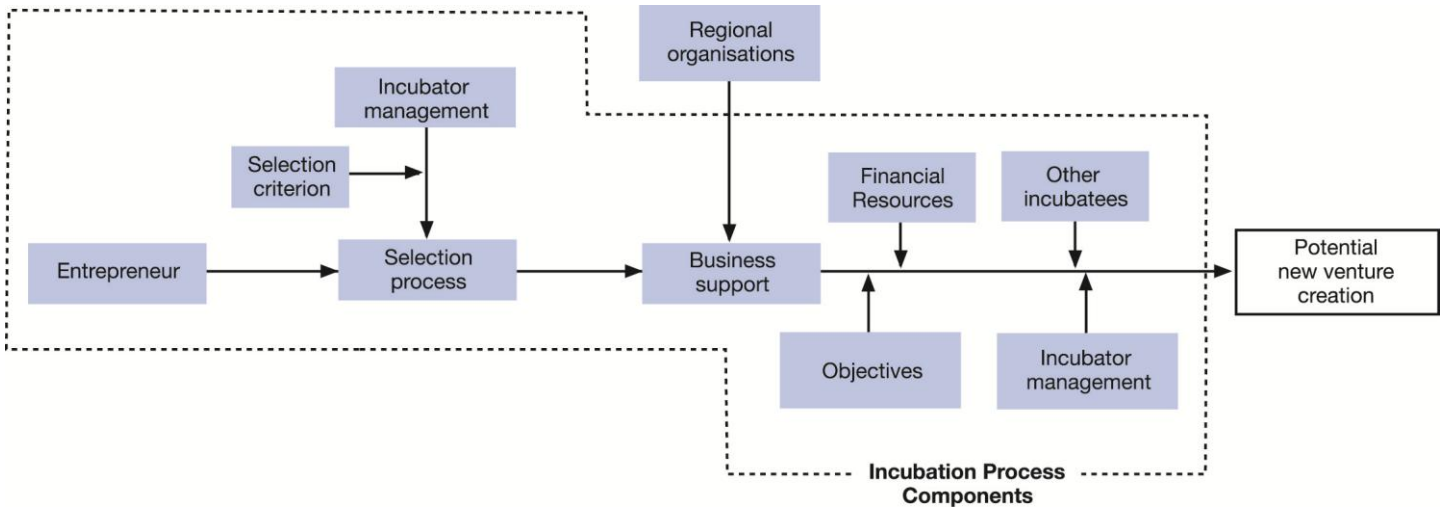

Figure 2.5: Initial conceptual framework from incubation literature review (Author's own)

suggested this is their role. Regional organisations are also connected to business support as the review suggested that the incubation process draws from external organisations to function. Other incubatees moderates business support as the literature suggests that other incubatees and entrepreneurs draw from each other to develop their spin-offs. Finally, objectives and resources were added to moderate business support as it has been suggested that an incubator's objectives and resources may affect how the process functions. After the individual review of the RIS literature in the next section and the entrepreneurship literature review, the conceptual framework will be updated with information taken from these two other literatures. A final conceptual framework will be discussed at the end of the entrepreneurship literature review which will be used as a framework to analyse the empirical chapter of the thesis. The next section discusses the literature around university incubation processes which is the second type of incubation process analysed in this thesis.

2.2 University incubation processes

While university incubators are included in incubator typologies discussed within the incubation literature, studies of university incubation processes are based within the technology transfer literature and have remained relatively separate from the incubation literature. The separation of these literatures is an important issue to highlight as it has hindered the development of an understanding of the differences between incubation process types.

University incubation processes take place in university incubators and involve academics as entrepreneurs[3]. As mentioned in the above section that discusses the taxonomy of incubators, university incubators assist in the commercialisation of science and technology produced by university research (Campbell et al., 1985, Grimaldi and Grandi, 2005). While some argue that the primary interest of university incubators is development of new products or technologies as an end in itself (Bollingtoft and Ulhoi, 2005), others who include student spin-offs in their classification, suggest that university incubators nurture and develop entrepreneurial talent through entrepreneurship courses (Steffensen et al., 2000). University incubators in the literature are also referred to as academic incubators, science parks, research parks, technology parks (Bollingtoft and Ulhoi, 2005) which has not helped consolidate the literature and confound findings.

[3] A discussion around academic entrepreneurs will take place in entrepreneurship literature section.

An issue with the literature around university incubation processes is the lack of consensus on the boundary of a university incubator as "University" is used interchangeably to mean the wider university institution (Lockett et al., 2002) and property-based incubators located close to university campuses (Patton et al., 2009). This thesis follows the former conceptualisation or studies that focus on the wider university. Overall, research on university incubation processes is sparse (Markman et al., 2005). Only two known studies focus on university incubation processes with the boundary of the wider university institution. The first is a study by Lockett et al (2002) that undertook surveys and interviews with individuals from the university and spin-offs to understand the role of the university in the incubation of academics. They found that university incubation process components include the TTO, incubation space, resources (e.g. human resources, financial resources, social resources, technological resources and organisational resources), academic entrepreneurs, university actors (head of the department, university management and business development managers (BDMs) from the TTO) and external resource providers (e.g. business angels, venture capital management companies, property-based incubators, venture capitalists, public support agencies and industrial partners) (Lockett et al., 2002). This suggests that there are similarities in terms of incubation process components between university incubation processes and what the broader incubation literature suggests. The role of the university in incubation, more narrowly defined as the TTO, is to coordinate access to resources required by academics to develop their ideas into spin-offs (ibid). However, despite the important role of the TTO, according to Lockett et al (2002), the mere existence of a TTO within a university is not a sufficient condition for successful incubation. They argue that BDMs within TTOs need to have the 'right' experience to support spin-offs and social capital to provide access to a range of resources for the spin-offs as the university typically lacks the necessary resources. The actual incubation process is not described in the study.

In the second known study, Clarysse et al (2005) conducted interviews with individuals from technology transfer units associated with universities and public research institutes to identify incubation strategies. From their study, they identified three types of spin-out models including a low selective model, a supportive model and an incubator model. Their main findings suggest that different university incubation models have very different resource implications in managing the spin-off process which are also linked to the model's objectives. However, this study also does not explain a university

incubation process in detail as the research focuses on the perspective of incubation management actors rather than the entrepreneur.

As TTOs were found to be important in university incubation processes, it is also essential to discuss some of the literature focused on TTOs. TTOs facilitate technology transfer through the licensing to industry of inventions or IP resulting from university research (Siegel et al., 2003) or through the creation of spin-offs. The importance of TTOs in supporting academics in developing spin-offs is unclear within the literature. Some studies have found that they are important intermediaries through which university research is commercialised (Jain and George, 2007a) while others suggest that university spin-offs encounter obstacles and challenges and report more negative than positive experience of resource acquisition and support in the university context (Mustar et al., 2006, Harrison and Leitch, 2010). Some of these obstacles and challenges include the university's policy towards IP (which is conservative and risk-averse), available financial resources, faculty reward systems, TTO staff also known as BDMs (e.g. compensation, practices, experience and lack of autonomy within the university), the department which the academic is based, central management of the university, cultural barriers between universities and firms, access to external organisations and time given to academics to work on developing their spin-offs (Siegel et al., 2003, Mustar et al., 2006, Tuunainen, 2005, Lockett et al., 2002, Markman et al., 2005). Lockett and Wright (2004) and Powers and McDougall (2004) in studies focused on TTOs found that the size and experience of a technology transfer office is positively associated with increased spin-off activity. Lockett et al. (2003) found that more successful universities have developed more explicit and proactive strategies towards the development of spin-out companies. Lockett et al. (2002) also found that universities successful in creating spin-offs have clearer strategies for using surrogate entrepreneurs.

The actual incubation process academics go through which is facilitated by TTOs is not explicitly analysed (Clarysse et al., 2005). However, there are some studies that have analysed the selection process and types of resources that TTOs offer. An individual study on the selection process utilised by TTOs found that the selection criteria utilised are similar to those of venture capitalists (Meseri and Maital, 2001). The selection criteria are based on market need, market size, existence of patent, success chances for R&D stage, level of innovativeness, and degree of maturity of idea. Pro start-up TTOs also focus on criteria focused on the quality of entrepreneurs (ibid).

Along with typical incubator resources discussed in the above general incubation literature section (2.1.5), university incubation process resources may also include physical resources such as access to labs and equipment, technological resources such as licensing of technology and human resources such as surrogate entrepreneurs and student employees (Lockett et al., 2002, Clarysse et al., 2005). However, empirical studies suggest that many of the resources the academic entrepreneurs need may not be supplied by the university and, therefore, the use of external resource providers who are accessed via the guidance and coordination of TTO officers at the university (Lockett et al., 2002). In a recent empirical study, Harrison and Leitch (2010) found that there were gaps in the university's support for the personal development of the academic entrepreneur during the commercialisation process notably in identifying the market opportunity for the technology, technology development, explanation of alternative exploitation options, and career options for academic entrepreneurs which affected the strategic and operational development of the technology into a commercial venture. This suggests that similar to the findings from the general incubation literature external organisations play a role in university incubation processes.

There are a limited number of studies that have attempted to understand the role of the region in university incubation processes. Most studies focus on how spin-offs contribute to regions (Benneworth and Charles, 2005, Benneworth and Hospers, 2007, Leitch and Harrison, 2005). Harrison and Leitch (2010) found that the constraining influence of the regional environment including lack of access to regional business development resources, lack of access to a local market and lack of viable scale of cluster industrial activity caused a fundamental constraint on the development of spin-offs and their ability to translate leading-edge knowledge into high growth potential businesses. Clarysse et al (2005) highlight in their findings that different university incubation models interact differently with 'the local environment'. A 'low selective model' which incubates mostly service-oriented spin-offs requires a large local market of established firms while the 'supportive model' heavily relies on the regional dynamic to function, specifically the availability of venture capital. Finally, the 'incubator model' which is based on more technological spin-offs is less dependent on the local environment, engaging in a much broader worldwide environment. Outside of the university incubation processes, other studies have discussed the role of regions in facilitating entrepreneurship (Roberts, 1991, Saxenian, 1994, Roberts and Malone,

1996). These studies will be discussed in the section of the literature review that focuses on the RIS (see section 2.4).

2.2.1 Summary

The discussion above highlighted that there is very limited research focused on the process of incubation in a university context. The primary objective of university incubators is development of new products or technologies (Bollingtoft and Ulhoi, 2005). University incubators in the literature are also referred to as academic incubators, science parks, research parks, technology parks which has not helped consolidate the literature and confound findings (ibid). There is also a lack of consensus on the boundary of a university incubator as "University" is used interchangeably to mean the wider university institution (Lockett et al., 2002) and property-based incubators located close to university campuses (Patton et al., 2009).

Studies focused on the wider university institution as an incubator found that university incubation process components include the TTO, incubation space, resources (e.g. human resources, financial resources, social resources, technological resources and organisational resources), academic entrepreneurs, university actors (head of the department, university management and BDMs from the TTO) and external resource providers (e.g. business angels, venture capital management companies, property-based incubators, venture capitalists, public support agencies and industrial partners) (Lockett et al., 2002). The role of the university in incubation, more narrowly defined as the TTO, is to coordinate access to resources required by academics to develop their ideas into spin-offs as the university does not have most resources internal to the university (ibid). This suggests that university incubation processes may be highly dependent on the regional context in which they are based. However, there are a limited number of studies that have linked university incubation processes and the regional environment as most research focuses on how spin-offs contribute to the region. The next section will discuss the literature around student incubation processes which are the third category of incubation processes analysed in this thesis.

2.3 Student incubation processes

Despite the fact that academic entrepreneurship is a relatively marginal phenomenon in comparison with the increasing number of students starting businesses, most studies focusing on entrepreneurship in the context of the university have focused on academic entrepreneurs and incubation rather than student entrepreneurs (Politis et al., 2012).

Similar to university incubation processes, studies of student incubation processes have also remained relatively separate from the incubation literature and are based within the entrepreneurship education literature. The separation of these literatures is an important issue to highlight as it has hindered the development of an understanding of the differences between incubation process types. There are a very limited number of studies that focus on student incubation as a means to new venture creation as most studies are concerned with how student incubation programmes contribute to entrepreneurial education (Ollila and Williams-Middleton, 2011).

Student incubators are not included in typologies of incubators and are seen as a sub-set of university incubators that nurture and develop entrepreneurial talent through entrepreneurship courses (Steffensen et al., 2000). Student incubation processes involve the incubation of student entrepreneurs [4] within a university context as student incubators are usually located within universities. Most of the existing entrepreneurship programme studies are descriptive and not empirically‐based. Nevertheless, there is still information that can be taken from these studies to provide a framework for analysing the student incubation process case study in this thesis.

Despite the use of different terms to describe components, which is also an issue in the incubation literature, a synthesis of the studies highlights that the components of student incubation processes includes actors, a selection process and business support. The key actors include students, programme management (Klofsten, 2000), other internal specialist consultants/advisors (Robertson and Collins, 2003, Ollila and Williams-Middleton, 2011), external actors such as experienced business people (Rasmussen and Sørheim, 2006), VCs and other supportive organisations (Klofsten, 2000), student union actors (Robertson and Collins, 2003) and educators (Ollila and Williams-Middleton, 2011).

To enter programmes, students are selected through interviews with programme management (Klofsten, 2000) and psychologists (Rasmussen and Sørheim, 2006) based on selection criteria. These criteria differed across the programmes ranging from the motivation of the individual (Klofsten, 2000) and high growth ideas (Rasmussen and Sørheim, 2006). Within the programmes, students may take part in a business plan

[4] A discussion around student entrepreneurs will take place in entrepreneurship literature section.

competition (Robertson and Collins, 2003) and receive business support including office space (Rasmussen and Sørheim, 2006), workshops, one-one-one advice (Robertson and Collins, 2003), mentoring, supervision, access to networks, seed financing (Klofsten, 2000) and education courses focused on strategy, finance, marketing and leadership (Ollila and Williams-Middleton, 2011). Students may also be co-located in a single teaching and working environment (ibid).

According to some of the studies, entrepreneurship programmes are highly dependent on external actors for both financial and practical business support as they offer (often free) support which compensates for the lack of financial resources in the university (Rasmussen and Sørheim, 2006). This is beneficial for student entrepreneurs as it builds their social capital as they are engaging with individuals with access to other networks and exposes them to up-to-date and real-life experience (ibid). This suggests that, similar to the findings in the general incubation literature, external organisations and perhaps the regional context are important for the functioning of student incubation processes. However, student incubation process studies have not discussed the regional context in-depth.

One study in particular that utilised empirical research indicated an interesting finding that is relevant for the needs of this thesis. Rasmussen and Sørheim (2006) found that students were taking up and developing the ideas that were not exploited by senior academics to start businesses which suggested that student incubation processes can contribute to the university mission of technology transfer through the commercialisation of university inventions. This finding has implications for university incubation processes and how different programmes within the same university interact and collaborate. This is important for the needs of this thesis which analyses both a student and university incubation process within the same university.

2.3.1 Summary

From the above brief discussion, it can be seen that there is a very limited amount of research focused on student incubation processes. Student incubators are seen as a sub-set of university incubators as they take place within the university context. However, rather than incubating academic entrepreneurs, student incubation processes involve the incubation of student entrepreneurs. Most of the existing entrepreneurship programme studies are descriptive and not empirically-based. A synthesis of the existing studies highlights that the components of student incubation processes includes actors, a

selection process and business support. The key actors include students, programme management other internal specialist consultants/advisors, external actors such as experienced business people, VCs and other supportive organisations, student union actors and educators. Students are selected through interviews with programme management and psychologists based on selection criteria such as the motivation of the individual and high growth ideas. Within the programmes, students may be co-located in a single teaching and working environment. Business support may involve a business plan competition, office space, workshops, one-one-one advice, mentoring, supervision, access to networks, seed financing and education courses focused on strategy, finance, marketing and leadership. According to some of the studies, entrepreneurship programmes are highly dependent on external actors for both financial and practical business support as they offer (often free) support which compensates for the lack of financial resources in the university. This suggests that external organisations and perhaps the regional context is also important for the functioning of student incubation programmes. However, the link between student incubation processes and the regional context is missing from the existing studies. The next section will discuss the RIS literature to further develop the conceptual framework at the end of the incubation literature review section.

2.4 Regional innovation systems literature

As discussed in the introduction and in the above incubation literature review, there is a gap in understanding incubation in terms of the regional context within which it occurs. This gap is important to address as the incubation process transcends the incubator (Hackett and Dilts, 2004a) drawing from external organisations to function. Additionally, entrepreneurship is a multi-dimensional process of which the external environment is a key component (Gartner, 1985). To address this gap, this thesis integrates the incubation literature with the RIS literature as the latter provides a framework for contextualising the process into its regional environment. The review that follows discusses the RIS literature to gain an understanding of a RIS and to define its core components. These components will be included in the conceptual framework to address this thesis' fifth research question. Prior to a discussion of these components, the review will begin by very briefly discussing the broader research areas the RIS literature connects to including systems of innovation (SI) and national innovation systems (NIS).

2.4.1 The broader context of regional innovation systems

The RIS literature is embedded in the SI and NIS which highlight that innovation does not take place in isolation but rather by firms in collaboration with other organisations (Fagerberg, 2005). SI consist of components and relationships that interact in the production, diffusion and deployment of new and economically useful knowledge (Lundvall, 1992). A SI is an open system with feedback mechanisms that help to produce new knowledge and new technologies (Cooke, 1998). Organisations are one of two main components of an SI which includes firms or non-firms such as universities, schools or government organisations (Edquist, 2005). The more regular the flows of information and interaction between organisations, the stronger the SI (Cooke, 1998). Institutions are the second SI component which includes laws, rules, norms and routines that incentivise and act as obstacles for innovation (Edquist, 2005). "Institutions are context-specific and collectively act as an integrated web running through different systems (e.g. social, economic), scales of governance (e.g. local, regional, national), and levels of inter-relation (e.g. among individuals, organizations, societies)" (Doloreux and Parto, 2005:146). The interaction or linkages between organisations and institutions is the core of the SI approach (Carlsson, 2007) which provides a framework for researchers to better understand the knowledge generation and exploitation process.

One of the strengths of an SI framework which separates it from other approaches is that it places innovation and learning processes at the centre of focus (Edquist, 2005). This allows for the creation of new knowledge or combination of existing knowledge in new ways through feedback loops (Lundvall, 1992). A SI framework is also holistic in the sense that it includes all determinants of innovation including organisational, social and political factors (ibid). One of the main limitations of the approach is determining how to represent an SI in reality (Markusen, 1999) e.g. what makes up a system of innovation, who are the actors and what interactions bind them together.

According to Edquist (2005: 199), there are three ways to identify SI boundaries: (1) spatially/geographically; (2) sectorally; and (3) in terms of activities. The spatial/geographical boundaries include research on NIS or the national scale (Freeman, 1987, Lundvall, 1998) , RIS or the regional scale (Cooke et al., 1997, Autio, 1998) and more recently local innovation systems (LIS) or the local scale (Saxenian, 1990, Rantisi, 2002, Simmie, 2005). Sectoral systems of innovation (SIS) and territorial systems of innovation (TIS) represent the second classification of SI. Boundaries of the system in

SIS and TIS are based on sectors. Other conceptualisations have been termed metropolitan systems of innovation (Diez, 2002, Fischer et al., 2001) as well as international systems of innovation (ISI) as interactions move beyond national borders to international activity (McKelvey, 1991, Niosi and Bellon, 1994, Niosi and Bellon, 1996, Bartholomew, 1997, Fransman, 1999, Niosi et al., 2000). Finally, activities undertaken within the system is the third classification (Liu and White, 2001, Edquist, 2005). This categorisation based on activities implies that a system-level analysis should begin with an understanding of how fundamental activities of the innovation process are organised, distributed and coordinated (Liu and White, 2001). In the entrepreneurship literature, SI are also referred to as entrepreneurial systems (Spilling, 1996, Neck et al., 2004). This thesis is interested in the spatial boundaries of the regional scale or a RIS approach.

Discussions and analysis around RIS usually begins with an explanation of NIS as RIS are argued to be theoretically rooted in NIS (Moulaert and Sekia, 2003). The emergence of the NIS approach stemmed from accelerating economic globalisation during the 1980s and increasing international competition between countries (Sharif, 2006). In this economic context, the application of new knowledge and technology to products and production processes was essential for countries to remain competitive. To succeed in the innovation process, firms need to interact with other firms, universities, and private and public laboratories. A systemic approach based on the concept of NIS provided a framework for attempting to understand such complexity. In an NIS perspective, innovativeness of a nation is understood as a result of interactions between national organisations (Miettinen, 2002).

In the policy context, a NIS framework quickly emerged as a tool for policymaking (Miettinen, 2002: 14). According to Godin (2009), NIS brought a name or label to the systems approach. However, despite these points, a NIS framework was unable to explain regional imbalances and growth performances – both within countries and among areas of the world (McKelvey, 1991). Higher levels of analysis at the national level also presented other issues: "the larger the aggregate, the more difficult it is to define the actors or nodes and to analyse the quality and dynamics of their interactions" (Miettinen, 2002: 37). These interactions were argued to be "embedded" within a regional context or the regional scale (Simmie, 2005). As a result, regions became increasingly regarded as important nodes of production, trade and decision making (Nijkamp, 2003). Additionally, tacit knowledge was found to be transferred via face-to-

face interactions within an atmosphere of trust (Storper and Venables, 2004) which is facilitated by geographical proximity that occurs at a regional scale (Howells, 2002). According to Alderman (2001), proximity is implicit in the concept of the RIS.

2.4.2 Regional innovation systems

As discussed above, NIS were unable to account for the disparity of innovation performance amongst countries and, therefore, the RIS approach emerged during the 1990s. RIS place increased emphasis on characteristics and forces at the regional scale as opposed to the national scale (Braczyk et al., 1998, Cooke et al., 2004, Cooke et al., 1997). The RIS approach is embedded in the theory and research of regional science with its emphasis on proximity, path dependency and evolutionary economics (Doloreux and Parto, 2005). More recently, RIS have been discussed as a new interpretation of territorial innovation models (TIM) along with the 'learning region' literature (Morgan, 2007, Moulaert and Sekia, 2003).

Cooke et al (2004: 3) define an RIS as "interacting knowledge generation and exploitation sub-systems linked to global, national and other RIS for commercialising new knowledge". Moodysson (2004: 145) delineates a RIS as "a system of collective order emanating from mutual trust and understanding in an economic community, facilitated by a common set of regional institutions and organisations, underpinned by the unique territorial assets of the region" or socio-economic and cultural setting. Another definition of a RIS is that as "the localised network of actors and institutions in the public and private sectors whose activities and interactions generate, import, modify and diffuse new technologies" (Evangelista et al., 2002:174). Despite the absence of consensus, these definitions highlight that a RIS contains multiple interacting sub-systems, requires trust to operate, is facilitated by regional organisations, and is underpinned by a socio-economic and cultural setting.

According to Autio (1998), RISs can be viewed as social systems composed of interacting sub-systems: the knowledge application and exploitation sub-system and the knowledge generation and diffusion sub-system embedded in a common regional socioeconomic and cultural setting. Figure 2.6 provides a conceptualisation of the RIS framework including the two sub-systems and external influences which variably affect the sub-systems (Autio, 1998). The knowledge generation and diffusion subsystem consists of public sector organisations such as universities, research institutes, technology transfer agencies, and regional and local governance bodies responsible for

innovation support practices and policies (Cooke et al., 2000). Incubators are also part of this subsystem. The knowledge application and exploitation subsystem includes firms which exploit knowledge for commercial return. The external influences include other RISs, the NIS, and European policy instruments and international organisations. The interactions within and between organisations and sub-systems (seen by the arrows connecting the two sub-systems) generate the knowledge flows that drive the RIS.

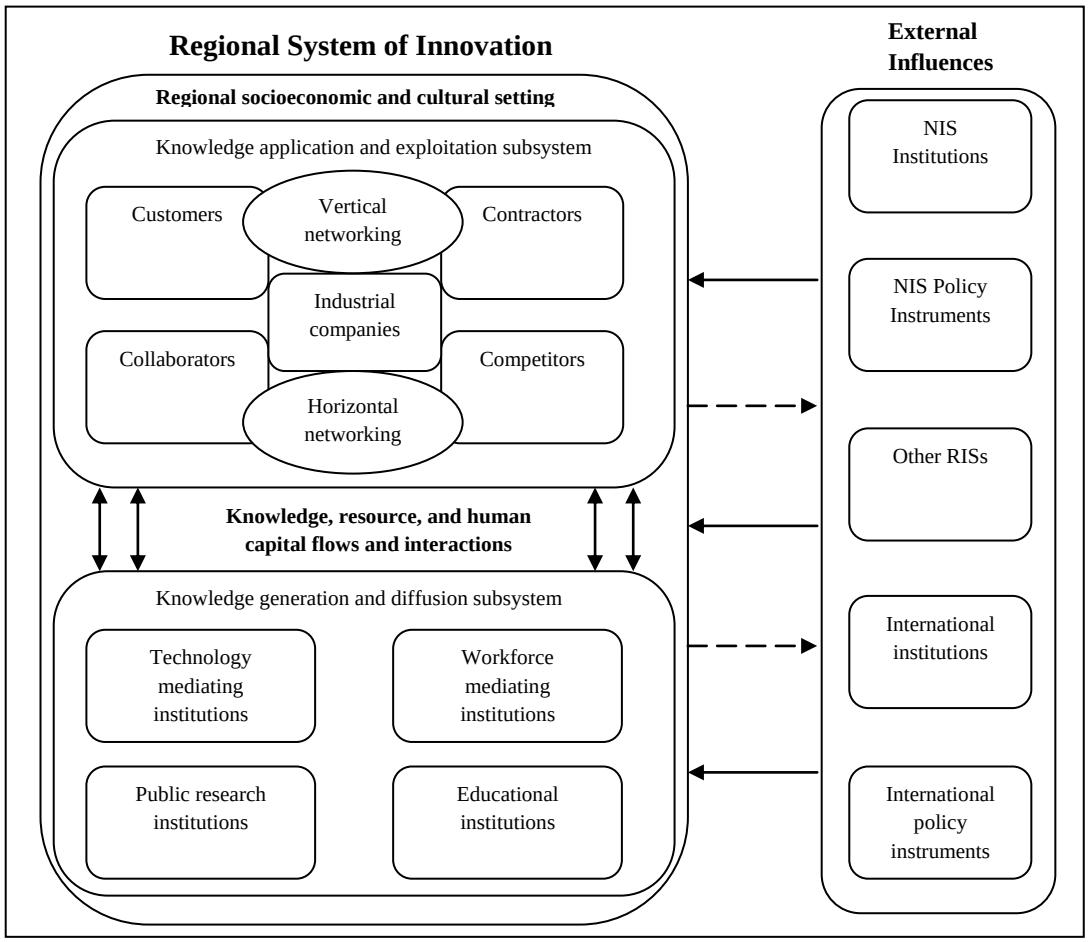

Figure 2.6: RIS conceptualisation (Autio, 1998:134)

Cooke et al (2000:104) and Cooke (2002) also provide a conceptualisation of a RIS which was adapted from Autio's (1998) version. The figure has not been included here as there were only slight changes from Autio's model. The term 'institutions' in Autio's model has been changed to 'organisations' and 'international policy instruments' to 'European Union Policy Instruments'. In another conceptualisation by Tödtling and Trippl (2005), the authors also slightly modify Autio's (1998) model by adding a regional policy dimension to the regional socioeconomic and cultural setting area of the figure. They argue that policy actors at the regional level can play a powerful role in

shaping regional innovation processes. Interactions in the RIS should ideally be intensive within and between the two sub-systems where there is a continuous flow or exchange of knowledge, resources and human capital (ibid). The similarity between the conceptualisations demonstrates that there is some agreement in the literature on the components which make up a RIS.

The next section will discuss specifically regional organisations, interaction between regional organisations and the regional socioeconomic and cultural setting in more detail. These three elements represent core aspects of the RIS framework and will be used to address the thesis' fifth research question. The next section starts by discussing the literature around organisations in a RIS.

2.4.3 Organisations of the RIS

As discussed, a RIS includes two sub-systems made up of various regional organisations. The knowledge creation and diffusion subsystem consists of public sector organisations such as universities, research institutes, technology transfer agencies, incubators and regional and local governance bodies responsible for innovation support practices and policies (Cooke et al., 2000). The knowledge application and exploitation subsystem contains firms which exploit knowledge for commercial gain. The organisations within these sub-systems will be discussed in more detail below.

The knowledge creation and diffusion organisations include universities, polytechnics, and publicly‑funded research organisations. By performing basic and applied research, these organisations are vital to the development and diffusion of technical knowledge, education, and R&D (Doloreux, 2002). These organisations also contribute to the regional skill base (Goddard and Chatterton, 1999) on which the knowledge application and exploitation sub-system can draw (Autio, 1998). As discussed in the incubation literature review, universities provide business and research centres, continuing business education, can potentially act as a base for research and development for entrepreneurs and provide tenant companies in the form of university faculty entrepreneurs (Smilor, 1987). According to the survey undertaken in the Smilor (1987) study, 80% of incubators had some kind of affiliation with a university.

TTOs, innovation advisory agencies, and incubators focus on the diffusion of knowledge. Their role is to provide technical support and information to knowledge-based firms and are oriented toward developing new and profitable industrial activities

at the regional level (Doloreux, 2002). TTOs are intermediaries through which university research is commercialised (Jain and George, 2007b). This occurs by identifying, protecting, marketing and licensing IP developed by academic faculty (Djokovic and Souitaris, 2008). The role of incubators are as 'intermediate organisations' that "provide the social environment, technological and organisational resources, and managerial expertise for the transformation of a technology-based business idea into an efficient economic organisation" (Phan et al., 2005: 170 and 171). Governmental organisations (parliaments, ministries other public agencies or councils for science and technology) are responsible for the formulation and implementation of policies affecting innovation.

The knowledge application and exploitation organisations consist of firms. Firms play an important role in RIS through the exploitation of knowledge (Doloreux, 2002). They achieve this by interacting and learning from various external actors such as customers, contractors, collaborators and competitors (Autio, 1998). These sources provide the know-why and know-how which are crucial for entrepreneurial success (Fischer, 2006). Knowledge intensive business services (KIBS) firms or "firms performing, mainly for other firms, services encompassing a high intellectual value-added" (Muller, 2001: 2), are particularly important for the incubation process as they are utilised to provide resources to develop incubated companies[5]. According to Muller and Zenker (2001: 1503), "KIBS hold a specific position in innovation systems because they play a two-fold role. Firstly, they act as an external knowledge source and contribute to innovations in their client firms and secondly, KIBS introduce internal innovations, provide mostly highly-qualified workplaces and contribute to economic performance and growth". Miles et al (1995) identify two main KIBs categories: "traditional professional services" liable to be intensive users of new technology and "new technology-based KIBS". Both of these types of services may be utilised during the incubation process. Traditional professional services include services such as marketing, financial services and management consultancy. New technology-based KIBS provide technology services such as software development, training in new technology and design.

2.4.4 Organisational interactions in RIS

As discussed above, a RIS is characterised by organisational actors from the knowledge creation and diffusion subsystem (e.g. universities, polytechnics, governmental

[5] They are often termed "external resource providers" in the incubation literature (Lockett et al., 2002).

agencies, public funded research organisations and innovation advisory organisations) and from the knowledge application and exploitation (e.g. firms). In addition to organisational actors, a RIS is also typified by relationships between these organisations (Edquist, 1997). The larger network of a RIS includes interactions between firms and knowledge-creating and diffusing organisations such as universities, training organisations, R&D institutes, technology transfer agencies or between small start-up firms and larger (customer) firms (Doloreux and Parto, 2005, Cooke, 2001, Asheim and Isaken, 2002). The functionality of RIS is determined to a large extent by linkages between these actors and their integration into interregional networks (Sternberg, 2000, Gregersen and Johnson, 1997). This interaction enables firms and relevant organisations to associate, to learn, to critique or pursue specific project ideas (Cooke, 2001). Despite the recognition that interaction takes place between organisations in a RIS or a networked RIS, similar to the SI, the RIS literature has not discussed the interactions between organisations in sufficient detail (Markusen, 1999, Doloreux and Parto, 2005, Iammarino, 2005, Cooper and Park, 2008).

One exception to this is firms and their relationships with other regional organisations. Within a RIS, a firm is considered to be a learning organisation that interacts with other firms (Doloreux, 2002). The relationships represent vertical networking and horizontal networking (Autio, 1998). Vertical networking exists both within and between firms. Networks of externalised relationships are "relational structures between independent firms that are based upon a high degree of trust that takes time to develop" (Fischer, 2006:102). The type of externalised relationships may be formal (joint ventures or partnerships) or informal (trust-based relationships) depending on the firm (ibid). Horizontal networking is between collaborators and competitors and "favoured" within a RIS as this type of relationship provides knowledge and information crucial to the innovation process (Doloreux, 2002). Small firms usually interact with other small firms as a natural consequence of familiarity between individuals in different firms (Malecki, 1993). The rationale for a firm to collaborate is to gain rapid access to new technologies or markets, to benefit from economies of scale in joint R&D and production, to tap into external sources of know-how and to share risks (Fischer, 2006).

2.4.5 Regional socioeconomic and cultural setting of the RIS

The interactions between regional organisations cannot be understood without taking into consideration the institutional and cultural context in which they are based

(Lundvall, 1992) which is referred to as the regional socio-economic and cultural setting (see above Figure 2.6). The regional socioeconomic and cultural setting is the context in which knowledge creation and exploitation in a region takes place for the needs of entrepreneurial processes (Spilling, 1996). According to Cooke (1997), regions evolve along different trajectories through combinations of political, cultural and economic forces: "Different institutional settings will be likely to give rise to distinctive conventions or forms of collective social order leading to the establishment or enhancement of different kinds of organisations and even, to some extent, rules of the game or microconstitutional regulation" (ibid: 480). From a review of the literature, it was found that the regional and socio-economic setting consists of the supply of regional finance, a region's entrepreneurial culture, the mentality of regional organisations, the supply of regional talent and the existence of regional networks. These elements will be discussed in more detail below.

Regional finance includes venture capitalist funding, a regional stock exchange to provide a local capital market, a regional credit-based system to finance provision of loans and regional public budgets (Cooke, 2001). The availability of regional finance, specifically venture capital investment, has a positive effect on business formation and can play a central role in facilitating and supporting the entrepreneurial process (Mason and Harrison, 2002, Saxenian, 1994). Venture capital provides funding for entrepreneurs to develop their spin-offs (Feldman, 2001) and the existence of well developed venture capital networks in regions significantly accelerates the pace of technological innovation and economic development (Florida and Kenney, 1988). According to Cooke (2001), a region that displays systemic innovation will have relative freedom as to how they spend their budgets: decentralised spending, autonomous spending and taxation authority.

A region's entrepreneurial culture, also referred to as 'supportive social capital' (Feldman, 2001), or 'entrepreneurial climate of an area' (Spilling, 1996), is the intangible non-pecuniary factors that facilitate information sharing and flow of ideas (Feldman, 2001). The culture of a region influences the support environment for new venture creation to the perception of risk among actual and prospective entrepreneurs (Cooper and Park, 2008). A low societal appreciation for entrepreneurship may lead to a low entry rate of start-up firms while the opposite is true for a high appreciation for entrepreneurship (Nijkamp, 2003).

The mentality of regional organisations or embeddedness is the extent to which a social community operates in terms of shared norms of cooperation, trustful interaction and "untraded interdependencies" (Dosi, 1988). Embeddedness occurs in regions that have a large concentration of firms, a high degree of shared social and cultural values and various resources that can be utilised (Doloreux, 2002). According to Cooke (2001) the mentality of regional organisations that reflects internal harmonious labour relations, shop-floor cooperation, worker welfare orientation and openness to externalising transactions and knowledge exchange with other firms and organisations with respect to innovation, the stronger the SI. In the context of entrepreneurship, an open culture is a critical success factor for new forms of entrepreneurship (Nijkamp, 2003) and helps anchor, facilitate and stimulate localised innovation networks (Pilon and DeBresson, 2003).

The supply of regional talent is the proportion of individuals in a region with high levels of human capital (Florida, 2002). Human capital is the combination of formal education, experience and practical learning that takes place on the job, as well as non-formal education, such as specific training courses (Davidsson and Honig, 2003). A region with a larger human capital stock generates more entrepreneurs and, thus, more start-ups (Mathur, 1999) as once engaged in the entrepreneurial process, such entrepreneurs have superior ability in successfully exploiting opportunities (Davidsson and Honig, 2003). According to Spilling (1996), economic actors with entrepreneurial experience and potential affects the quality and capacity of an innovation system. The supply of regional talent also includes the labour force. A better quality labour force positively affects new venture creation (Bruno, 1982) as entrepreneurs are able to draw from regional organisations and actors with the necessary skills to develop their businesses.

Regional networks are networks that occur at a regional scale between firms and other regional organisations. As discussed above in the section on the interaction between regional organisations, the functionality of the RIS is determined to a large extent by linkages between actors and their integration into interregional networks (Sternberg, 2000, Gregersen and Johnson, 1997). A highly networked RIS has been called a "network RIS" (Cooke, 1998) or "regionally networked innovation system" (Asheim and Isaken, 2002) and is regarded as a the ideal type of RIS where firms are surrounded by a strong local supporting organisational infrastructure (Asheim and Isaken, 2002). In the context of entrepreneurship, networks benefit the entrepreneurs by providing resources critical for new venture creation (Bull and Willard, 1993) such as information

for opportunity recognition (Shane and Venkataraman, 2000). Given the existence of a rich network, entrepreneurs who are well connected and have social and professional relationship will experience more success in new venture creation (Carolis et al., 2009). Saxenian (1996) demonstrated the importance of networks in her comparison study of Silicon Valley and Route 128. She found that despite similar origins and technologies, both Silicon Valley and Route 128 evolved distinct industrial systems which she attributes to the complex networks of social relationships within and between firms and between firms and local institutions. Silicon Valley's network-based industrial system promoted learning, had open labour markets encouraging entrepreneurship and experimentation and involved horizontal intra-firm collaboration.

2.4.6 Summary

The review of the RIS literature began with a discussion on the literature around SI and NIS which represent the broader context for the RIS literature. SI highlight that innovation is systemic and that organisations interact for the needs of production, diffusion and the deployment of knowledge. NIS were discussed and explained as the predecessor to RIS which depict organisations at a national scale. Following NIS, the literature around RIS was presented focusing on existing definitions, conceptualisations and internal RIS components. Through a review of various definitions, it was highlighted that there is no consensus on one specific RIS definition. Despite this lack of consensus, most studies agree that a RIS is made up of two sub-systems consisting of organisations, interactions between these organisations and a socio-economic and cultural setting.

In the context of the RIS, organisations are based within two subsystems: a knowledge creation and diffusion subsystem and a knowledge application and exploitation subsystem. Organisations from the knowledge creation and diffusion subsystem such as universities, technology transfer offices, innovation advisory agencies, and incubators all have a role in creating and diffusing knowledge in the RIS. Firms from the knowledge application and exploitation subsystem apply and exploit knowledge. KIBs are a specific type of organisation utilised as service providers for entrepreneurs during the incubation process. Organisational interactions were also discussed which include interactions between firms and knowledge creation and diffusion organisations and small start-up firms and larger firms. However, despite this, it was emphasised that the RIS literature does not go into depth explaining linkages apart from between firms.

A final section of the review discussed the socio-economic and cultural setting of a RIS which consists of availability of regional finance, a region's entrepreneurial culture, the mentality of regional organisations, the supply of regional talent and the existence of regional networks. It was highlighted that regions have different political, cultural and economic forces which give rise to different kinds of organisations and ways of doing things. Knowledge generation and exploitation takes place in this context and is embedded in social relationships which develop over time along culturally determined lines. Regions that display systemic innovation will operate in terms of shared norms of cooperation, display an atmosphere of a cooperative culture, openness for interaction, relative freedom as to how they spend their budgets, have supplies of regional finance and regional talent and regional networks. This has implications for the way the incubation process functions.

2.4.7 Conceptual framework

Based on the above review of the RIS literature, important additional constructs have been identified and added to the initial conceptual framework (see Figure 2.7). From the review of the RIS literature, it was found that the most relevant components of the RIS for the needs of this thesis are: regional organisations and the regional socioeconomic and cultural setting. The regional socio-economic and cultural setting component has been added to the framework and has been further broken down into access to finance, networks, supply of talent, entrepreneurial spirit and organisational mentality. "Regional organisations" has also remained in the framework, however, they have been embedded in the socio-economic and cultural setting of the RIS as it may affect how they engage with entrepreneurs during the incubation process. A link between organisational mentality and regional organisations has been added to represent this relationship. The socio-economic and cultural setting has also been directly linked to the incubation process as the incubation process is embedded within it. The RIS literature suggests that regions have different political, cultural and economic forces which give rise to different kinds of organisations, availability of regional finance and talent, networks and entrepreneurial spirit all of which may affect how the incubation process functions. The next section turns to the third critical literature necessary to understand the form of the incubation process, that concerning the entrepreneur.

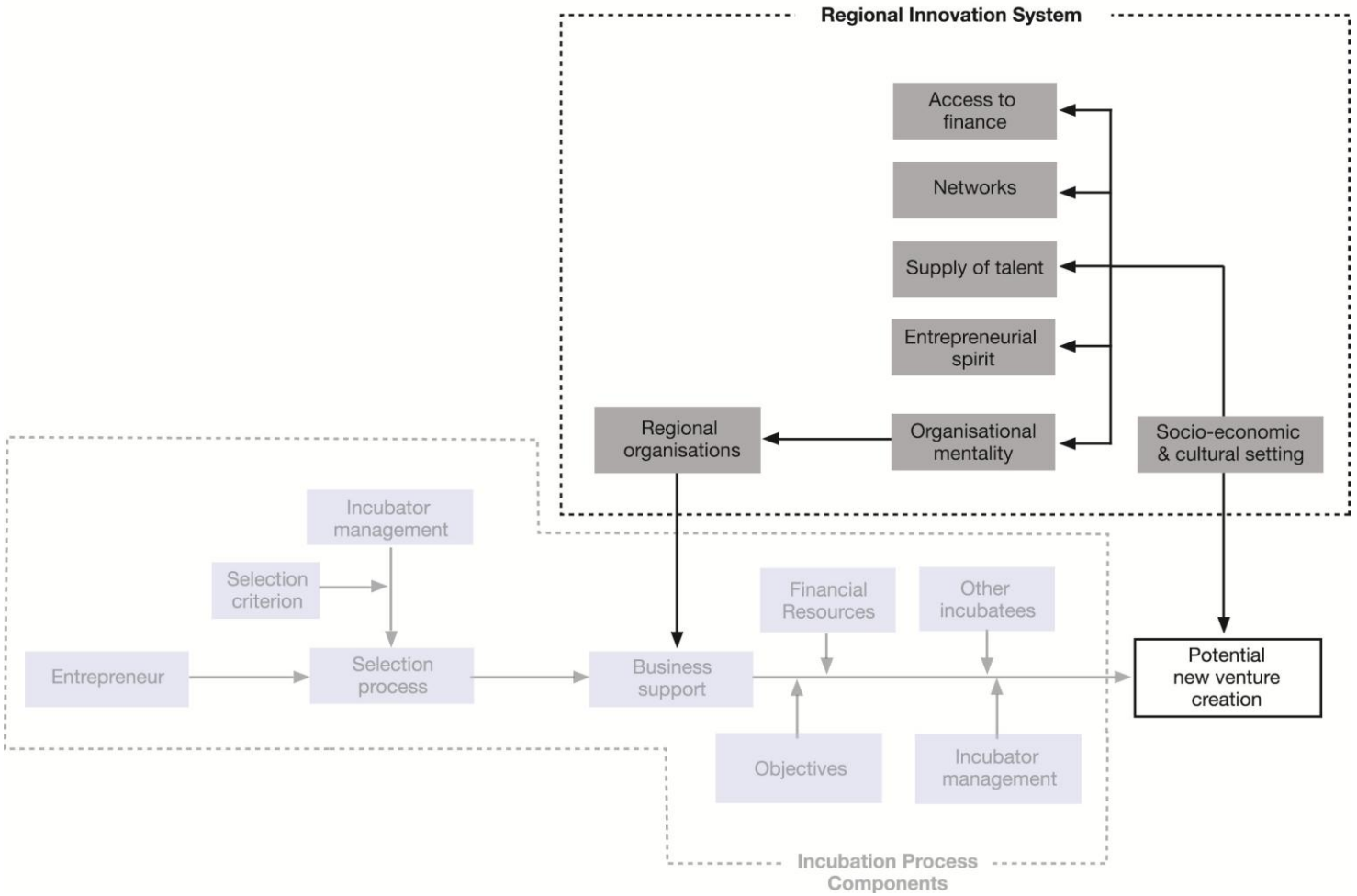

Figure 2.7: Conceptual framework: combination of incubation and RIS literature (Author's own)

2.5 Entrepreneurship literature

As discussed in the introduction and at the end of the incubation literature review section, there is a gap in the literature around understanding how an entrepreneur's experience and background affects new venture creation in the context of the incubation process. This gap is important to address as entrepreneurs are the key actors incubated and have a particularly important influence on the ability of ventures to spin-off from the incubation process (Phan et al., 2005). The thesis integrates the entrepreneurship literature and the incubation literature as the former provides a framework to address this gap. This section reviews the literature around how an entrepreneur's experience and background affects new venture creation including entrepreneurial experience, industrial experience, education and family background. The reason for selecting these four elements is because they have been found to affect positively new venture creation. These components will be included in the conceptual framework to address this thesis' fourth research question. Prior to discussing how an entrepreneur's experience and background affects new venture creation, it is first important to discuss the typologies of entrepreneurs within the literature.

2.5.1 Types of entrepreneurs

Within the entrepreneurship literature, there is a growing recognition of the heterogeneity of entrepreneurs in new venture creation (Westhead et al., 2009, Mosey and Wright, 2007, Westhead, 2005). It has been suggested that it is important to account for this heterogeneity as the resource needs of different entrepreneurs may not be the same (Westhead et al., 2009) and to help inform the policy agenda around government support for different types of entrepreneurs (Westhead et al., 2004, Westhead et al., 2003). Entrepreneurs may vary based on their entrepreneurial experience, managerial experience, industrial experience, family backgrounds, personal attitudes towards entrepreneurship, 'opportunity confidence' and motivation which affects their ability to develop spin-offs in new venture creation processes (Mosey and Wright, 2007, Bruderl et al., 1992, Dimov, 2010, Westhead and Wright, 1998, Westhead et al., 2009, Shane, 2000, Ucbasaran et al., 2008). As a result, existing research has attempted to identify types of entrepreneurs.

The most common differentiating factor is based on an entrepreneur's *prior entrepreneurial experience* which include a range of entrepreneur types: nascent (Delmar and Davidsson, 2000), novice (Birley and Westhead, 1993) and habitual

(Birley and Westhead, 1993, Ucbasaran et al., 2003b). Nascent entrepreneurs are individuals considering the establishment of a new business (Delmar and Davidsson, 2000). Novice entrepreneurs are individuals with no previous experience of founding a business, while habitual entrepreneurs are individuals that established at least one other business prior to the start-up of their current new venture (Birley and Westhead, 1993).

In addition to differentiating entrepreneurs based on their prior entrepreneurial experience, entrepreneurs are also categorised by their *individual status* (professors, assistants, researchers and doctoral students and students) and *type of spin-off* they correspond to (academic or student spin-offs) which includes academic and student entrepreneurs (Pirnay et al., 2003). Within the academic entrepreneur category, there are also typologies of academics based on their prior entrepreneurial experience including nascent academic entrepreneurs, novice academic entrepreneurs and habitual academic entrepreneurs (Mosey and Wright, 2007). While there are no formal typologies, the literature also discusses differences between entrepreneurs in relation to their prior knowledge or industrial experience, education and family background (Shane, 2000, Lee and Tsang, 2001).

There has been very little research comparing entrepreneur types. Most research comparing entrepreneur types focuses on a comparison of the typology between novice and habitual entrepreneurs (Birley and Westhead, 1993). These comparisons highlight the differences between entrepreneurs in relation to their prior entrepreneurial experience. The findings from these studies highlight that habitual entrepreneurs do better in establishing new ventures than novice entrepreneurs as a result of their experience (Politis, 2008). There are also studies that compare differences between novice entrepreneurs and serial (e.g. entrepreneurs with ownership in a single business) and portfolio entrepreneurs (e.g. entrepreneurs with ownership stakes in two or more businesses) (Westhead, 2005). These studies highlight that portfolio entrepreneurs are more likely to express dimensions of entrepreneurial behaviour (ibid).

There has also been very limited research on comparing entrepreneurs based on the typology from Pirnay et al (2003) (e.g. academic and student entrepreneurs) discussed above. A recent study has compared students entrepreneurs with non-student entrepreneurs and found that students entrepreneurs have a distinct way of reasoning in relation to their acquisition and use of resources when compared with entrepreneurs starting new ventures outside the university context (Politis et al., 2012). The next

section will discuss how entrepreneurs with prior entrepreneurial experience benefit during the new venture creation process.

2.5.2 Prior entrepreneurial experience and new venture creation

The literature suggests that an entrepreneur with prior entrepreneurial experience (habitual entrepreneurs) will benefit during the new venture creation process. Habitual entrepreneurs' previous experience of starting and managing entrepreneurial ventures can provide valuable knowledge of the venturing process and of the specific venture context including knowledge of customers, suppliers and other stakeholders as well as navigating through the uncertainties associated with establishing and managing a new venture (Dimov, 2010). Prior entrepreneurial experience also enables the entrepreneur to obtain more easily external financial resources from banks and venture capitalists and understand the processes and financial institutions' requirements (Westhead et al., 2004, Wright et al., 1997).

Prior entrepreneurial experience may support the development of networks and the accumulation of more information, knowledge and contacts (Westhead et al., 2004) as well as provide initial access to broader and deeper networks (Shane and Khurana, 2003). Habitual entrepreneurs also learn from previous failure to develop social networks (Ucbasaran et al., 2003b). Entrepreneurs with prior entrepreneurial experience have an enhanced reputation which increases the legitimacy to gain the resources required to address the hurdles to the formation of the new venture (Ucbasaran et al., 2003b).

Prior entrepreneurial experience also affects an entrepreneur's own and others expectations of the liabilities of newness in founding a new firm (Shane and Khurana, 2003). Habitual entrepreneurs are more easily able to exploit opportunities as prior experience provides a "special alertness to spotting opportunities" (Westhead et al., 2004:792, Ardichvili et al., 2003). Dimov (2010) highlights that habitual entrepreneurs discontinue early their efforts on lacklustre opportunities in pursuit of more appealing alternatives pursing opportunities which are attractive. Ucbasaran et al (2009) found that habitual entrepreneurs identify more business opportunities than novice entrepreneurs and have more time and mental capability to spot or develop novel business opportunities as they have learned to routinise their activities and or delegate responsibility (Ucbasaran et al., 2003a, Ucbasaran et al., 2009, Ucbasaran et al., 2008).

The literature around academic habitual entrepreneurs suggests that prior entrepreneurial experience helps academics with prior entrepreneurial experience adapt to the role of the entrepreneur (Shane and Khurana, 2003). Additionally, academic entrepreneurs with prior entrepreneurial experience have broader social networks and are more effective in developing network ties than academic entrepreneurs with no prior entrepreneurial experience (Mosey and Wright, 2007).

It has also been suggested that it is important to consider the type of entrepreneurial experience. Cooper and Park (2008) suggest that the skills and expertise entrepreneurs develop will be influenced by all the organisations in which they have worked which affects their opportunity recognition and exploitation abilities. Apart from the benefits that stem from prior entrepreneurial experience, Westhead et al (2004) suggest that there may be liabilities associated with prior entrepreneurial experience. These liabilities include the unrealistic risk-return performance expectations from venture capitalists, the accumulation of large debts and repayment costs, a reduction in the entrepreneur's motivation to work hard, biases that influence the entrepreneur's decision and goals and routine patterns of interpersonal interactions that hinder their ability to innovate (ibid). In a recent study, Ucbasaran et al (2009) found that entrepreneurs with above 4.5 business ownership experiences were negatively associated with the number of opportunities an entrepreneur identified.

From the opposite perspective, entrepreneurs that lack entrepreneurial experience (novice entrepreneurs) will have limited human capital, finance and information resource pools and knowledge of prior business ownership experience to draw upon to address issues that come up during the new venture creation process (Westhead et al., 2004).

2.5.3 Industrial experience and new venture creation

The literature also highlights the positive link between prior industrial experience and new venture creation. Prior industrial experience, specifically prior knowledge of markets, of ways to serve markets, and knowledge of customer problems, is important for opportunity identification as entrepreneurs discover opportunities related to information that they already possess (Shane, 2000, Ardichvili et al., 2003). Industrial experience also increases an entrepreneur's opportunity confidence which helps with the opportunity identification process to make better judgements about the feasibility of the opportunity and their ability to exploit it successfully (Dimov, 2010). Industry-specific

experience can also be useful for the evaluation of new entrepreneurial opportunities (Kor et al., 2007). Ucbasaran et al (2003b) highlight that industry experience can limit the risks associated with the business during opportunity identification. Additionally, industry experience can provide valuable knowledge, skills, and personal/professional networks (Dimov, 2010, Cooper and Park, 2008). Entrepreneurs with industrial experience have access to relationships with critical stakeholders, such as potential customers, suppliers, or other resource providers, and can more easily secure resources in the current venturing effort through previous industry connections (Kor et al., 2007; Shane and Venkataraman, 2000). Empirical research indicates that specific industry know-how is a significant determinant of both marginal new venture survival and growth (Cooper et al., 1994).

2.5.4 Education and new venture creation

The literature also suggests that prior education or 'intellectual capital' may benefit the entrepreneur during the new venture creation process (Cooper and Park, 2008). More specifically, prior education has been found to have a positive effect on an entrepreneur's capacity to recognise business opportunities (Ramos-Rodríguez et al., 2010, Arenius and Clercq, 2005, Davidsson and Honig, 2003). Some argue that empirical research indicates that education is a significant determinant of new venture survival and growth (Cooper et al., 1994) while others explain that empirical research has demonstrated a range of results regarding the relationship between education and new venture creation (Davidsson and Honig, 2003).

From a review of the literature, most studies highlight the benefit of education to new venture creation. A study from Ucbasaran et al (2008) found that entrepreneurs with higher levels of education reported higher probabilities of identifying more opportunities. The reason for this, according to Shane (2000) and Roberts (1991), is that prior information stemming from education influences the entrepreneur's ability to understand, extrapolate, interpret and apply new information. Arenius and Clecq (2005) also suggest that an entrepreneur's education may enhance the opportunity recognition process through the facilitation of access to knowledge, e.g. such as alumni network contacts, provide a broader knowledge base to draw from and provide more self-confidence for the entrepreneur to come up with good ideas. Park (2005) highlights that technical knowledge stems from education which contributes to opportunity recognition and development. Formal education may also assist in the accumulation of explicit

knowledge that may provide skills useful to entrepreneurs (Davidsson and Honig, 2003).

2.5.5 Family background and new venture creation

Unlike the other categories discussed above, an entrepreneur's family connection, such as the role of family members and/or family experience with small business or self-employment and its effect on new venture creation, has received limited attention in the entrepreneurship literature (Rogoff and Heck, 2003). Some have found a family connection positively influences new venture creation (Westhead et al., 2004, Rogoff and Heck, 2003) while others found that family experience with small business or self-employment is not strongly associated with small business foundation (Mazzarol et al., 1999). Westhead et al (2004) and Chrisman et al (2003) highlight that a family provides human capital resources such as potential business partners. Family members have also been found to contribute financial resources and social networks which positively affect new venture creation (Rogoff and Heck, 2003, Steier and Greenwood, 2000, Liao and Welsch, 2005). It has been suggested that family role models also positively influence entrepreneurs during the new venture creation process (Busenitz and Lau, 1996, Ronstadt, 1984). Rogoff and Heck (2003) explain that family provides a major source and origin of education and values that are critical to entrepreneurs during the new venture creation process. In relation to student entrepreneurs, one study found that a high percentage of student entrepreneurs stem from families who are involved in their own businesses (Robertson and Collins, 2003).

2.5.6 Summary

The above review of the entrepreneurship literature highlighted that entrepreneurs are heterogeneous. As a result, various typologies have been created to be able to compare entrepreneurs including typologies based on prior entrepreneurial experience (e.g. novice and habitual entrepreneurs), individual status (professors, assistants, researchers and doctoral students and students) and type of spin-off they correspond to (academic or student spin-offs). While there are no formal typologies, researchers have also focused on differences between entrepreneurs based upon prior industrial experience, education and family background. However, despite these typologies and the recognition that entrepreneurs are heterogeneous, there are limited studies comparing entrepreneur types. One exception to this are studies focused on comparing entrepreneurs based on their prior entrepreneurial experience.

Apart from the typologies of different types of entrepreneurs, other studies have focused on understanding how the experience and background of entrepreneurs affects new venture creation. This includes studies focusing on how prior entrepreneurial experience, industrial experience, education and family background affect entrepreneurs during the new venture creation process. These studies highlight that entrepreneurs are positively affected by their prior experience and background during new venture creation.

2.5.7 Conceptual framework: incubation, RIS and entrepreneurship literature

Based on the above review of the entrepreneurship literature, key components have been added to the conceptual framework from the end of the RIS literature review (see Figure 2.8). The entrepreneur has been largely ignored by existing incubation process research despite the fact that they are the key actors incubated and the recognition that they have a particularly important influence on the ability of ventures to spin-off from the process (Phan et al., 2005). Not only is the perspective of the entrepreneur not accounted for, but there is a failure to account for the differences between entrepreneurs and how individual entrepreneurial characteristics affect their ability to start a new venture in the context of the incubation process. The review of the entrepreneurship literature highlighted that it is important to consider the heterogeneity of entrepreneurs as they have different experiences and backgrounds which affects potential new venture creation. More specifically, the literature suggests that prior entrepreneurial experience positively affects entrepreneurs during new venture creation (Shane and Khurana, 2003). As a result, entrepreneurial experience has been added into the conceptual framework linked to the entrepreneur. The literature also highlights that prior industrial experience also positively affects entrepreneurs during new venture creation (Shane, 2000, Ardichvili et al., 2003). Industrial experience has also been added into the conceptual framework and linked to the entrepreneur. Most research on the role of education in new venture creation also found that it positively affects entrepreneurs during new venture creation. As a result, education has been added to the conceptual framework and linked to the entrepreneur. Finally, the entrepreneurship literature highlights that an entrepreneur's family background may positively influence new venture creation. Family background has been added into the conceptual framework. This now represents a holistic conceptual framework to be validated and developed through inductive theorising from empirical insights. Chapter 3 now turns to the research methods chapter which explores the data collection and analysis approach.

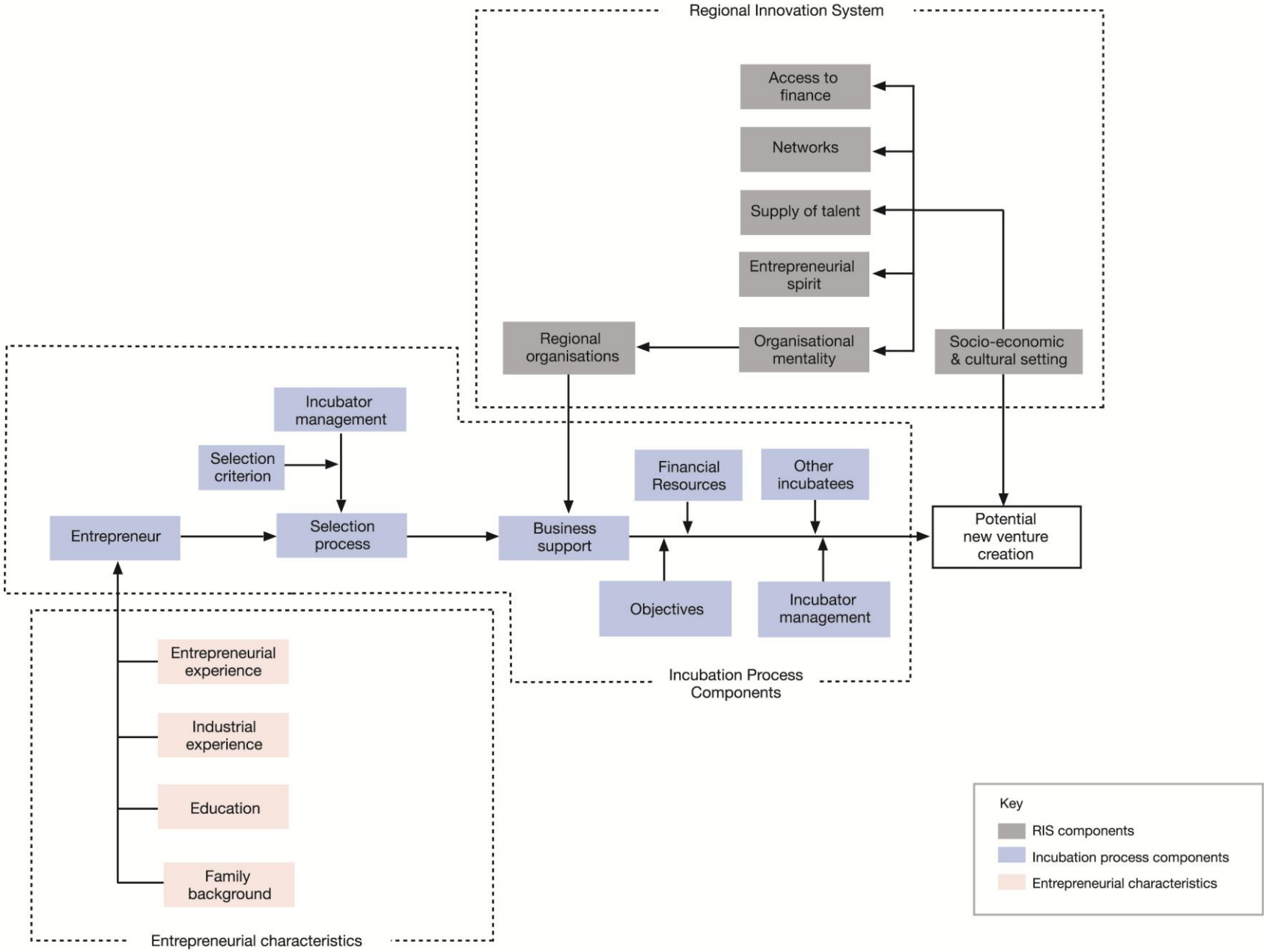

Figure 2.8: Conceptual framework: incubation, RIS and entrepreneurship literature (Author's own)

Chapter 3: A Methodological Approach to Researching Incubation Processes

The previous chapter reviewed the incubation literature and focused on presenting the gaps surrounding research on incubation processes. The RIS and entrepreneurship literature were also reviewed and integrated with the incubation literature to develop a conceptual framework for analysing the case studies which will be discussed in the next chapter. This chapter explains and justifies the methods used in this thesis. The research questions outlined and explained in Chapter 1 and 2, which focus on understanding in-depth processes (e.g. approaches to incubation) and their differences, require a qualitative research strategy and multiple-case study research design. The chapter begins by discussing the qualitative research strategy and the epistemological and ontological orientations of the study. Second, the choice of a multiple case study research design is then explained. Third, the selection of cases for the study, which was based on theoretical sampling, is addressed. Fourth, the sample and data collection methods used in the study are described in detail. Fifth, the data analysis process including the framework approach and use of NVivo is explicated. Finally, research ethics and how it was embedded in the research process is described.

3.1 Research strategy

This thesis utilised a *qualitative* research strategy. The rationale for selecting a qualitative approach is based on its emphasis on inductive theory generation, an interpretive epistemological orientation, a constructionist ontological orientation and its ability to capture complexity (Bryman and Bell, 2007). Utilising a qualitative approach which focuses on inductive theory generation enables the thesis to generate empirically-based knowledge to provide an *in-depth* understanding of how approaches to incubation function, as one of its strengths is its ability to uncover "deeper processes in individuals, teams and organizations and understanding how those processes unfold over time" (Bluhm et al., 2011:1870). The one departure from a pure-inductive approach is the initial identification of relevant constructs arising from previous incubation literature which offer a potential structure for exploring the differences in approaches to incubation. These constructs will be discussed in the next Section 3.2.

A qualitative approach was also chosen because an interpretive epistemological approach enables an "understanding (of) the social world through an examination of the interpretation of that world by its participants" (Bryman and Bell, 2007: 402). This perspective is in line with the main aim of the study, which is to capture how incubation processes function through the experiences of individual, incubated entrepreneurs. Finally, a qualitative research strategy was also selected as it is based on a constructionist ontology which implies that "social properties are outcomes of the interactions between individuals, rather than phenomena 'out there' and separate from those involved in its construction" (ibid: 402). This perspective also fits with the viewpoint of this thesis which recognises that the incubation experiences of the entrepreneurs can be socially constructed – positively or negatively – around their interaction with incubator management actors and other actors (e.g. other incubatees and external actors). The next section will discuss the research design utilised in this thesis.

3.2 Research design

The research design is based upon three key factors including a multiple case study methodology, different constructs for building the comparison and the adoption of the entrepreneur's perspective. Figure 3.1 provides an overview of the research design. The rest of this section is dedicated to explain how these factors affect the research design.

First, a *multiple case study* methodology was adopted as multiple cases characteristically offer a stronger base for theory building (Yin, 1994), and ''yield more robust, generalisable and testable theory than single-case research'' (Eisenhardt and Graebner, 2007: 27). Additionally, the multiple case approach choice was based on findings from the review discussed in Chapter 2. From this review, it was found that existing incubation literature fails to account for the heterogeneity of incubation processes. As a result, this thesis was specifically designed around accounting for these differences by selecting three different incubation approaches (a regional process, a university process and a student process)[6] and comparing them across four constructs (the incubation process, the incubator's objectives and resources, the entrepreneur type and the role of the RIS).

[6] The rationale for selecting these three specific process types will be discussed in detail in the next section 3.3.

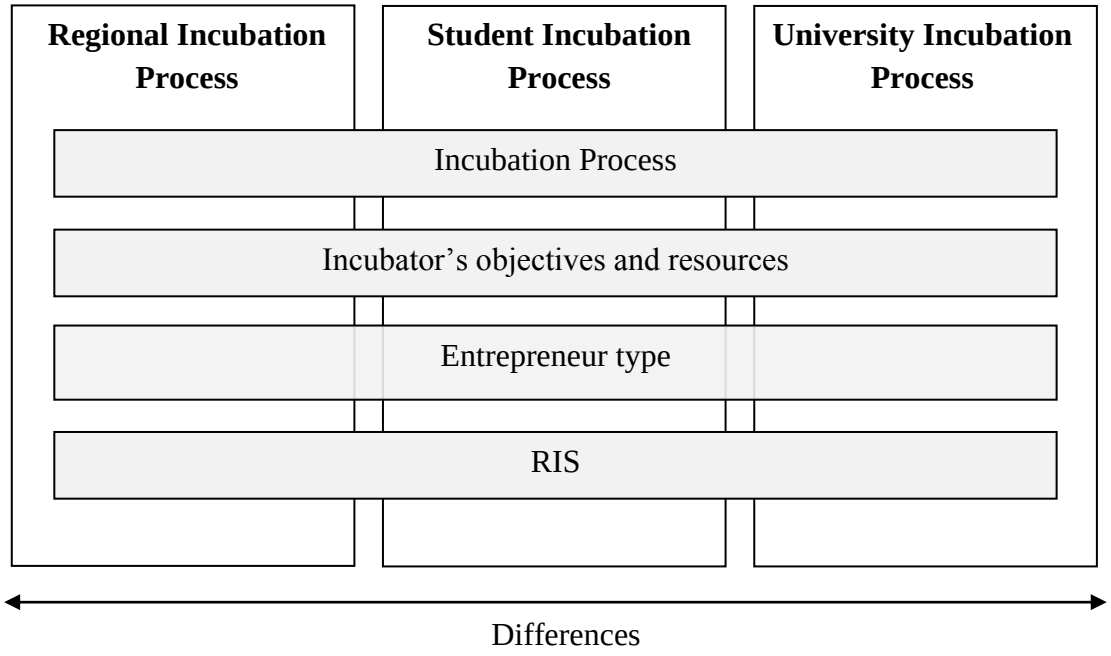

Figure 3.1: Multiple case study research design and constructs (Author's own)

Second, because of the heterogeneity of the cases (i.e. incubation processes), there was a need to introduce a common basis for their comparison. This common basis consists of the four broad categories of construct mentioned above. This methodological choice is an essential tool for the comparison across the different cases which takes place in Chapter 6.

The first construct used to compare the cases is the incubation process. This construct includes the components (the selection process and business support process) of the process and how the components function. The reason for selecting this construct is that the main focus of this thesis is to understand how different incubation processes function.

The second construct utilised to compare the cases is the incubator's objectives and resources. The rationale for selecting this construct is that the objectives and resources of the larger incubator may affect the processes and how they function (Clarysse et al., 2005, Hackett and Dilts, 2004b). The failure to account for the objectives and resources employed by an incubator to the incubation process limits an understanding of the process (ibid).

The third construct used to compare the cases is the RIS. The RIS includes regional organisations/actors and the socio-economic and cultural setting. The motivation for selecting this construct is that it has been suggested that the incubation process

transcends the incubator (Hackett and Dilts, 2004b) drawing from external organisations which may be regional. Despite the cases being located in one region, it is likely that there are differences in how the processes utilise the RIS which this thesis accounts for[7]. This conjecture is based on existing studies which suggest that an incubator's mediation activities may differ in relation to the innovation system they connect to (Bergek and Norman, 2008).

The fourth construct used to compare the cases was the entrepreneur type. The entrepreneur type includes academic entrepreneurs, student entrepreneurs and non-academic/student entrepreneurs. The rationale for selecting this construct is that entrepreneurs in the context of the incubation process are heterogeneous in relation to their individual status (e.g. professors, assistants, researchers and students) (Pirnay et al., 2003) and their experience and backgrounds. This includes entrepreneurial experience, industrial experience, (Mosey and Wright, 2007, Bruderl et al., 1992), education (Ramos-Rodríguez et al., 2010, Arenius and Clercq, 2005, Davidsson and Honig, 2003) and family background which affects their success in new venture creation (Westhead and Wright, 1998) and potentially their success in the incubation process[8]. As a result, it has been suggested that researchers need to accommodate the heterogeneity of entrepreneurs into their research designs (Ucbasaran et al., 2003b).

Third, this thesis is designed around the *entrepreneur's* perspective of how they experience the incubation process as most existing research focuses on the incubator management level of analysis. Capturing the entrepreneur's perspective is important because of the main influence they have on the ability of ventures to spin-off from the incubation process (Phan et al., 2005). Additionally, recent findings suggest that entrepreneurs may have a different perspective on how the process functions from incubator management actors (Patton et al., 2009). The next section will discuss the criteria behind the selection of cases.

3.3 Selection of cases

The rationale for selecting the three process types (a regional process, a university process and a student process) was based on theoretical sampling on the likelihood that the cases will offer theoretical insights (Eisenhardt and Graebner, 2007) as all three

[7] The selection of the region will be discussed in the below section 3.3.

[8] The entrepreneurs selected and their backgrounds will be discussed in-depth in section 3.4.

processes are connected to incubator archetypes (a regional incubator and two university incubators) (vonZedtwitz, 2003) and are non-profit entities which are the most common types (Hackett and Dilts, 2004b). This approach of selecting process/incubator archetypes is similar to another study whose aim was also to understand the differences across incubator types (vonZedtwitz and Grimaldi, 2006)[9].

The regional process, which was based within a regional incubator, was selected over other regional incubation processes in the North East region as it provided funding for the research undertaken in this thesis. Despite this initial selection constraint, the process represented an interesting case as it was part of Newcastle's 'Science City' (NSC) designation by the national government in 2004.

The regional incubator is new, having only been established in 2009. Since its establishment, 15 entrepreneurs have been supported and spun-off from the process in sectors including ageing and health, sustainability, engineering and IT. The incubator's main objective is to create high-growth spin-offs to contribute to regional development. It is a well-funded process with funds totalling £6,600,000 through One North East[10] (£3,600,000 funded by single programme and £3,000,000 funded by European Regional Development Fund - ERDF). Apart from One North East, the other principal stakeholders are Newcastle University and Newcastle City Council. The process focused on providing entrepreneurs with business support (including a rare occurrence of a salary) to develop ideas based on market needs or insight-led innovation while they were physically incubated ranging from six months to one year[11]. Incubator management actors were housed in the incubator including a Chief Executive Officer (CEO), Innovation Director, Finance Director and procurement staff. Along with supporting incubated entrepreneurs, the incubator also supported other regional entrepreneurs. However, those entrepreneurs are not the focus of this research.

The Newcastle University process, which was based within a university incubator, was selected over other university processes as it was 100% managed by the University's TTO. The importance of selecting a process which was 100% managed by the University is that previous research found that university processes not 100% managed

[9] While this study was specifically interested in understanding the differences in the service profiles of incubators, it still highlights the importance of selecting archetypes.

[10] One North East is now closed due to government mandate.

[11] The incubation timeframe changed from a 12 month period to a 6 month period .

by the university could not pursue their own commercial agendas even if the university allowed relatively wide operational latitude (vonZedtwitz, 2003). On the contrary, processes managed exclusively by a university fully reflect the university's commercialisation agenda. The latter is important for this study to capture better the way a university incubation process functions.

The TTO was established in the early 1990s. Since its establishment, 31 academic entrepreneurs have been supported and spun-off from the process in sectors including ageing and health, sustainability, engineering and IT. The creation of spin-offs to contribute to regional development is a third strand objective in relation to the university's main objectives which are to be a world-class research intensive university and deliver teaching and facilitate learning. The process focuses on supporting Newcastle University's academic entrepreneurs to commercialise ideas based on their research through a team of BDMs. There is no physical incubation space as academics are based within their academic departments. Incubator management actors include the director of the TTO and BDMs that act as intermediaries between the TTO and the academic. It is important to highlight that at the time of interviews with incubator management actors and academic entrepreneurs, the process was in the middle of going through a restructuring from a centralised system to a faculty-based system.

The student process was selected as it was based within the Careers Service at Newcastle University in a student incubator. The importance of the selection of this case was that it was based within the same university as the university incubation approach which controlled for the differences in university culture to ensure comparability across cases (Clark, 1998). The student incubator was established in 2001. Since its establishment, 167 spin-offs have been supported and spun-off from the process in sectors including retail, manufacturing, ageing and health, sustainability, engineering and IT. The creation of student spin-offs is a secondary objective to developing the entrepreneurial capacity of the student. The process focuses on providing types of business support to student entrepreneurs either based on their research or other business ideas through a team of externally bought in business advisers. The student incubation process is not well-funded. In 2011/12, the incubator's total expenditure for its activities included £87,000 and only provides access to small funds entrepreneurs can apply for including £250 pre-start and post-start grants. While the process maintains a physical space which students have access to, the process is not focused on physical incubation of student entrepreneurs. Incubator management actors include the director

of the incubator, other internal business advisers and external business advisers some of whom are not 100% based in the incubator.

In addition to the selection of the incubation process cases, it is also important to highlight how the entrepreneurs (the unit of analysis) within each case were selected. The selection of entrepreneurs within each process was based on multiple criteria including the spin-off's sector, the background of the entrepreneur and the time frame the entrepreneur moved through the incubation process. The spin-off's sector was considered to ensure the comparability across cases and to control for sector as it was outside the study's main focus. As a result, entrepreneurs were selected across the three processes based on their spin-off fitting into three main sectors: ageing and health, sustainability and engineering/IT. It needs to be highlighted here that although the first two are not sectors with the narrow economic definition, they can still be considered relatively homogenous sectors. These sectors represent the three main sectors that the North East region has focused on developing as part of their NSC initiative.

Entrepreneurs were also selected on the basis of their previous background including their prior entrepreneurial experience, industrial experience and education. Using LinkedIn, academic websites and CVs obtained from the incubators, the entrepreneurs were selected with and without entrepreneurial experience, industrial experience and education. Another selection criterion was the time frame they moved through the incubation processes. Entrepreneurs that had spun-off from the process (retrospective cases) and entrepreneurs that were currently going through the process at the time of interview (real-time cases) were both selected to participate in the research. The rationale for this was to mitigate bias and "retrospective sense making" by combining retrospective and real-time cases (Eisenhardt and Graebner, 2007:28). From these retrospective and real-time cases, entrepreneurs were selected throughout the life time of the incubation process to capture a complete understanding of how the incubation process functions as it has been suggested in the literature that incubation processes may change over time (Grimaldi and Grandi, 2005).

The selection of cases within the same region was also an important choice to control for regional factors to be able to compare the three different processes. All cases selected were based within the North East region[12] which represents a region that has a

[12] The North East region is defined as an administrative region and includes the sub-regions of County Durham, Northumberland, Tyne and Wear and Teesside.

weak RIS and in relation to entrepreneurship performs poorly on key indicators of entrepreneurship (e.g. VAT registrations and Total Entrepreneurial Activity (TEA)) compared with other English regions (Johnson and Reed, 2008). The rationale for selecting a region with a weak RIS and poor performance of entrepreneurship was that it has been suggested in the literature that incubation processes will play a more proactive incubation role in regions characterised by weak entrepreneurial communities than regions that benefit from high levels of innovation where the region acts as an incubator for the spin-out companies (Clarysse et al., 2005). Therefore, the North East region provided the opportunity to address better the research questions around how incubation processes function. The next section will discuss the sample and data collection methods utilised.

3.4 Sample and data collection methods

As Gephart (2004: 458) has identified, "qualitative research requires qualitative methods by definition". In this thesis, the qualitative research method to collect data was semi-structured interviews to explore how incubation processes function from the perspective of the entrepreneurs. The rationale for selecting this method is that by nature the approach provides *structure* and *flexibility* to the interview process (Bryman and Bell, 2007). The importance of structure is that it provided standardisation of the interview questions across the cases which was essential for cross-case comparability. On the other hand, flexibility enabled questions to be asked that were not on the original list and the ability to pick up on things the interviewees said during the interviews (ibid). Prior to conducting the official interviews, a pilot study was undertaken to address any issues with the interview questions and to test how well the questions flowed (Bryman and Bell, 2007). Two entrepreneurs from the regional incubation process were interviewed based on the questions developed. The success of the interviews did not require any changes to the original questions but provided a greater sense of confidence when proceeding with the official interviews.

The time frame of the interviews ranged from sixty minutes to two hours. Audio recording was used during all interviews to maintain the original detail provided by the interviewees and to enable for transcriptions. The standardisation of questions and the recording of answers reduced the error of interview variability (Bryman and Bell, 2007). The interview questions were based around the areas the research questions sought to address which included (see Appendix I for list of questions):

- the dynamics of the incubation process
- the entrepreneur's experience and background and how it affected their incubation process journey
- the role of the region in the incubation process

Post interviews, the bulk of the data were transcribed by the author to ensure in-depth emersion in the data (Ritchie and Spencer, 1994). Professional transcribers were also employed to speed up the process. The volume of data obtained through the empirical investigations in terms of words was 513,442. The continuation of this section will explain, in-depth, the data collection methods broken down by incubation process as the data collection method differed by process due to their differences in incubation periods and the actors involved in managing each process and their perspective on access issues.

The Regional Incubation Process

In the regional process, data were collected through a series of steps. First, from a list of twelve entrepreneurs obtained from the incubator, five entrepreneurs that had spun-off from the process were selected and asked to participate in the semi-structured interviews to discuss retrospectively their incubation experiences. The criteria for the selection of entrepreneurs were discussed in the above section. In addition to interviewing the five entrepreneurs, an additional three entrepreneurs were interviewed *longitudinally* across their nine month incubation period. The three entrepreneurs were interviewed every two weeks[13] from the beginning of the process until they spun-off from the process. This longitudinal approach acknowledges multiple calls in the literature for further longitudinal entrepreneurship research to chart the development of entrepreneurial ventures over time (Davidsson et al., 2001, Bygrave, 2007). While not longitudinal research per se, this gesture enabled a deeper understanding of how the process functions from entrepreneurs who are going through the process in *real* time, helping to overcome the problem with post hoc reflection in the other interviews. Table 3.1 provides an overview of the sample of entrepreneurs interviewed including the spin-off sector, timeframe in process, entrepreneurial experience, industrial experience, education and family background. In addition to the eight entrepreneurs, three incubator management actors who were highly involved in the process were also asked to take part in the semi-structured interviews for triangulation purposes and to gain the insights

[13] Mid-way through the process this time frame changed to once every month as it was found that interviewees had more to discuss after a month's time.

Entrepreneur	Spin-off sector	Timeframe in process	Entrepreneurial experience	Industrial experience	Education	Family Business Background
Entrepreneur #1	Sustainability; Engineering	2010	Started 2 engineering consultancies	Automotive design	MBA	No
Entrepreneur #2	Ageing and Health	2010	Involved with biotech start-ups	Regenerative medicine	MBA, PhD	No
Entrepreneur #3	Ageing and Health	2010	Started 2 service consultancies	None	BA	No
Entrepreneur #4	Sustainability	2011	Started 3 lifestyle start-ups	Teaching	BSc	No
Entrepreneur#5	Sustainability	2011	Started 2 start-ups	Sustainability and economic development	2 MScs and MBA	No
Entrepreneur #6*	Sustainability	2012	Started 3 start-ups	IT	Masters in Software Engineering	No
Entrepreneur #7*	Engineering	2012	Started 3 creative start-ups	None	None	No
Entrepreneur #8*	Ageing and Health	2012	Started 2 start-ups	None	None	No

Note: *Denotes entrepreneurs were longitudinally tracked.

Table 3.1: Non-academic/student entrepreneur interviewees by spin-off sector, timeframe in process and entrepreneur characteristics

of the individuals responsible for managing the process. These additional interviews were conducted to control for interpretive bias on the part of the researcher and to gain additional insight from highly knowledgeable informants (Eisenhardt and Graebner, 2007). In total, 11 individual semi-structured interviews for the regional process were conducted (face-to-face and via phone) in the period April – December 2011.

Apart from semi-structured interviews, unstructured observation was also utilised to understand further how the regional process functioned (Bryman and Bell, 2007). The case study approach characteristically joins data collection methods such as archives, interviews, questionnaires and observations (Eisenhardt, 1989). The unstructured observation involved the researcher joining thirty incubator team meetings, sitting-in on two idea development meetings between the entrepreneurs, one communications group meeting, one core partner meeting, two incubator away days and three six science city meetings, ten incubator sponsored regional events and watching the entrepreneurs in the incubation space.

The Student Incubation Process

In the student process, data were collected in a slightly different way from the regional process. The first step involved an initial meeting with the Assistant Director of the Careers Service who manages the process to discuss the thesis's research objectives and acquire access to the student entrepreneurs. Second, a list which included all the student entrepreneurs that had been supported by the process was requested from the Assistant Director. As the list provided only included information on the name of entrepreneur and spin-off, the third step involved internet research to obtain information on the start-ups and classify them into sectors. Based on this information, from the list of one hundred sixty-seven student entrepreneurs that had been supported from 2001 to 2011, ten entrepreneurs (two from the same spin-off) were selected. The selection criteria for choosing students to participate were discussed above.

In addition to selecting ten student entrepreneurs, an additional three student entrepreneurs who were going through the process were also selected to be interviewed. To obtain access to these three student entrepreneurs, the Assistant Director was re-approached. These individuals were then contacted by the Assistant Director explaining the research and asking if they were willing to participate, to which all three agreed. Unlike the second group of non-academic/student entrepreneurs that were interviewed longitudinally, this second group of student entrepreneurs could not be tracked

longitudinally due to the timeframe of the student process which exceeded the PhD period. To accommodate this, the three student entrepreneurs selected were at *different* stages of the process to acquire more of a window into the process. Table 3.2 provides an overview of the student entrepreneurs interviewed including the spin-off sector, timeframe in process, entrepreneurial experience, industrial experience, education and family background.

Along with the thirteen student entrepreneurs interviewed, two other incubator management actors who were highly involved in the student process were also asked to take part in the semi-structured interviews for triangulation purposes and to gain the insights of the individuals responsible for managing the process. In total fifteen individual semi-structured interviews for the student incubation process were conducted (face-to-face and by telephone) in the period April – December 2011.

The University Incubation Process

In the university incubation approach, the data collection process was similar to the student process. The first step involved an initial meeting with the TTO Director to discuss the research objectives and access to data. Second, a list of all academic entrepreneurs supported by the TTO was requested from the TTO Director. As the list only included information on the name of the academic entrepreneur, spin-off, trading date and status, research was undertaken to obtain information on the spin-offs and classify them into sectors. Based on this information, from the list of thirty-one spin-offs that had been supported from 1990 to 2010, twelve spin-offs were selected based on the criteria discussed above. This represented eighteen academic entrepreneurs as six spin-offs had two pairs of academic entrepreneurs and six spin-offs had one academic entrepreneur. Multiple academic entrepreneurs from one spin-off were interviewed for triangulation purposes.

In addition to selecting eighteen academic entrepreneurs, an additional four academic entrepreneurs were selected to be interviewed who were going through different stages of the process. To obtain access to these academic entrepreneurs, the TTO Director was asked to provide a second list of academic entrepreneurs the process was currently supporting. These individuals were contacted by the TTO explaining the research and asking if they were willing to participate, which all agreed.

Entrepreneur	Spin-off sector	Timeframe in process	Entrepreneurial experience	Industrial experience	Education	Family Business Background
Entrepreneur #1	Ageing & Health	2007	None	Drug Design	PhD Biochemistry	Yes
Entrepreneur #2	Engineering	2007	None	Business development	BA	Yes
Entrepreneur #3/4	Sustainability	2009	None	None; engineer	MEng; MEng	Yes
Entrepreneur #5	Sustainability	2005	None	Consulting	PhD	Yes
Entrepreneur #6	Ageing & Health	2009	None	Teaching	BSc	Yes
Entrepreneur #7	Ageing &Health	2008	None	Sales executive	BA	Yes
Entrepreneur #8	Sustainability	2004	None	Marine sector	BEng	Yes
Entrepreneur#9	Engineering/IT	2005	None	Engineering	BEng	Yes
Entrepreneur #10	Sustainability	2001	None	None	PhD	Yes
Entrepreneur #11*	Sustainability	2012 (Product development)	None	Architecture	Masters Renewable Energy	Yes
Entrepreneur #12*	Engineering/IT	2012 (Business plan development)	None	None	Masters Digital Media	Yes
Entrepreneur #13*	Sustainability	2012 (Idea development)	Started 2 companies	Sustainability	2 MScs and MBA	Yes

Note: * Denotes entrepreneurs in process interviewed at different stages.

Table 3.2 Student entrepreneur interviewees by spin-off sector, timeframe in process and entrepreneur characteristics

As the initial list included twenty-seven academic entrepreneurs and no information was given on the status of these individuals in the process, all twenty seven academic entrepreneurs were emailed explaining the research and asking for them to provide their current status in process. Based on their responses, from the list of twenty seven academic entrepreneurs, four were selected. Similar to the student entrepreneurs, this second group of academic entrepreneurs could not be tracked longitudinally due to the timeframe of the process which exceeded the PhD period. To accommodate this, the four academic entrepreneurs selected were at *different* stages of the process to acquire a window into the process. Table 3.3 provides an overview of the academic entrepreneurs interviewed including the spin-off sector, timeframe in process, entrepreneurial experience, industrial experience, education and family background.

Along with the twenty two academic entrepreneurs interviewed, four other university actors who were highly involved in the university incubation process were also asked to take part in the semi-structured interviews for triangulation purposes and to gain the insights of the individuals responsible for managing the process. In total twenty-six individual semi-structured interviews for the university incubation process were conducted (face-to-face and by telephone) in the period April – December 2011. The next section explains the data analysis framework used to analyse the data.

3.5 Data analysis

The data were analysed using a combination of the 'framework' approach and NVivo. The framework approach is an analytical method of qualitative data analysis which involves a process of familiarisation, identifying a thematic framework, indexing or coding, charting, mapping and interpretation according to key issues and themes (Ritchie and Spencer, 1994). Framework was chosen as it is in line with the agreed methods within the case study-based research approach including familiarisation, searching for cross-case patterns and emerging theory (Eisenhardt and Graebner, 2007). Additionally, framework was selected as one of framework's key features is it allows between – and within – case analysis (Ritchie and Spencer, 1994).

The data analysis was also supported by the use of NVivo, a computer-assisted qualitative data analysis software (CAQDAS) as it helps facilitate the analysis of qualitative data (Bryman and Bell, 2007). The benefit of utilising NVivo is that it

Entrepreneur	Spin-off sector	Timeframe in process	Entrepreneurial experience	Industrial experience	Education	Family Business Background
Entrepreneur #1/2	Ageing & Health	2001	None	Business development; Pharma	PhD, MBA; PhD	No; Yes
Entrepreneur #3	Ageing & Health	1998	None	None	PhD	No
Entrepreneur #4	Ageing & Health	2001	None	None	PhD	No
Entrepreneur #5	Sustainability	2001	Exposure to 1 start-up	Engineering	Masters	No
Entrepreneur #6	Engineering/IT	2003	1 Consultancy start-up	Engineering	PhD	No
Entrepreneur #7/8	Ageing & Health	2000	None; 1 start-up & academic spin-off	None	PhD; PhD	No; Yes
Entrepreneur #9/10	Ageing & Health	1989	None	Medicine/Diagnostics	PhD; PhD	No; Yes
Entrepreneur#11	Ageing & Health	2002	None	None	PhD	No
Entrepreneur #12/13	Engineering/IT	2008	2 start-ups & 1 academic spin-off; 2 start-ups	Pharma; Law & business development	PhD; MBA, PhD	No
Entrepreneur #13/14	Ageing & Health	2011	None	Therapy; Therapy	MPhil; PhD	No
Entrepreneur #15*	Ageing & Health	2012 (Product development)	None	Clinical Physiology	PhD	No
Entrepreneur #16*	Ageing & Health	2012 (Product development)	None	Dentistry	PhD	No
Entrepreneur #17*	Ageing & Health	2012 (Spin-off)	None	Therapy	PhD	No
Entrepreneur #18*	Ageing & Health	2012 (Idea development)	None	None	PhD	Yes

Note: *Denotes entrepreneurs in process interviewed at different stages.

Table 3.3: Academic entrepreneur interviewees by spin-off sector, timeframe in process and entrepreneur characteristics

enables the researcher to handle large amounts of data more easily "enhancing transparency" and, therefore, it has been argued the quality of the findings and argument may be more easily judged (Crowley et al., 2002:193). To aid in the best use of NVivo, a training course focused on utilising the programme for qualitative analysis was undertaken at Newcastle University alongside an international webinar provided by NVivo from a trained NVivo employee. Multiple NVivo manuals which focus on best use of the programme were also utilised (Gibbs, 2002, Richards, 1999).

When looking to the data analysis stages, the first step involved the process of familiarisation or "immersion in the data" gaining an overview of the data collected (Ritchie and Spencer, 1994:179). This process included listening to the recorded interviews, reading transcripts and studying observation notes. The interviews were then imported into NVivo and placed into their corresponding case study/incubation model folder (e.g. regional incubation process transcripts, student incubation process transcripts and university incubation process transcripts) and further into a subfolder depending on whether the interviewee was an entrepreneur or incubator management actor and in or post process. The second step in the analysis involved identifying a thematic framework informed by the original research aims, emergent issues raised by interviewees, analytical themes arising from recurring views or experiences and the incubation, entrepreneurship and RIS literature (Eisenhardt and Graebner, 2007). Using NVivo's organising concept of the "node", these themes were created in NVivo which were represented by nodes (e.g. incubation process, entrepreneur type, incubator's objectives and resources and RIS) and sub-nodes (e.g. actors, relationship between actors, selection process, business support process, regional organisations, interactions between regional organisations/actors, socio-economic and cultural setting, entrepreneurial experience, industrial experience, education and family background). The third step utilised ''indexing'' or ''coding'' whereby the thematic coding was systematically applied to the interview transcript within NVivo which involves selecting text and sending the text to a theme folder. As new themes emerged from the data, new nodes were created (e.g. incubation management learning, risk aversion, duty of care, entrepreneurial knowledge and social capital). As a result of this step, the data were lifted from the original transcripts and arranged according to the appropriate thematic reference by individual case study framework approach. The final step involved interpretation or interpreting the findings from the data which involved reading the coded text in each theme various times to allow the unique patterns of each case to

emerge (Eisenhardt, 1989). During this process, notes were kept and nodes were created in NVivo (e.g. regional process versus university process, regional process versus student process, student process versus university process) as large differences between the three incubation models surfaced from each case to prepare for the next stage of cross case analysis.

After writing up the individual cases of the three processes, the next step in the data analysis process involved a cross-case analysis to establish the differences between the three incubation processes across the four constructs (incubation process, incubator's objectives and resources, the entrepreneur type and role of the RIS). Following Eisenhardt (1989), this process involved selecting categories or dimensions and looking for inter-case differences between these constructs across the processes. The NVivo nodes established for the comparison were re-visited and read through several times. The individual case findings within each construct were also re-visited several times to help draw out the variations between the three cases. For the needs of the research, interviewees were approached to clarify their comments from transcriptions or to answer further questions which came up during the analysis stage. All interviewees were willing to respond and address questions and comments. It should be highlighted here that the analysis process discussed above led to the structure of the empirical part of the thesis which is broken down into two chapters: a within and across case analysis chapter (see Chapter 5 and 6). The next section will discuss the research ethics utilised this thesis.

3.6 Research ethics

At all stages of the research process, research ethics were considered. Participants and incubator management actors in the study were all notified of the purpose of the research as well as how the research would be utilised for the needs of this thesis. Incubator management actors were provided a written document with the overview of the research objectives. They consented freely to participation and were given the opportunity to decline to take part or withdraw from the study at any point in time without any adverse consequences (Bryman and Bell, 2007). Prior to the interview stage, interviewees were notified of the types of questions that would be asked during the interview and were asked to give their consent and sign a research ethics form. The research ethics form obtained the consent of the interviewees to participate in the interviews, consent to use the interviews internally and externally for external

examination, consent for the original names to be used and consent for subsequent publication. A copy of the form used is contained in Appendix II. Confirmation was also given for the use of an audio device for the needs of accurate data collection and transcription. All participants were notified when transcriptions were completed and sent a copy for their approval. The next section will provide a summary of the research methods discussed in the above sections.

3.7 Summary

This chapter explained the methodological approach undertaken in this thesis. First, the rationale for selecting a qualitative research strategy was explained which included the thesis's emphasis on understanding in-depth processes, inductive theory generation, an interpretive epistemological orientation and a constructionist ontological orientation. Second, the research design was discussed including the choice of a multiple case study design which was influenced by the qualitative research strategy and analysis of prior research approaches utilised in the incubation literature and their strengths and weaknesses. Third, time was spent discussing the selection of cases and criteria which were based on theoretical sampling on the likelihood that the cases will offer theoretical insights. Fourth, the choice of qualitative research methods utilised, specifically semi-structured interviews, was explained to explore how incubation processes function from the perspective of the entrepreneurs. Additionally, the data collection approach was explained in detail broken down by each incubation process as there were slight differences between the three approaches. Fifth, the data analysis process highlighted that it involved a combination of the 'framework' approach and NVivo which are both in line with the agreed methods within the case study-based research approach. Finally, a research ethics section explained that throughout the research process participants were treated ethically and were informed on how the research would affect them. The next chapter will present the first findings chapter of the within case analysis of each incubation process across the four constructs (e.g. incubation process, incubator's objectives and resources, entrepreneur type and the role of the RIS) discussed above.

Chapter 4: Accounting for experiences of incubation processes

The previous chapter explained the qualitative methodology utilised to approach the empirical analysis undertaken in this analysis. This chapter provides the analysis of each of the three incubation models across the fours constructs outlined in the methodology chapter: the incubation process, the incubator's objectives and resources, the role of the RIS and entrepreneur type. This Chapter has four objectives which are linked to the gaps in the literature discussed in Chapter 2. First, it was found that there is a lack of understanding on how the incubation process functions (Hackett and Dilts, 2004b). The first aim of this chapter addresses this gap and explores how each incubation process is *experienced* by entrepreneurs and provides insights into the processes' attributes. Second, most studies do not take into account how an incubator's objectives and resources affect the incubation process despite the recognition that objectives and resources can influence how the process functions (Clarysse et al., 2005, Hackett and Dilts, 2004b). The second objective of the chapter addresses this gap specifically looking at how each incubation model's objectives and resources affect the way the incubation process functions. Third, no known studies have analysed how the incubation process is affected by the RIS it connects to despite the recognition that the incubation process transcends the incubator (Hackett and Dilts, 2004b) drawing from external organisations. The third aim of this chapter is to provide rich insights into how the three incubation models are affected and utilise the RIS in which they are based. Fourth, despite the growing recognition of the heterogeneity of entrepreneurs in new venture creation (Mosey and Wright, 2007) and the important influence of entrepreneurs on the ability of the venture to spin-off from the incubation process (Phan et al., 2005), there are no known studies that analyse how an entrepreneur's experience and background affects new venture creation in the context of the incubation process. Therefore, the fourth objective of the chapter is to examine how the individual entrepreneur's experience and background affect how they are able to progress through the process. The interactions between these four principal variables will provide the richness that will inform the study and lay the basis for the comparison of the incubation models across the four constructs in Chapter 5.

The Chapter is structured by each case study or incubation model (the regional incubation model, the student incubation model and the university incubation model). Within each incubation model, the case analysis is organised by the four constructs beginning with the incubation process and then followed by the incubator's objectives and resources, the RIS and entrepreneur type. This structure provides a rich analysis of the cases as it presents a multi-level perspective of each case by first explaining how the incubation process functions and then how its objectives and resources, the RIS and the entrepreneur's experience and background affects the process. Each incubation model section ends with a summary of the key points drawn from each case analysis. The next section begins with the regional incubation model and starts by discussing the findings from the first construct, 'the incubation process'.

4.1 The regional incubation model

As mentioned in the previous chapter, the regional incubation model which was established in 2009, is a regional incubation process which aims to create high-growth spin-offs in sectors including ageing and health, sustainability, engineering and IT. The process focuses on providing business support to entrepreneurs through internal and external actors while they are physically incubated over a period of six months to a year[14]. Since its inception, the process has supported 15 spin-offs. At the time of writing this thesis, the incubation model had recruited 'three waves' of entrepreneurs. In 2009, seven first wave entrepreneurs were recruited. Four second wave entrepreneurs were recruited in 2010 and four third wave entrepreneurs were recruited in 2011. The next section will discuss how the regional incubation process is experienced by entrepreneurs and provide insights into its attributes.

4.1.1 Incubation process

It has been suggested that the incubation process consists of a selection process and a business support process (Campbell et al., 1985, Hackett and Dilts, 2008). This notion was supported by the findings from the regional incubation process which is a function of the interaction of the entrepreneur with two main sub-processes, *a selection process* and *a business support process*. The incubation process begins with a selection process which is utilised by actors from the incubator to recruit high-quality entrepreneurs to the process. To manage the expectations of the entrepreneur, the selection process spans a

[14] The timeframe changed from the various groups of entrepreneurs that went through the process.

time period of eight weeks from launching the availability of entrepreneur positions to making an offer. The actors involved in selecting entrepreneurs include a panel of internal incubator management actors and external regional people with business start-up experience[15]. Utilising multiple actors to select entrepreneurs, including both internal and external actors, was essential as it enabled incubator management actors to have multiple decision makers to judge the right candidate. An incubator management actor explained the importance of utilising multiple decision makers during the selection process:

> *"Because the panel...they were a fairly broad group, they had sort of specialism in different areas, so that enabled them to probe the idea much more – a little bit like a Dragon's Den type situation. Everyone one on the panel had a particular knowledge of a particular industry...It enhanced the selection process because we got...feedback from the panel but it also gave something to the candidate who had the opportunity to discuss their business ideas with some business professionals from the region".*

The majority of entrepreneurs explained that there were multiple actors involved in the selection process:

> *"I...had to...present to a panel of sort of experts that they brought in including the Innovation Director and CEO and Business Support Manager".*

The role of the entrepreneur in the selection process, which has not yet been discussed in the incubation literature, is to prove their suitability for the incubation process and for starting a business. Apart from demonstrating their capabilities, the entrepreneurs utilise their engagement with incubator management actors during the selection process to better understand what their potential role will be in the incubation process. The majority of entrepreneurs highlighted how they used the selection process to understand their role in the process:

> *"After the interview I understood that you had a certain amount of time to create a business which you took out so I mean after that interview I was even more excited by the role".*

The selection process is built around selection criteria which incubation managers utilise to recruit entrepreneurs to the incubation process. It was also found that through the recruitment of various groups of entrepreneurs the incubator's selection criteria change over time to accommodate better the incubator's objectives. These changes are a result of strategic management learning (a theme not yet discussed in the incubation

[15] Within the process, these individuals are known as the 'innovation advisory panel'.

literature) and actors involved in the selection process. An incubator management actor explained this point:

> *"We started to do that* (make changes) *through the learning lessons after each round of recruitment, where we said 'Who did we get applying, how did we select them, what did we get in, how is it working and what could we do differently and better?".*

For the first group of entrepreneurs, the selection process commenced with an informal *"cup of coffee"* interview where they discussed their background with the CEO[16]. The selection criteria were based on the success of the conversation and the 'chemistry' between the entrepreneur and CEO. The second group of entrepreneurs were involved in a more *"structured"* selection process which included a first interview, psychometric testing, a personality questionnaire, a second interview and a five minute presentation, all of which could demonstrate judgment, problem solving and ability to reason.

The emphasis of the criteria of the second selection process was on the individual competencies of the entrepreneur such as leadership skills, good judgement and vision. According to incubator management actors, the rationale for focusing on individual competencies was that if they recruited entrepreneurs with the appropriate skill set, then they could support the development of the idea. The significant difference between the selection process of the first and second group of entrepreneurs was a result of the young age of the incubator as the first selection process took place within its first year of existence. Additionally, an HR adviser was in place at the time of the second selection process and could guide incubator management actors on selection criteria and the consequences the selection criteria has on the process. The majority of entrepreneurs that were involved in the first selection process highlighted the newness of the process:

> *"It was the early stage of the IMs* (entrepreneurs). *We were the first IMs coming through so it was ploughing a new field and I think everyone was searching for the recipe of how it would work. No one quite knew what the formula would be and I think we were part of developing that formula".*

The third entrepreneur group's selection process was very similar to the second process but also involved a telephone interview and presentation to external regional actors to interrogate further the business idea. The telephone interview enabled incubator management actors to engage quickly with the entrepreneur before inviting them to a face-to-face interview. In this third group, much more emphasis was placed on the business idea rather than just the individual competences of the entrepreneurs as lessons

[16] The CEO is a key actor in the business support process.

from the first and second group of entrepreneurs demonstrated that they found it difficult to take on a business idea that they had not developed prior to entering the incubation process. Additionally, the incubation period of entrepreneurs was significantly decreased from the first and second group of entrepreneurs. Selecting entrepreneurs who already had ideas meant that they were able to hit the ground a lot more quickly when they entered the regional incubation process and they had something to run with that they were highly motivated to achieve. This point is reflected in the third group of entrepreneur's comments:

> *"I think that is one of the reasons why they chose me...the programme has been shrunk down to six months so they were keen to find people with ideas that they had already been working on because if you go in without an idea and you are walking around blind for a couple of months, it is quite hard to find something that you really buy into emotionally as well as a business idea and I bought into this emotionally a long time ago. I spoke at length...in the interview process to tell them about what I had done...to show that actually this isn't just a flash in the pan and we spent quite a long time working through our ideas".*

According to an incubator management actor, the stronger spin-offs were selected based on multiple selection criteria including both the idea and the individual entrepreneur:

> *"I think from the presentations that were done by these individuals* (last group of entrepreneurs) *on their moving out into their businesses when they were incorporating, these did look, I think, the strongest set of proposals that we had going through – I think. I definitely feel that the balance is the person and the idea and I think it does have to be both".*

After the entrepreneurs go through the selection process discussed above, the rest of the incubation process involves a business support process. While there is no consensus in the incubation literature on the totality of the business support process such as which actors are involved in the process, types of business support and how business support is deployed, multiple studies suggest that the business support process is concerned with leveraging the internal incubator's knowledge and external knowledge to help entrepreneurs develop their businesses during the incubation process (Smilor, 1987, Patton et al., 2009). This conceptualisation fits with the findings from the regional incubation process which entails the entrepreneur receiving types of business support from internal and external actors to develop their businesses across a series of stages. The entrepreneurs receive this support while they are physically based in the incubator. Internal business support is delivered by actors internal to the incubator including actors such as an innovation director, CEO, finance director (all of whom have prior entrepreneurial experience), a business support manager, finance manager, procurement

staff and interns. The most important internal relationship is between the innovation director[17] and the entrepreneur as the entrepreneur is mostly engaging with this individual throughout the process until they exit the incubator. The majority of entrepreneurs explained the importance of this relationship:

> *"It's...an ear to bend when you need it..."We're having a bit of a hard time with this. Can we have a chat about it?"... you can always ask the innovation director. I mean that goes for saying you can call him, even when he's not in the office sort of thing".*

The importance of the innovation director's prior entrepreneurial experience was highlighted by the entrepreneurs as it meant he had more credibility and contributed to their "readiness...for co-production" (Rice, 2002: 2002). The majority of entrepreneurs reflected this point:

> *"I've been just seeking out, speaking to people I know and trust, like the innovation director, in the office who have good experience with all this sort of stuff".*

Existing literature also suggests that other incubatees or entrepreneurs starting businesses in the incubator play an important role in sharing knowledge (Sherman and Chappell, 1998, Bollingtoft, 2012, Bollingtoft and Ulhoi, 2005). However, it was found that incubatees in the regional incubation process played a limited role and the relationship with the entrepreneur is not as sophisticated as previous research indicates. The majority of entrepreneurs explained this limited relationship with other incubatees during the incubation process:

> *"It is very hard for people to give you input after a few weeks because they have already dropped behind in the knowledge which you have".*

External business support is provided by regional organisations/actors and other extra-regional actors some of whom are affiliated with the incubator[18]. Similar to the selection process discussed above, the business support process changes over time as a result of strategic management learning and actors involved in the process. An incubator management actor explained this point:

> *"I believe because the organisation is only about 3 years old as times progressed we have learned and we have put in more systems and processes".*

[17] For the first and second group of entrepreneurs, the most important relationship was between the CEO and the entrepreneur as the innovation director was only recruited at the back end of the second group of entrepreneurs recruited to the process.

[18] Section 5.3 provides an in-depth explanation on the role of regional organisations/actors in the business support process and, therefore, will not be discussed in detail here.

The process is also perceived differently by the entrepreneurs and by the incubator management actors delivering the process. For the incubator management actors, while confirming that the process changed across groups of entrepreneurs, the process was described as linear across three stages: induction and idea evaluation, market feedback, further idea development and spin-off launch. For the first and second group of entrepreneurs, while they moved through the three stages and were aware that they were required to develop business ideas closely connected to market needs and develop high-quality business propositions, the stages of the process were less clear for the entrepreneurs. The majority of the first and second group of entrepreneurs all highlighted this point:

> *"There was a process that the CEO and business support manager were aware of and the board were aware of but I don't think that was communicated to the IMs* (entrepreneurs) *particularly well".*

The third group of entrepreneurs were clearer about the process as the person involved in managing the process had changed and the process itself was *"more refined"* having been tested on the two previous group of entrepreneurs. Additionally, for the third group of entrepreneurs the process was less focused on idea development (as the entrepreneurs came into the process with ideas) and more focused on applying resource to business development, market testing and preparing the business through investment. Despite these differences, the entrepreneurs have an active role in the regional incubation process and are expected to take the lead in developing their spin-offs. The majority of entrepreneurs explained that they played an active role in the process:

> *"You're hired to just get on with the project…not to be babysat".*

However, while taking the lead, the entrepreneurs are weakly tied to the incubator as they are employees receiving a salary and are only based in the incubator for a six to nine month period of time. The stages of the business support process will be discussed in more detail below.

Stage 1: Induction and idea evaluation

Stage one of the business support process takes place across three-four months where the entrepreneur is involved in an induction process. During the induction process, the entrepreneur is introduced to the incubator's procedures and processes and meets with all the key incubator team members. Stage one also involves the entrepreneur identifying and evaluating business ideas, working out a structure of how they are going

to start to test their insights and finding out which types of business support are available from the incubation process. Idea identification and evaluation involves desk-based research, the use of external idea databases, researching other high growth companies, attending external events and conferences to network with individuals in their industries, spending time at the local universities, looking at potential research to commercialise and utilising idea development companies. To evaluate their ideas, the entrepreneurs utilise "innovation resources", a type of business support not discussed in the literature, provided by the incubation process such as internal idea databases and an innovation framework. The benefit of these innovation resources was highlighted by the majority of entrepreneurs:

> *"I found it a very quick way of dismissing business ideas basically as I said in that first stage I had a lot of propositions and if you tried to fit those propositions into that model you can very quickly decide if it is worth following up on the proposition or not".*

For the third group of entrepreneurs who came into the process with ideas, this first stage is about questioning their ideas to see if there are any other greater opportunities, trying to quantify the demand and size of the industry and establishing how to develop high growth strategies. By the end of stage one of the process, the entrepreneurs have pinned down two or three opportunities. During this stage, apart from innovation resources, the entrepreneurs are provided with physical resources such as computers, meeting rooms, phone lines and an allocated desk space within the incubator, financial resources in the form of a salary which enables them to entirely focus on developing their businesses and learning resources or entrepreneurial knowledge such as access to workshops/seminars (a theme not yet included in incubation process models). The entrepreneurs, while mostly relying on themselves to develop ideas, are also *informally* engaging with incubator management actors, specifically the CEO and innovation director in three types of co-production modalities; "proactive crisis intervention"[19], "reactive crisis intervention"[20] and "proactive developmental intervention"[21] (Rice,

[19] "Proactive crisis intervention" is when the incubator manager proactively engages with the entrepreneur in providing business support on an episodic basis (Rice, 2002).

[20] "Reactive crisis intervention" is when the entrepreneur initiates contact with the incubator manager and is focused on a particular issue and is of a limited duration.

[21] "Proactive developmental intervention" refers to the ongoing interaction between the incubator manager and entrepreneur which focus on the development needs of the entrepreneur and their spin-off (Rice, 2002).

2002:175). The benefit of these types of informal interactions is that the entrepreneurs can gain support as and when an issue arises as well as discuss more development type questions relating to developing the spin-off in the process. The majority of entrepreneurs highlighted the benefit of the proactive developmental intervention:

> *"The CEO would start at seven o'clock in the morning and I used to start early in the morning too...It gave him a chance to hear what I was up to and I could run some ideas past him...so when it did come to an official review I could cover the basis of what was concerning him".*

The entrepreneurs are also informally engaging with external regional organisations and actors in their industry to gain insights on existing ideas and business models (see Section 4.3 for a full discussion on this point). Apart from the informal interactions, on a weekly basis, the entrepreneurs are *formally* attending progress meetings with incubator management actors to evaluate the progress of their ideas. Similar to the findings in the literature that "too much formal intervention can be perceived as interference" (Patton et al., 2009:629), the majority of entrepreneurs expressed their discontent with the formal interactions as they felt unsupported during this type of interaction:

> *"I think the review meetings...were often quite negative...it felt like an us and them situation not come and chat with us tell us where you are up to and we will support you moving forward. It wasn't a two-way development kind of meeting it was more like tell us where you got to and why haven't you gotten further".*

To progress to the next stage, the entrepreneurs went through a "stage gate" or review to convince the management team that they should "invest" in the entrepreneurs to take their opportunities forward. This involved a presentation of the current development of their companies and an outline of their needs going forward. For the third group of entrepreneurs, the review involved innovation advisory panel actors.

Stage 2: Market feedback and business plan development

Having identified their ideas in stage one of the process, stage two of the process involves the entrepreneurs testing their ideas through customer feedback and pilot studies alongside developing a business plan around the chosen opportunities. The entrepreneurs also put together a solid project plan including time scales and resources required to develop the businesses. They start procuring services from regional organisations such as traditional professional KIBS and new technology KIBS to develop their businesses. For the third group of entrepreneurs, stage two also involved bringing in a team of people to help them develop their particular projects as the

incubator management actors learned that it was important for the entrepreneurs to exit the incubator with a team in place to continue to take the business forward.

During this stage, apart from utilising business development resources, the entrepreneurs continue to utilise the physical resources of the incubator. They also make use of financial resources from the incubator to pay regional organisations for their business services. Network resources are provided by incubator management actors such as access to networking events, workshops and contacts which the entrepreneurs utilise on need-to-need basis. The entrepreneurs also benefit from being located in the incubator as it provides a supportive environment for them to develop their business, credibility when engaging with external actors and encouragement. Many entrepreneurs described the benefit of being located in the incubator:

> *"I certainly value the psychological nudge it has given me to get on with the business and a business vision that is quite large scale you know have a bigger vision and this is how you might take that forward so it certainly lifted up my perspective that way".*

While still playing an active role in the process, the entrepreneurs rely on informal day-to-day engagement with incubator management actors receiving business development resources such as help and guidance around business plan writing, financial forecasting and overall decision making in regards to businesses strategies. The third group of entrepreneurs, who were led by the innovation director, were pushed to engage more closely with potential customers. The entrepreneurs are also engaging informally with external mentors that provide free business advice and experience. Apart from informal interactions, at this stage, the entrepreneurs are engaging formally with regional organisation/actors to develop and test their ideas, to contract services to develop their businesses and to work as part of the entrepreneur's team. The entrepreneurs' valued informal support over formal support as it enabled them to engage quickly with incubator management actors and return quickly to progress their businesses. The majority of entrepreneurs highlighted the importance of informal over formal support:

> *"You don't really need to have a formal process...I don't think it can be formalised because it just wastes your time".*

To progress to the third and final stage, the second stage gate involved an internal progress meeting where the incubator management actors decide if the entrepreneurs' businesses have the potential to develop into a company and spin-off from the incubator. The decision is based on the development progress from stage one and the

feedback from the market testing. For the third group of entrepreneurs, the review also involved the innovation advisory panel actors.

Stage 3: Further business development and company launch

The third stage is the continuation of working with procured organisations to finalise the development of the companies, refining the businesses based on the continuous customer feedback, pilot studies and feedback from internal management actors. During this stage, entrepreneurs are also meeting with external lawyers to discuss legally ending their employment contracts with the incubator, the company formation, share allocation and debenture allocation. Apart from continuing to utilise the physical resources of the incubator, the entrepreneurs utilise financial resources provided by the process to pay for the costs of interactions with lawyers. The entrepreneurs rely on the support of an incubator management actor to engage with the lawyer to collect all the relevant paperwork discussed above to spin-off. This support is helpful as it enables the entrepreneurs to continue to focus on their businesses at the last stages of the incubation process:

> *"X person handled most of it. So, it was quite easy really, in the end. I could just concentrate on my businesses. And then Science City handled all the legal legalities and I just reviewed all the documents and it was quite easy".*

The next section will discuss how the incubator's objectives and resources affect the regional incubation process.

4.1.2 Incubator's objectives and resources

The second construct analysed in the regional incubation process is the incubator's objectives and resources. The larger objective of the regional incubator is regional development which is achieved through the creation of science-based, high growth spin-offs, building networks in the region through engagement with regional stakeholders and engaging with the regional community improving education and skills. The process is funded by public sector resources from the North East regional development agency, One North East. It has been suggested that accounting for an incubator's objectives and resources enables a better understanding of the incubation process as how the process functions is a reflection of its objectives and resources (Clarysse et al., 2005, Hackett and Dilts, 2004b). The findings from the regional incubation process highlight that the incubator's objectives influence the role of the entrepreneur in the process, the spin-off sector, the way the entrepreneur's built their spin-offs during the process, the types of

ideas the incubation process selects and the types of support provided. In addition to objectives, it was found that the incubator's financial resources moderate the way the business support process functions. These points are discussed in detail below.

The regional development objective, which is in part achieved by building networks in the region through engagement with regional stakeholders, affects the role of the entrepreneurs within the process. Along with developing their spin-offs during the incubation process, the entrepreneurs take on a "stakeholder management role" to promote their activities in the region on behalf of the incubator. This means that the entrepreneurs are not able to focus completely on developing their companies during the incubation process. The entrepreneurs explained that they undertook both these roles during the process:

> *"I would say NIM* (starting a business) *was 80% of my role but I also knew there was 20% where I had to support Science City* (the incubator) *and just making sure the message was getting out what the NIM managers* (entrepreneurs) *were doing and the projects we were developing".*

The regional development objective, also achieved through developing high-growth, science-based businesses, affects the spin-off sector, the way the entrepreneurs built their spin-offs during the process and the types of ideas the incubation process selects. The science-based spin-off objective required entrepreneurs to establish businesses around key regional science-based sectors such as ageing and health and sustainability. This meant that from the early stages of the process, the entrepreneurs were obliged to look to these sectors for business ideas. This was confirmed by the majority of entrepreneurs' comments:

> *"We all started looking into areas that we had been told to, things that fit into...the research themes that were being promoted across the North East from the University and other kinds of places and people and organisations".*

For ideas that marginally tied in to the science-based sectors, the entrepreneurs received less support from the incubator management actors to reduce risk (a theme not yet discussed in the incubation literature) in getting involved in projects that would make the process appear unsuccessful.

The regional development objective, also achieved by establishing high-growth spin-offs, affected the way the entrepreneurs structured their business models and propositions which included building scale and exponential growth into propositions. To accommodate this objective, incubator management actors provided "innovation

resources" and innovation frameworks which the entrepreneurs utilise to dismiss non-high growth propositions. The high-growth spin-off objective is also reflected in the selection criterion utilised to select entrepreneurs to the regional incubation process which was focused around the business idea. Both of these points were discussed in the previous section.

In relation to resources, the regional process was sufficiently resourced to achieve its objectives which led to a more effective business support process. The entrepreneurs benefited from the well-resourced process as they received a salary during incubation which helped them have a cushion while setting up their businesses and enabled them to focus only on developing their businesses during the process. Additionally, the entrepreneurs were given a large budget[22] to develop their companies which was put towards procuring regional organisations, recruiting team members, attending regional and national events and anything else the entrepreneurs would need to develop their businesses. The benefit of the well-resourced process was expressed by the majority of entrepreneurs:

> *"The salary packages is the best part of the support cause that allows you to concentrate only on starting your business rather than in most cases you have to work and then try and start a business on a night or a weekend and trying to do that is impossible".*

Apart from the above point, the incubator's resources also had negative effects on the regional incubation process and how it functions. It was found that being funded by public sector resources influences the activities that entrepreneurs are required to undertake during the process. One such activity requires the entrepreneurs to capture their outputs such as engagement with regional actors in a CRM system to demonstrate the larger incubator's regional development objective. This activity negatively affects the entrepreneur's ability to be dynamic in establishing a spin-off as they spent a large portion of their day tracking their activities. The majority of entrepreneurs demonstrated their frustration with this requirement:

> *"It helps Science City* (the incubator) *justify why they are there, it doesn't help my company...to develop itself...Time is so short and especially when you're developing a company...and when you are pulled away from that core part of the company you are slowing down its progress".*

[22] The amount of resources varied from entrepreneur to entrepreneur as it was based on the needs of their spin-offs.

Another activity requires the entrepreneurs to procure services or products from an incubator established panel of external regional organisations as a result of public sector funding obligations that transactions are open and transparent. This two-month activity includes filling out large amounts of paperwork, sending out three quotes to potential service providers, waiting for their responses and judging potential proposals. This activity negatively affects the entrepreneur's ability to be entrepreneurial in establishing a spin-off as it slows down the development process, dictates how the entrepreneurs can approach potential service providers and be commercial with them, affects which external organisations entrepreneurs could procure as they were limited to an established panel and requires the entrepreneurs to pay an automatic 20% non-recoverable VAT to the government on anything procured. The negative impact of this process was highlighted by the majority of entrepreneurs:

> *"It's anti-entrepreneurial. Having to do so much paperwork and justify the money that you want to spend...And when you work in the private sector, you ask for a quote off somebody. If it's good then you just use them and once they've done the work, you pay them. But it's a lot more complicated here".*

Public sector resources also influence which regional organisations the entrepreneurs are able to interact with during the process which is a reflection of the requirement of public funds to demonstrate outputs. The entrepreneurs were asked to select from regional organisations/actors as service providers to achieve regional development objectives. Additionally, entrepreneurs were unable to engage with other publicly-funded organisations with similar outputs as the regional incubator as it would then not be able to claim supporting the entrepreneurs as an output of its own. This negatively affected the entrepreneurs during the process as they were not able to tap into specific regional knowledge to develop their companies. The majority of entrepreneurs explained how this negatively affected their business:

> *"I missed out on a lot of technical expertise that the region has in place at X organisation that would benefitted me in putting together my business".*

In addition to affecting the activities that entrepreneurs are required to undertake and which organisations entrepreneurs could interact with during the process, the incubator's public sector resources also influenced how entrepreneurs spent money during the process. As a result of public funded budgets only being renewed if yearly funds are spent, the entrepreneurs expressed a feeling of pressure from incubator management actors to continue to spend money towards developing their businesses throughout the process. This negatively affects the spin-off's ability to attract venture

capital in the future as VCs look to the amount of development funds spent during the early stages of the business. The entrepreneurs highlighted their concern with this potential future issue:

> *"I think I've probably spent around about £80,000 on this project. And it's a little bit concerning for me because I know that when I take that to an investment house, they'll sort of say, "Well, how come you've had to use so much money so fast".*

Not only are the entrepreneurs affected by being part of a publicly-funded incubation process, but incubator management actors are also affected. The requirements of incubator funders were found to affect the ability of incubator management to balance the needs of the entrepreneurs with the needs of funders during the process. An incubator management actor highlighted this conflict:

> *"The customer of the programmes are the funding bodies so they set the targets and so it is very easy just to be looking at the funder's requirements and lose sight of what I would call more of the consumer's requirements – which is the potential SMEs that we are supporting and the entrepreneurs that we are supporting. So they are almost the consumers of our product and it would be very easy to lose sight of that when your customer is demanding tick some certain boxes to cover the funding criteria".*

The activities incubator management actors are required to undertake are also affected. Incubator management actors are required to write quarterly reports to keep the sponsors updated on the outputs of the resources given, attend meetings with sponsors to answer progress questions, implement new procedures within the incubator and to prepare for yearly audits from the sponsors. Additionally, incubator management actors spent effort to obtain strong links with private sector regional organisations as more public sector funding is granted to incubators that have links with private sector businesses and can demonstrate the value that they bring to the region through engaging with private sector partners. One such example is the addition of external regional actors to the selection panel of the third group of entrepreneurs. This is reflected in one comment made by an incubator management actor:

> *"More and more funding will only be granted if we have got very good links with private sector businesses and we can demonstrate the value that we are bringing through having private sector partners".*

However, the role of private sector individuals and organisations is valued in the incubator as it reminds incubator management actors of their objective to support entrepreneurs rather than just meeting the needs of the funders. An incubator management actor highlighted this point:

"So I think having private sector individuals in there, reminds the organisation of what it is all about and sometimes, just asks some of those very basic questions that you can stop asking yourself when you are focused on a funding body set of criteria or a set of tick boxes and I think that is very valuable".

The next section will discuss the role of the RIS in the regional incubation process.

4.1.3 The role of the RIS

The third construct analysed is the RIS which is a combination of the interaction of regional organisations/actors and the regional socio-economic and cultural setting. It has been suggested that the incubation process transcends the incubator (Hackett and Dilts, 2004b) as it relies on the support of external organisations to function. In the regional process, it was found that regional organisations/actors contribute to selecting entrepreneurs to the incubation process, act as service providers, as a knowledge resource, as actors in the entrepreneurs' teams, as mentors and as funders for the incubation process and are utilised strategically at *explicit* points in the process. These findings are discussed below.

Regional organisations/actors play a multi-faceted role throughout the timeframe the entrepreneur is based within the regional incubation process. In the early stages of the process, actors from regional firms are involved in contributing to the selection process of entrepreneurs to the regional incubation process. They are invited to sit on the incubator's decision panel which includes listening to the presentation the entrepreneurs deliver to incubator management actors. Post presentation, actors from regional firms provide feedback to incubator management actors on the quality of the entrepreneur's presentation and their potential business ideas. At this early stage of the process, actors from regional firms are utilised by incubator management actors to get a wider pool of people to judge potential entrepreneurs for the process. This was discussed in the above incubation process section.

As the entrepreneurs enter the regional incubation process and begin to develop their ideas, they approach regional firms in similar sectors to get feedback on their propositions, to learn about existing business models, potential markets and potential customers. Regional firms at this stage are utilised by the entrepreneurs as a knowledge resource to develop their companies during the process. The entrepreneurs explain the role of regional firms:

"It has been helpful speaking to those people (from regional organisations) *just gaining some knowledge from them as I developed the companies so that's been helpful, there is a good connection with them".*

As the ideas become more solidified, the entrepreneurs utilise regional firms to develop and test their ideas during the process. This may involve conversations with regional firms to provide feedback on the entrepreneur's services and products or using regional organisations physical space to prototype their products for proof of concept. This enables the entrepreneurs to re-work their services/products while still in the incubation process. The benefit of engaging with regional firms to test products/services was expressed by many of the entrepreneurs:

"I was always in contact with renewable energy companies, with some of these car dealers in how I scan their cars and bits and pieces when I was in the NIM process...it gave me that kind of market analysis of whether or not I had a proposition of which I could roll out".

During the above idea testing stage, entrepreneurs also start to utilise actors from regional firms in their specific business sectors as mentors during the process. The entrepreneurs are more aware of their needs at this stage in the process and regional actors are able to provide tailored advice, business support, access to networks and potential collaborators in addition to the internal incubator management actors. The help provided by actors from regional firms as mentors during the process was explained by the majority of entrepreneurs:

"I have opted in for a business mentor and he is not working for any money or for any remuneration... it is of interest to him and a bit of fun to help me out".

As the businesses progress further, the entrepreneurs procure services from regional firms to continue to develop their companies. These organisations include both traditional KIBs (idea development services, marketing services, project management services, business planning services, legal services, website development, branding work and patent filing) and new technology KIBs (product development, software development, engineering support, lab services and prototype building services). The types of regional firms entrepreneurs interact with are based on the needs of each entrepreneur's business:

"I've got a local software company doing the phone app and also the software for the management system".

"We got someone to do some IP searching around the proposition".

Alongside procuring services from regional firms, entrepreneurs procure regional actors to work as part of their team to continue to develop their businesses including individuals such as finance directors to help with financial modelling, operations directors to focus on product development, software specialists to work on software development, project managers to continue to market test the product and marketers to develop marketing strategies. Regional actors also contribute to the internal business support process of entrepreneurs through their role on the incubator's advisory panel. These actors include serial entrepreneurs, business angels, venture capitalists and corporate R&D actors who have high level entrepreneurial and industrial experience. From the incubator management actor's perspective, the panel and the panel's feedback is used as a method of reviewing the entrepreneur's progress in the incubation process. From the entrepreneur's perspective, the advisory panel is utilised as a critical resource that provides constructive feedback on their ideas and business progress and provides access to networks. For some entrepreneurs, the panel actors become unofficial mentors and spend time with the entrepreneurs outside of the meetings. The majority of entrepreneurs benefited from engaging with the panel actors during the process:

> *"I found it helpful...what we get out of it is advice, potential contacts...in industry so…potential customers for me. There's another guy who's a VC that got contacts of loads of potential investors".*

It was also found that regional organisations/actors were used strategically by both incubator management actors and entrepreneurs during the process. Incubator management actors purposefully utilise actors from the RIS to contribute to the processes' selection component to get a wider pool of people to judge potential entrepreneurs. They also utilise regional actors to sit on the advisory panel to provide additional business support to the entrepreneur and to be part of a panel of service providers from which the entrepreneurs procure to develop their spin-off.

Entrepreneurs also utilise regional organisations/actors strategically during the process to develop and test their ideas, as a knowledge resource, as mentors to provide business advice and guidance and as actors to work as part of their team to develop their spin-offs. The strategic use of regional organisations/actors meant there were low transaction costs for the entrepreneurs to engage with these organisations which positively affected new venture creation. An incubator management actor highlighted this point:

> *"One of the advantages of being in a...programme like this...and one of the advantages being developed by the key partners should be that those key partners*

already have access to high quality consultants, to potential customers, to potential management team and board funders so to facilitate introductions to those people...to make it a good environment and a successful environment".

Finally, it was found that the process was moderately dependent on regional organisations/actors as there is also 'in-house' business expertise within the incubator via incubator management actors. Internal business support, while complemented by regional organisations/actors, is also delivered by internal actors within the incubator. This was discussed in the above incubation process section (4.1.1).

Apart from regional organisations, it was found that the regional socio-economic and cultural setting[23] of the RIS, which has not yet been discussed in the incubation literature, also plays a role in the regional incubation process. While it was found that regional organisations/actors are utilised by entrepreneurs during the incubation process (4.1.3), the level of the openness of regional organisations to engage is low. Entrepreneurs expressed that they were seen as competition by other regional organisations/actors that have similar objectives to the regional incubator. This affected the entrepreneur in the regional incubation process as it took a while for them to engage with people in the region and made them miss out on regional knowledge that would have benefited the development of their companies. The lack of engagement of regional organisations/actors was expressed by the majority of entrepreneurs:

"It is taking a little while to get engaged with...people in the region...they know what they are trying to do and they have decided what their objectives are and what their outputs are and if someone else comes in on the periphery of that, who are you, what are you and we know what we are trying to do".

The mentality of regional organisations/actors, which was described by the entrepreneurs as public-sector oriented, very bureaucratic and influenced by the availability of public sector funds over the years, also affected the way entrepreneurs engaged with regional organisations. Other regional firms had an expectation that the entrepreneur's business services were free as a result of their connection to a regional incubator with regional development objectives. The entrepreneurs expressed that this expectation made it more difficult for them to engage with regional firms, to gain networks and develop their businesses during the incubation process. The majority of entrepreneurs explained the difficulty of engaging with regional organisations/actors:

[23] The regional and socio-economic setting of the RIS is defined as level of openness of regional organisations to engage, the mentality of regional organisations, entrepreneurial spirit, access to networks, access to finance and access to talent.

"There's one company... they did say why should we pay for this because you're Science City (a regional incubator) *you...you can do it for us for free can't you and I would say no I am developing a company which has to be self-sufficient over the next months....But they saw Science City as a hand out...They didn't want to pay for it".*

The entrepreneurial spirit, another element of the regional socio-economic and cultural setting of the RIS, also plays a role in the regional incubation process. It was found that the region lacks an entrepreneurial spirit. This negatively affected the entrepreneurs during the incubation process as regional organisations/actors were not willing to take risks on engaging and collaborating with entrepreneurs in regards to product development and/or forming partnerships. This lack of entrepreneurial spirit was reflected in by the majority of the entrepreneur:

"It is not a very entrepreneurial city and people want desperately, desperately security. They are not willing to take a punt in any shape or form...they weren't willing to take any risk whatsoever on a new area".

As a result of the lack of entrepreneurialism within the region, most of the entrepreneurs relied more on themselves to progress their business during the incubation process. One entrepreneur captured this point well when he noted:

"I had to fall upon myself to do a lot more".

Access to networks, which is the fourth element of the regional socio-economic and cultural setting of the RIS, also plays a role in the regional incubation process. Entrepreneurs utilised regional networks to access potential collaborators, services providers and to engage with venture capitalists while going through the regional incubation process. One specific regional event (*"First Friday"*) organised by the regional incubator was highlighted by the entrepreneurs as the most helpful for tapping into the regional network. From the incubator management actor's perspectives, regional networks are utilised to identify entrepreneurs for the incubation process. The use of the regional network is highlighted by one of the incubator management actor's comments:

"The networks that I have through working in this area for a number of years helped to identify high quality people in the region".

Access to regional finance, another element of the regional socio-economic and cultural setting of the RIS, also plays a role in the regional incubation process. The availability of regional finance from the regional development agency, the core sponsor of the process, meant that the process was well-resourced. The entrepreneurs benefited from the well-resourced process as they received a salary and were given a large budget to

develop their companies. Most of the spin-offs were at too early a stage to engage fully with venture capitalists. The well-resourced process was discussed in the incubator's objectives and resources section above (section 4.1.2).

The quality and availability of regional talent, the last element of the regional socio-economic and cultural setting of the RIS, also affects the regional incubation process. The lack of regional talent affected the availability of high quality entrepreneurs which the incubator management actors could draw from for the regional incubation process. This affected the quality of entrepreneurs and ideas going into the incubation process. This point is clearly explained by one of the comments of an incubator management actor who was highly involved in the incubation processes' selection process:

> *"I think it has affected it from the fact that it is not in London, New York, Silicon Valley. Essentially anywhere that is not in one of the major metropolitan areas in a highly developed entrepreneurial city which act as talent magnets...are not going to have access to the highest pool of talent which is naturally drawn to those places. So I think the material going in the top of the programme is affected being in the regional environment".*

The lack of regional talent also limited the number of quality organisations and actors the entrepreneurs could utilise to develop their businesses during the process. This meant that the entrepreneurs had to utilise substandard people which affected the quality of their businesses. Many entrepreneurs expressed the frustration that they felt with the lack of regional talent:

> *"A lot of the really talented people are in London so there are people who I would love to work with who are down in London...sometimes you have to hire sub-standard people which ultimately knocks on the quality of your business"*

The above discussion demonstrated that the RIS plays a multi-faceted role in the incubation process. The next section will discuss how the entrepreneur's experience and background affects their incubation journey.

4.1.4 Entrepreneur type

The fourth construct analysed is the entrepreneurial characteristics of the non-academic/student entrepreneurs which are further defined by entrepreneurial experience, industrial experience, education and family background. It has been suggested in the larger entrepreneurship literature that entrepreneurs are heterogeneous (Mosey and Wright, 2007, Westhead and Wright, 1998) and an entrepreneur's prior entrepreneurial experience, industrial experience, education and family background may positively

impact new venture creation (Mosey and Wright, 2007, Bruderl et al., 1992, Shane and Khurana, 2003). Despite this, there are no known studies that analyse how the individual entrepreneurial characteristics of entrepreneurs affect the incubation process.

When looking to entrepreneurial experience (which all entrepreneurs in the regional process had), it was found that prior entrepreneurial experience positively affected how the entrepreneurs progressed through the regional incubation process. First, prior entrepreneurial experience assists the entrepreneurs in more easily identifying and rejecting opportunities during the process. By more easily identifying and rejecting opportunities, entrepreneurs are able to quickly move on with their ideas or 'fail quickly and cheaply' and leave the incubation process without pursuing an idea. The majority of the entrepreneurs explained this point:

> *"I felt that I could deconstruct an idea much more realistically than perhaps people who hadn't had that kind of former businesses experience".*

Second, prior entrepreneurial experience enables the entrepreneurs to utilise prior business knowledge during the incubation process. This facilitates the entrepreneur's ability to get more easily through the fast-paced time frame of the incubation process as they are able not to make the same mistakes they made in the development of previous businesses. It also provides the entrepreneurs with more confidence during the process on how to push things forward, what aspects of the business to focus and not focus on, an understanding of challenges of starting a business and potential future barriers. Many of the entrepreneurs' comments reflected the above points:

> *"I gave myself a higher workload by looking at three or four different companies at a time...because I understood, maybe that was my previous experience but I knew there would a drop off in these companies we were developing and so I made allowances for that by developing several at the same time".*

Prior entrepreneurial experience also helps the entrepreneurs to access more easily resources from external sources during the incubation process as they enter the incubation process with their own networks. It also enables the entrepreneurs to know who not to access resources from based on previous bad experience. This allows the entrepreneurs to be less reliant on the incubation process for support and more dependent on themselves and their own networks. This was illustrated by the comments from the majority of entrepreneurs that had prior entrepreneurial experience:

"I'm fortunate that I've been working in business for a number of years so I've got contacts in the right fields...So I can always call upon people as and when I need them really".

Finally, prior entrepreneurial experience also helps the entrepreneurs engage more easily with incubator management actors with prior entrepreneurial experience as they both share a similar 'entrepreneurial' world view. Many of the entrepreneurs with prior entrepreneurial experience explained this point:

"I always found a good connection with the CEO and finance director and they both came from the private sector. They had a similar mindset to my approach to business so they were always very supportive".

When looking to industrial experience, it was found that prior industrial experience in the same sector the entrepreneur is starting a business positively affects how the entrepreneurs progressed through the regional incubation process. First, entrepreneurs with industrial experience in a given sector were able to recognise opportunities more easily in those sectors during the incubation process. As entrepreneurs were able to recognise opportunities more easily, they were able to develop high-quality propositions in the fast-paced time frame of the regional incubation process. This point was illustrated by the comments from many of the entrepreneurs with industrial experience:

"It (the initial idea) *has come out of the last few years' experience of working in the electric vehicle arena and...the understanding of the market place and where the opportunities are...That certainly helped me I think with the...proposition and I had not spent those six or eight years doing that...it would have been a lot harder proposition to have started from cold".*

Second, entrepreneurs with prior industrial experience in a given sector have more confidence in starting a business in that given sector during the regional incubation process. This confidence stemmed from background knowledge gained from their prior industrial experience which the entrepreneurs could use to develop their business. An incubator management actor who was exposed to three rounds of entrepreneurs in the regional incubation process explained this point:

"I think I always found that they did obviously lean to their own idea...It was often an idea that was around their skill set. So if they had a strength in engineering and it was that sort of skill set then they were more comfortable".

Finally, entrepreneurs with prior industrial experience in a given sector were able to access resources more easily during the incubation process as they have more legitimacy with external actors in the sector than with external actors in a different

sector. This point was illustrated by comments from many of the entrepreneurs with industrial experience:

> *"I don't know maybe that's where, because that's my core skill set maybe I had the authority and they realised it is worth talking to this guy...because it tied into my automotive background".*

From the opposite perspective, entrepreneurs who started businesses outside of their industrial background were less confident during the incubation process. This meant they required more support from the incubation process, specifically from the Innovation Director. Entrepreneurs without consonant industrial experience highlighted this point effectively:

> *"He* (the Innovation Director) *has a lot more knowledge of these technologies than I do...I've been getting up to speed and learning from him really...With this project I've been dropped in the deep end cause it's not really my area of expertise…so it's kind of been in the deep end".*

In addition, entrepreneurs with no prior industrial experience in the given sector of the business had no contacts in the sector and found it took time to make contacts in the given sector. This affected the entrepreneur's ability to develop high-quality propositions in the short time frame of the regional incubation process as they were not able to collect substantial insights that could feed into potential business opportunities. This also affected the way entrepreneurs went about developing their ideas. Without the background knowledge in the given sector, entrepreneurs could not completely rely on themselves to develop high-quality propositions and were more reliant on external actors to develop the idea during the idea development stages of the incubation process. Entrepreneurs with no prior industrial experience in the given sector of the business they were starting explained this point:

> *"Starting with the ageing sector was good but as somebody that hadn't worked in that previously I had very few contacts I could make myself and it took some time to get my foot in the door to do the type of ethnographic research that would enable us to understand or see the deep insights that was expected of the IMs* (entrepreneurs) *and to reveal different business opportunities".*

Another interesting finding that emerged is that entrepreneurs with less industrial experience and more entrepreneurial experience were more connected to the market, aware of potential customers and engaging with potential customers during the incubation process. The meant that when they spun-off from the incubation process, the propositions of these entrepreneurs were stronger and they were leaving the process

with a business that was closer to being up and running. An incubator management actor also captured this point:

> *"The last group of innovation managers all went out with customers who had already been contacted...Even some had managed to get trials taking place so...when they were leaving, they were talking about a business. The first group, I think it was still almost an idea. You know it hadn't gone to the stage where they had the clear market identified, a clear customer and they were in dialogue with that customer on a regular basis. So it was quite significantly different I think".*

When looking to education, it was found that prior education affects the ability of entrepreneurs to assess their opportunities during the regional incubation process. Entrepreneurs with MBAs were more easily able to utilise tools learned during their MBAs such as SWOT analysis to analyse their ideas. The MBA also helped give names to concepts they came across during the incubation process such as demand pull. Prior education also helped the entrepreneurs access more easily contacts from the university they previously attended which they utilised to develop their ideas during the process. The role of an educational background in the incubation process was highlighted as important by many of the entrepreneurs with MBAs:

> *"I think where we would always revert back to that and it sounds quite simple but it was quite important because on the MBA you can hear of demand pull, technology push and it was making sure that we had that demand pull".*

Overall, entrepreneurs from the regional incubation process did not have to adapt to the role of an entrepreneur during the incubation process which meant they could be proactive and more easily develop their spin-offs during the incubation process. The majority of entrepreneurs explained this point:

> *"That's kind of why we're here. Right? That's one of the reasons we got chosen is 'cause we're fairly proactive, can solve our own problems. Like if you need someone to give you the authority to do stuff all the time, then that's not really the definition of an entrepreneur really. It's more like an employee. And so…it's not something that's put to mind all the time. I'm not engineering it to see like that. It's just that's the way I like to work. Just get on".*

None of the entrepreneurs in the regional process were affected by their family background or had family business backgrounds. The next section will briefly summarise the findings from the regional incubation process.

4.1.5 Summary

The above section shed light on the regional incubation process in relation to its incubation components and how they function, the incubator's objectives and resources

and how they affect the process, the RIS and its role in the process and the entrepreneur's background and experience and how that affected how their incubation journeys (see Table 4.1 for overview of the main findings). The regional incubation process is a function of the physical incubation of an entrepreneur with two main sub-processes, a selection process and a business support process. The selection process is utilised by actors from the incubator to recruit high-quality entrepreneurs. It was found that the selection approach is a balanced screening process which utilises multiple actors and selection criteria (e.g. the individual competences of the entrepreneur and the business idea). The use of multiple actors in the decision making process and multiple selection criteria increased the chances of potential new venture creation in the context of the incubation process.

After the selection process, entrepreneurs go through a business support process which is a combination of types of support delivered through internal and external actors across three stages: induction and idea evaluation, market feedback and business plan development and further business development and company launch. Throughout their incubation period, entrepreneurs have access to day-to-day support and guidance from internal actors; the most important of which is the Innovation Director. The internal actors are engaging with the entrepreneurs in a range of co-production modalities which positively affect the entrepreneurs and potential new venture creation during the incubation process. Additionally, incubator management actors all have entrepreneurial experience which was found to affect positively the entrepreneurs and their willingness to engage during the incubation process.

The incubator's objectives and resources were found to affect how the incubation process functions and potential new venture creation. The creation of spin-offs was the main objective of the process which meant that there were sufficient financial resources allocated to the process to achieve this objective including a salary for the entrepreneurs, funding to develop prototypes and funding to procure service providers. Other objectives of the process also affected the role of the entrepreneur in the process, the spin-off sector, the way the entrepreneurs built their spin-offs during the process, the types of ideas the incubation process selects and the types of support provided.

Apart from the use of internal knowledge and actors, it was found that the process also draws from the RIS in which it is based. Incubation management actors utilise regional actors as individuals in the selection process and to provide business support to the

Original constructs	Regional Incubation Process
Incubation process	*Selection process* - Relatively discerning - Selection criteria: business idea and entrepreneur's competences - Entrepreneur plays an active role - Multiple actors (internal and external) in the decision making process - Time frame standardised *Business support process* - Actors delivering support have prior entrepreneurial experience - Support delivered in broad range of co-production modalities - Entrepreneurs physically incubated - Availability of innovation resources
Incubator objectives and resources	New venture creation is primary objective Well-resourced process
The role of the regional environment	*Regional organisations* -Mostly used private sector regional organisations -Strategically utilised regional organisations -Somewhat dependent on regional organisations -Transaction costs for entrepreneurs to engage with regional organisations are not free *Socio-economic and cultural setting* - Regional organisations not open to engage with entrepreneurs because of tie to regional incubator - Lack of entrepreneurial spirit meant the regional organisations/actors not willing to take risks on collaborating - Lack of regional talent affected quality of organisations/actors
Entrepreneurial characteristics	- Entrepreneurs are homogeneous in relation to their prior entrepreneurial experience and are positively affected by their prior entrepreneurial experience - Entrepreneurs are heterogeneous in relation to their industrial experience and are positively affected by prior consonant industrial experience - Entrepreneurs positively affected by their education; used education to assess opportunities and develop business ideas - Entrepreneurs had no prior family backgrounds in business

Table 4.1: Summary of findings from original constructs and the regional incubation process (Author's Own)

entrepreneurs. The entrepreneurs also draw from regional organisations and actors of the RIS as knowledge resources, to develop and test their ideas, as mentors, as service providers and as actors to work as part of their team to develop their ideas during the process. The more regional organisations and actors enabled business support processes through the provision of resources, the more likely success of potential new venture creation in the context of the incubation process. The regional process was found to utilise strategically and had a low dependency on regional organisations and actors.

The regional socio-economic and cultural setting of the RIS was found to affect negatively the way entrepreneurs progress their ideas during the process as they engaged with regional organisations that see them as competition, are not willing to take risks and expect the entrepreneur's services for free. The lack of regional talent also affects the quality of services the entrepreneurs receive from service providers to develop their idea and the quality of entrepreneurs the process is able to recruit. The regional socio-economic and cultural setting of the RIS also provided the entrepreneurs with networks and access to regional finance to develop their ideas during the process.

The non-academic/student entrepreneurs experience and background (e.g. entrepreneurial experience, industrial experience and education) affected them during their incubation journey. All entrepreneurs had prior entrepreneurial experience (which they drew from during the process) positively affecting the way they were able to progress through the incubation process. Industrial experience facilities opportunity identification, access to resources and confidence during the incubation process. Education, specifically MBAs, helped the entrepreneurs evaluate their opportunities during the incubation process. None of the entrepreneurs were influenced by their family background.

Apart from the above findings, four other inductively-derived constructs (e.g. risk aversion, incubation management learning, social capital and entrepreneurial knowledge) were also found to be important for explaining how the regional incubation process functions (see Table 4.2 for an overview). The process was found to have a predominantly low approach to risk aversion utilising a selection process to recruit entrepreneurs to the process. Strategic incubation management learning was also found to be important for refining the selection and business support components of the process to improve the overall incubation journey for the entrepreneurs. The process

Inductively-derived constructs	Regional Incubation Process
Risk aversion	Low approach to risk - selective selection process
Entrepreneurial knowledge	Somewhat of a priority - access to seminars and workshops
Social capital	Somewhat of a priority -access to networking events, external contacts -facilitated by incubation management actors
Incubator management learning	Strategic management learning - built into selection and business support process
Duty of care	Did not use duty of care

Table 4.2: Summary of findings from inductively-derived constructs and the regional incubation process (Author's own)

was also found to support the development of the entrepreneur's social capital by providing access to networks through internal and external actors. Finally, the process provided limited access to seminars and workshops as the development of the entrepreneur's entrepreneurial knowledge was not a main priority as a result of the processes' short incubation period. The next section will analyse the student incubation process which represents the second type of incubation process analysed in this thesis.

4.2 The student incubation model

The student incubator was established in 2001. Since its establishment, one hundred sixty seven spin-offs have been supported and spun-off from the process in sectors including retail, manufacturing, ageing and health, sustainability, engineering and IT. The creation of student spin-offs is a secondary objective to developing the entrepreneurial capacity of the student. The process focuses on providing types of business support to student entrepreneurs either based on their research or other ideas through a team of externally bought in business advisers. It is not a well-funded process. In 2011/12, the incubator's total expenditure for its activities included £87,000. Student entrepreneurs have limited access to financial resources including £250 pre-start and post-start grants. While the process maintains a physical space which students have access to, the process is not focused on physical incubation of student entrepreneurs. Incubator management actors include the Director of the incubator, other internal business advisers and external business advisers.

4.2.1 Incubation process

There is little known about student incubation processes and how they function as most student entrepreneurship literature focuses on entrepreneurship education. The findings from the analysis of the student incubation process analysed in this thesis suggest that the process is only a function of a *business support process*. There is no selection process to the student incubation process but rather the process is open to graduates for life and to current students. The reason for the lack of a selection process is tied to the primary objective of the incubator which is about building the entrepreneurial capacity of the student entrepreneur rather than focused on new start-up creation which is a secondary objective. This point is discussed in more detail in the incubator type section (see section 4.2.2)[24]. Additionally, the lack of selection process is also influenced by the incubator management actor's perception that selecting "winner" ideas at the outset is not possible. One incubator management actor highlighted this point when he noted:

> *"It's not my job to tell somebody to do this and do that, or don't do this and don't do that particular idea. That would be me playing God and I'm most certainly not that".*

The repercussions of the lack of selection process on the student entrepreneur is that the entrepreneur felt there was less credibility as any student could be supported by the process. It also did not give the student entrepreneurs confidence on their ideas as they had not been selected to be supported. The majority of student entrepreneurs explained this point:

> *"I do remember being surprised on how little analysis of the idea there was. I sort of got the impression that if I had come along and said I wanted to be a rat catcher they would have been very keen to support that".*

Essentially, the student incubation process begins with a business support process which is not a formal process where students are physically incubated in an incubation space over a period of time[25], but rather the process is a mechanism by which students are provided and referred to types of business support depending on their needs. This means that the business support process is utilised to accommodate the student entrepreneurs who may be at different stages in the development of their ideas whereby not every

[24] While it was found that there is no selection process to the student incubation process, there are selection processes and decision points throughout the business support process which are discussed in the text.

[25] Physical resources such as an incubation space including computers, phones and white boards are available to students on a need-to-need basis.

student entrepreneur has to engage with all types of support or follow one process. This is further explained by one of the incubator management actors:

> *"Some people begin their journey at A, others come in and they're at W and anywhere in between, and sometimes people come in at V and W who you actually have to take all the way back to A, because they think that they're ready to start up but what it turns out, they haven't actually done a great deal of market research whatsoever".*

The incubator management actors include the Assistant Director of the process, development officers, business advisers, entrepreneurs in residence (EIR) and student interns most of whom do not have prior entrepreneurial experience. Development officers provide development support to the student entrepreneurs. Business advisers are external contract-managed actors that are trained business advisers. EIRs are private sector individuals that are recruited and retained on the back of expertise and experiences in the areas that student entrepreneurs start businesses. The lack of engagement with actors with prior entrepreneurial experience negatively affected the student entrepreneurs and their "readiness...for co-production" (Rice, 2002:179) as the student entrepreneurs are more receptive to people with business experience. The majority of student entrepreneurs explained this point:

> *"They put us in touch with X* (EIR)*...really genuine helpful guy with a reason to listen to him. He has got a successful background. When someone has got that you instantly respect what they say".*

The process begins with student entrepreneurs taking part in an initial face-to-face meeting [26] with incubation actors where the student entrepreneurs are given an introduction to what support is available. The student entrepreneur's role in the initial meeting is to talk through their business idea. Depending on their ideas, the student entrepreneurs are asked to look at the market to assess further their ideas or those with more well-established ideas are asked to develop a business plan to be able to apply for a grant from the university and/or enter into the university's business plan competition [27]. Students with specific needs outside of what the student incubation process can provide, such as software development, are immediately referred to external organisations that are able to provide more tailored support. The majority of

[26] While the process usually involves a face-to-face to meeting, when that is not always possible, it may sometimes involve email contact or a phone call.

[27] At the time of interview, one incubator management actor explained that the business plan competition was going to be phased out to focus resources on more growth type support.

entrepreneurs explained that the initial introduction meeting involves the introduction of the business idea and types of support the process could provide:

> *"It was about ½ hour meeting just introducing the idea describing our product, the business as we saw it and how it would work and its benefits, it flaws that we saw, initial thoughts on how we can get funding and things".*

For the student entrepreneurs who were asked to write a business plan, the business support process involves continuous face-to-face meetings to receive feedback on the business plan until it has been completed. The business plan is then entered into the university's business plan competition or used to raise finance. The business plan competition, although award focused and meant to be an awareness raiser, helped the student entrepreneurs formalise their ideas and forced them to go forward with their ideas. If the student's ideas were well received at the university's business plan competition, it led to a sense of legitimacy, press exposure, financial reward, referral to regional competitions and provided access to other business support organisations. The benefit of participating in the university's business plan competition was highlighted by many of the entrepreneurs:

> *"The business plan competition helped me focus…So I think the competition was probably a watershed because I had to step up to the plate and it* (the business idea) *was well received and that led to a sense of legitimacy".*

After the business plan competition, the student entrepreneurs receive business support as and when they need it. This type of support may include learning resources (e.g. workshops on how to start a business), financial resources (e.g. £250)[28] or pre-start and post- start grants, physical resources (e.g. incubation space with computers, printing, meetings room and phones), business development resources (e.g. business guidance around the process of setting up a company and how to write a business plan) and network resources (e.g. access to networking events and introductions to venture capital firms). One of the most beneficial types of support is intangible resources such as encouragement to continue to progress their ideas. Many of the student entrepreneurs highlighted the benefit of intangible resources:

> *"I think more of the benefit I received was...the intangible sense of investment from the Enterprise Centre that gave me a sense of legitimacy to keep plugging ahead".*

[28] To mitigate risk to the university, there is a selection process for the student entrepreneurs to receive financial resources.

While the interaction between the student entrepreneur and incubator management actors can be a onetime formal or informal interaction or many interactions across a period of time, the interactions are "reactive crisis intervention" or interaction of a limited duration instigated by the entrepreneur to request help with a particular issue. This negatively affected the student entrepreneurs as it meant incubator management are less proactive in engaging with the students and managing the development of their spin-offs. One student entrepreneur who had received support from the student and regional process explained the difference between the two types of interactions and how he benefited more from the latter:

> *"It is actually a little bit of a pity for the Enterprise Centre that I got involved with Science City* (the regional incubator) *because Science City by far and away has been the best support…I worked with X who was my business adviser...and his process because he does project management was just so much more process-orientated, deadline-based, milestone-based. He was on our backs hounding us to do it...it was exactly what…I needed because we were...doing different stuff, an actual focus is not something you get from the Enterprise Centre particularly whereas in comparison to Science City. Much more focus and also having someone like X dotting around every now and again and talking about...what do you want to get out of this".*

Overall, the process is highly reliant on external actors who come in to the incubator's incubation space to provide support to student entrepreneurs and to refer them to other external actors. The benefit the student entrepreneurs gain from engaging with external actors with business knowledge was highlighted by the majority of student entrepreneurs:

> *"X person who is available to bounce your ideas...to help focus it down from someone with experience...was useful".*

However, some student entrepreneurs highlighted that they felt that they were referred to external actors as the student incubation process did not have the expertise to provide them with the right type of support. Some student entrepreneurs explained this point:

> *"They weren't experienced enough and that is why they passed on to X organisation who did have the expertise so they knew their limitations if that makes sense".*

For student entrepreneurs with start-ups based on their research, it was found that the support provided by the process was too generic and unhelpful as it was not sector-specific. Some of the student entrepreneurs demonstrated their frustration with the generic support:

> *"They didn't have much experience with science companies...it was just very generic information we received...So it was the very normal how to write a business plan. It*

could have come from any text book but it wasn't science-orientated...They didn't understand the technology behind our idea. They really didn't know how you would progress with a scientific idea, what stage of development was required, what funding is required...It was very much blind leading the blind".

Additionally, the business support did not focus on providing the student entrepreneurs with knowledge on how to grow their businesses. This negatively affects the student entrepreneurs as they are not instilled with the mentality and skills to think long term. Many of the student entrepreneurs explained this point:

"They are very much looking at a spin-out from a University like starting little and gaining enough money…there wasn't the kind of long high growth plans that are instilled by the Enterprise Centre (student process)*, it is more how can you sustain yourself".*

One of the incubator management actors acknowledged that he was aware that the process needed to make changes to accommodate higher growth, science-based/technology ideas. This was explained by his comment:

"We're trying to recognise the fact that people's aspirations are growing. They're wanting to set up stuff that involves technology, that has growth as a key part of the plan and model and therefore we've had to respond by introducing things like the investor panel, the Rise Up Pitch. We'll try and show that we can be of benefit to you if you've got a growth aspiration because why the hell would you go to the Careers Service if you wanted to introduce a new health food supplement or wanted to sell a particular brand of tea bags around the world? That's where our problems are, if I'm honest".

It was also found that other incubatees in the student incubation process played a limited role and the relationship with the entrepreneur is not as sophisticated as previous research in the general incubation literature indicates. Many of the student entrepreneurs explained the limited relationship with other incubatees during the process:

"Because the businesses are so varied it was difficult to take direct experiences and transfer them".

For most of the entrepreneurs, there is a point where the business support that is needed is beyond what the student incubation process can offer. As a result, the student entrepreneurs have to seek out more experienced people in their field to whom they are often referred by incubator management actors. The majority of student entrepreneurs highlighted the need to reach out to external people for more experienced support:

"The Careers Service (the student incubator) *becomes, not redundant but the help that is needed is perhaps beyond what they can offer...you are best off talking to more experienced people in the field and the Careers Service will put you in touch with them as well".*

It was highlighted by incubator management actors that the process is changing as a result of learning (a theme not yet discussed in the incubation literature). It was found that the stage of idea was being matched with the internal incubator management actor the entrepreneur would speak with as the business support process has become much more structured based on a referral system. More developed ideas were getting referred to more experienced actors such as business advisors or EIRs while less experienced ideas get referred to less experienced actors or development officers who use a coaching approach to help the students better form their ideas, establish goals and a set of purposes of why they are interested in starting a business. The process is changing to enable more experienced actors to engage with more developed ideas which is a better use of their time. This is also discussed in the next section (see section 4.2.3). These changes are also a result of resources and input and experience from external actors that are highly involved in the process. This is reflected in one incubator management actor's comments:

> *"This whole process kind of follows a similar process that we used to do at X organisation, and I remember having a conversation with the Assistant Director about that whole process, and out of that I think evolved this process at Newcastle University".*

Additionally, the incubator management actors also recently introduced an advisor and investor panel made up of regional actors. These panels were introduced to enable student entrepreneurs with high growth ideas (as discussed above) to pitch their ideas to receive feedback and to be able to refer student entrepreneurs to funding actors such as VCs[29]. The student entrepreneurs that went through the panel highlighted its benefit:

> *"I found it the most useful thing that could have happened at that time because of where it led to because without that I wouldn't have got networked with X who has networked me with a lot of other people".*

There is no official end to the student incubation process as student entrepreneurs are able to engage and receive support continuously from incubator management actors post-start-up. From the incubator management perspective, continuous engagement is important for the benefit of the University and the region. This is discussed in detail in the next section (see section 4.2.2). From the student entrepreneur's perspective, while they move on to other support organisations and receive guidance from regional actors outside of the process, it was found that some entrepreneurs have a desire to continue

[29] To mitigate risk, there is a selection process for student entrepreneurs to be able to pitch their ideas and to engage with the investor panel which is judged by incubator management actors.

their relationship with actors from the student incubation process as it enables them to have someone to call when they have questions. The next section will discuss how the incubator's objectives and resources affect the regional incubation process.

4.2.2 Incubator's objectives and resources

The second construct analysed in the student incubation model is the incubator's objectives and resources. The objectives of the student incubator is to first develop the entrepreneurial capacity of the student or their social capital, second, to create new start-ups and third, to maintain an ongoing relationship between the student entrepreneur and Newcastle University to develop the region. The process is funded by public sector resources from Newcastle University. The findings from the student incubation process suggest that the incubator's objectives affect the processes lack of selection process, how incubator management actors engage with student entrepreneurs, how the student incubation process is structured and the time frame of the process. In addition to the objectives, it was found that the incubator's financial resources and larger University's objectives and policies also determine how the process functions. These points are discussed in detail below.

The student incubation processes primary objective to develop the entrepreneurial capacity of the student entrepreneur rather than focusing on creating new start-ups means that there is no selection process to the student incubation process. The process is open to any current student or graduate. For the student entrepreneurs, this means that there are low barriers to engage initially with the process with any business idea and there is less credibility from being supported by the process. The objective of developing the entrepreneurial capacity of the student also affects how incubator management actors engage with student entrepreneurs. During the process, student entrepreneurs receive a *"coaching"* type of support or *"duty of care"* (a theme not yet discussed in the incubation literature) to provide the student entrepreneurs with a long-term perspective on the challenges of starting a business. The incubator management actors were finding that student entrepreneurs would start up businesses without considering the personal impacts and, therefore, would not last for more than a year. The duty of care type of support is explained by one incubator management actor:

> *"When you're given this with students in particular, you have to be a little bit more cautious...because we have a duty of care, and you have to kind of make the students realise just what they're potentially getting themselves into, whilst encouraging them to explore self employment, not to just tear off down the road and do it. In some ways*

the University has to act as the parent, and we can't just have people going off and potentially making decisions which could impact badly on the next five, six, seven years of their lives".

The objective of developing the entrepreneurial capacity of the student entrepreneur also affects how the student incubation process is structured which is in partnership with external regional organisations and actors. Most of the process is delivered by external actors to build the social capital of the student entrepreneur (a theme not yet included in incubation process models). One incubator management actor highlighted this point:

"Our ethos here is about each step of the way trying to build a client's social capital as well as any skills or competency or confidence. So the whole spectrum is delivered in partnership with people who have done it and been there or supported someone who has been there and done it in some specific way".

Another objective of the student incubation process is to propagate a *"cycle of life"* or an ongoing relationship between the student entrepreneur and the University where, potentially, the student entrepreneur continues to engage with the University in recruiting graduates, commissioning contract research, sponsoring PhDs and inspiring the next group of student entrepreneurs. This objective affects the time frame of the student incubation process which has no clear end as a way of continuing the relationship and propagating the "cycle of life". This means that the student entrepreneurs can continue to receive business support as and when they need it. The majority of student entrepreneurs highlighted that they continued to engage with the process post start-up:

"They were very keen to know how we were doing. There was a very lovely lady there...She used to ring up and make sure we were ok. We used to pop in and see her and keep her informed. They certainly didn't wash their hands of us 'cause we had moved on. They were very, very supportive".

Along with the specific incubator objectives, it was also found that the incubation process is affected by the larger university's objectives and policies in which it is based. The University's charitable aim and approach to risk-aversion (a theme not yet discussed in the incubation literature) affects the type of business support that the student incubation process provides which includes pre-start support. One such example is access to £250 pre-start and post-start grants which, according to incubator management, is not the kind of sums that could be misconstrued as the university investing but rather is about building the student's entrepreneurial capacity. The above affects the student entrepreneurs and their ability to acquire necessary funds during the business support process to develop their spin-off. Student entrepreneurs have to *"pool*

money" from different sources which is a long process. The majority of student entrepreneurs explained the negative aspects of only focusing on the pre-start support:

> *"They are very much looking at…starting little and gaining enough money…£250 to do this whilst it is useful it is a really small way of thinking about it. It is taking companies a long time like it took X company a long time to get their money because they were pooling money from like competition wins, different things like that and it is just like a long drawn out process".*

Apart from the University's objectives, its policies also affect the student incubation process. The University's financial regulations about accessing equity finance means that the incubator management actors can only act as an intermediary in certain exchanges when providing support to the student entrepreneurs rather than actively engage in the support process. One such example highlighted by incubator management is the interaction that takes place between the student entrepreneurs and venture capitalists. The incubator management actors can only be a host for that relationship to flourish rather than take investability decisions or enable venture capitalists to offer student entrepreneurs funding during their investor pitch panel. One incubator management actor explained this policy and how it affects the process:

> *"Legally we can't be involved in the brokerage of equity finance as we don't have Financial Services Authority approval. So the pitch represents an introduction to the people with access to the money, not the money directly".*

The University's policy around IP also affects the student incubation process as post-graduate student entrepreneurs' research is automatically assigned to the University. As a result, student entrepreneurs who aim to start businesses linked to their research are required to engage with the TTO to discuss the IP rights and evaluate if the student entrepreneur can be supported through the University incubation process. This interaction was described as a negative experience by the student entrepreneurs as they felt that their ideas were not valued or encouraged by the larger University. The student entrepreneurs that were required to engage with the TTO highlighted the difficulty they encountered:

> *"We went to the University IP people. They were like it is nothing to do with us we can't help you. We thought they would and we were quite willing to work with them and potentially to give the University some share if they would help us with it. They just washed their hands of us which the Careers Service was quite surprised about I think".*

Incubator management actors from the student process are also negatively affected by the University's IP policy as they find it difficult to balance the needs of the University

and the needs of the student entrepreneurs. One incubator management actor explained this point when he noted:

> *"Most, if not all, post-grad researchers now agree to assign their intellectual property rights to the University if asked to do so. That can lead to circumstances in which* (incubator management actors) *find themselves conflicted because they're often arguing against the view of their employer as to who owns what".*

When looking to the incubator's resources and how the resources affect the student incubation process, it was found that the process has limited resources which affect how it functions. First, the limited resources affect the quality of business support that the student entrepreneurs receive as a better resourced process would enable more one-on-one support. One incubator management actor highlighted the lack of resources and how it affects the quality of support when he noted:

> *"When anybody asks me what's missing I often hear it as 'what do you need?' and my immediate answer at the minute is people. The number of businesses we support is defined by the number of staff we have to support them. More development officers means more people get the one-to-one support they need that makes the difference, that they actually see their idea through".*

Second, limited resources also affect how the incubator management actors are utilised during the incubation process. More experienced incubation process support staff, such as business advisers, are utilised later in the student incubation process to ensure that they end up with a caseload of students and graduates who are more likely to start up rather than engaging with less advanced student entrepreneurs. This means that it is a better use of their time from the University's point of view as they are looking at best use of money. One incubator management actor explained this point when he noted:

> *"So rather than have us dealing with...everybody, we're dealing predominantly with people who...are going to go self employed, so the University naturally in these times of austerity and cost cutting and looking at value for money...the University doesn't want us dealing with a lot of people who may be at a very, very pre-start level. They'd rather we were at the other end of the journey, getting people into self employment"*

The next section will discuss the role of the RIS in the student incubation process.

4.2.3 The role of the RIS

The third construct analysed is the RIS which is a combination of the role of regional organisations/actors and the regional socio-economic and cultural setting. The student incubation process utilise regional organisations/actors (mostly public sector organisations) of the RIS. The process buys in business advisers from a regional organisation with business support experience to compensate for its lack of internal

knowledge. Business advisers from public sector regional organisations are key actors delivering business support to the student entrepreneurs during the process. They bring value for the student entrepreneurs as they are also dealing with other businesses across the region which contributes to the student entrepreneur's social capital. In addition to the business advisers, there are contracts between the student incubation process and EIR or regional actors with business start-up expertise in specific sectors to provide business support to the student entrepreneurs. The role of these external regional actors was highlighted by the majority of student entrepreneurs:

> *"He talked me through how to register as a sole trader and what the differences are between a limited company and a sole trader, at what point I should think about becoming a limited company...just general business advice".*

Second, apart from the bought-in services from regional actors, the process also relies on other regional public sector business support organisations to provide student entrepreneurs with business support. These organisations have strong links with the incubator and are referred to the student entrepreneurs by incubator management actors as another business support resource. The help from these support organisations was explained by the majority of student entrepreneurs:

> *"We have received support from X organisation as well who have been very useful. We have got some very good...advisers that tell us what funding is available to us and help us with those applications...so that has been really useful".*

Third, regional organisations provide training opportunities for the student entrepreneurs to develop their social capital which includes weekend courses, workshops and seminars covering aspects of business topics. One type of workshop is an evening event where local entrepreneurs discuss their success stories. Business development managers from the University are also invited to present to student entrepreneurs on courses that are arranged by the student incubation process on business topics such as the ins and outs of the patent process. This is to develop the student entrepreneur's entrepreneurial knowledge (a theme not yet included in incubation process models). The benefit of these types of seminars was expressed by many of the student entrepreneurs:

> *"I have been to a couple of seminars...management training on how to start your own business and mainly arranged through X organisation so they have been pretty good as well with those training programmes".*

Regional firms also sponsor regional competitions and awards. These awards include funding or free support from regional organisations which helps the student

entrepreneurs acquire services at an early stage which they otherwise would not be able afford. The funding from awards and prizes also gives the student entrepreneurs an intangible sense of investment and sense of legitimacy to keep moving ahead with their business idea. Regional actors such as senior partners of venture capital firms also act as judges at these competitions. The student entrepreneurs who received awards highlighted the benefit of the award funding:

> *"We won the X award...and...one of the sponsors of the thing was X a legal firm and they offered us basically £1,000 of free legal work...we kind of just got a bit lucky in the fact that we could get free stuff because we had won an award".*

Fifth, the student entrepreneurs utilise regional firms and actors in a similar industry to legitimise their ideas and to influence other public sector regional organisations to engage with their businesses. This was highlighted by some of the student entrepreneurs:

> *"So how do I put it, she was an example of how I sought buy in from sources external to x organisation...She gave...legitimacy to us...I think she probably contributed to PR".*

Seventh, student entrepreneurs utilise regional firms as service providers to develop their business ideas. These regional organisations include law firms, market research organisations and business development organisations. The transaction between the student entrepreneurs and regional organisations are not paid transactions but is rather a free transaction where the regional organisation gives the incubation process 10 to 20 hours every year of free support for students and grads. The rationale for the free support is that external organisations benefit from their connection to the University. The majority of student entrepreneurs highlighted how they benefited from engaging with regional service providers:

> *"The Careers Service initially brought in an IP expert for us so again they were wonderful...and we went through who would own what. If this idea worked, it was a million pound business. It was huge".*

Regional actors from firms are also utilised by the student entrepreneurs as mentors during the student incubation process. The mentors provide general advice, tips on engaging with venture capitalists and business guidance. The mentorship relationship was expressed by the majority of student entrepreneurs:

> *"X person* (mentor) *advised me that I wasn't ready to do the pitch and both him and X person have said that these kind of people that have got money to invest...when you see them for the first time, you want to say the right things the first time around,*

otherwise they might not want to look at you seriously the next time so they said we need to tighten things up on your business plan and get a team together before we actually approach investors".

Eighth, in addition to the internal incubation space provided by the student incubation process, public sector regional organisations also provide free office space for the student entrepreneurs which they utilise during the student incubation process. The student entrepreneurs that utilised the free space highlighted its benefit:

"We had a free office for a year in Gateshead. They (the student incubation process) *have an agreement with X organisation. There is one office available which can fit a few start-up companies in. It is quite a large office...We had an office for a year rent free with laptops provided, a printer, internet access everything you need".*

Finally, regional actors from public sector regional organisations such as business advisers provide feedback to help improve the student incubation process. These regional actors attend key monthly incubation process meetings and are invited to contribute their opinions on topics such as how to improve the process and new systems to introduce. An incubator management actor highlighted this point well when he noted:

"Things just seem to crop up in team meetings that they ask our opinion on, because we do get to attend the key meetings that are held, usually once every month at least, we're invited to contribute to anything that crops up in those meetings".

It was found that incubator management actors *strategically* utilise regional organisations/actors to contribute to internal panels that provide advice to the student entrepreneurs to help them develop their spin-offs, to provide support and feedback to improve the process and to acquire free services. The strategic use of regional organisations/actors is specifically important for the student process as it reduces transaction costs which is essential for a process with limited resources. Student entrepreneurs are less strategic in their use of regional organisations/actors as a result of their lack of entrepreneurial experience and networks and are more reliant on actors from the process to provide support and direction on who to engage with. This will be discussed in more detail in the entrepreneur type section below. Finally, it was found that the process was highly dependent on regional organisations/actors to function as the business support process is mostly delivered by bought in external regional actors that provide business support to student entrepreneurs. This was discussed in the above incubation process section.

Apart from regional organisations/actors, it was found that the regional socio-economic and cultural setting of the RIS, which has not yet been discussed in the incubation

literature, also plays a role in the student incubation process. While it was found that regional organisations/actors are utilised by entrepreneurs during the incubation process (as discussed above), the level of the openness of regional organisations to engage is low. The student entrepreneurs expressed that they were kept at arm's length by public sector regional organisations which were inflexible and not interested in small businesses. This made it more difficult for the entrepreneurs to develop their businesses during the student incubation process. The majority of student entrepreneurs explained this point:

> *"X organisation, as far as I can tell...are not interested particularly in small businesses. They don't return phone calls I mean I tried to get in touch with the people that manage the internet for schools the people that manage the learning platforms and stuff don't get any calls back. I don't think they are particularly interested".*

The mentality of regional organisations/actors, also affects the way student entrepreneurs engage with regional organisations. Privately-owned regional businesses and actors were not open to innovation and engaging with the student entrepreneurs. In one case, a regional organisation did not want to engage in developing products for a student entrepreneur's idea as it required them to develop things outside of their normal product development processes. Many of the student entrepreneurs explained the difficulty of engaging with regional organisations/actors:

> *"They weren't really interested in helping me out...because I was wanting new things, they didn't really want to change. They didn't want to do new things".*

The entrepreneurial spirit, another element of the regional socio-economic and cultural setting of the RIS, also plays a role in the student incubation process. It was found that the region lacks an entrepreneurial spirit. The lack of entrepreneurial spirit negatively affects the student entrepreneurs while they are in the incubation process as the student entrepreneurs are surrounded by individuals with low aspiration levels. The interaction with these individuals is discouraging for the student entrepreneurs while they are trying to start a business. This was explained by many of the student entrepreneurs:

> *"I actually think as a region people...the aspiration levels are very low which is a general problem, not just for business start-up. And so when you are surrounded by people with low aspirations, they either have all the capacity to do something but don't think big enough or are too quickly to put you down when you are trying to think big both of which are bad when you are trying to work in business".*

Access to networks, which is the fourth element of the regional socio-economic and cultural setting of the RIS, also plays a role in the student incubation process. The

student entrepreneurs leverage regional networks and events to engage with existing companies, venture capitalists and potential customers. The student incubation process also utilises the regional support network to support the student entrepreneurs during the process and to build their social capital. An incubator management actor highlighted this point when he noted:

> *"We see that there's value for our clients dealing with people who are also dealing with other businesses across the region to build up that social capital and those networks, that support network so we buy those in".*

Access to regional finance, another element of the regional socio-economic and cultural setting of the RIS, also plays a role in the student incubation process. During the student incubation process, student entrepreneurs are exposed to regional actors/organisations such as banks, VCs and business angels through introductions by incubator management actors at networking events or through the processes investor panel. Exposure to regional finance organisations and actors throughout the process made it easier for the student entrepreneurs to engage with these actors as it means that the students are less of a stranger to the regional finance community which was more helpful when it comes to pitching for investment. Many of the student entrepreneurs explained this point:

> *"So through being with the Careers Service and going to the networking events that they held we were already known to the venture capital firms which I think is very helpful when it comes to actually pitching for investment because they obviously need to know that you have a very good track record, you are not just a stranger".*

The quality and availability of regional talent, the last element of the regional socio-economic and cultural setting of the RIS did not play a role in the student incubation process. The next section will discuss how individual entrepreneurial characteristics of the student entrepreneurs affect their incubation journey during the student incubation process.

4.2.4 Entrepreneur type

The fourth construct analysed is the entrepreneurial characteristics of the student entrepreneurs which are further defined by entrepreneurial experience, industrial experience, education and family background. When looking to entrepreneurial experience, it was found that all student entrepreneurs (except one) did not have prior entrepreneurial experience which negatively affected how they progressed through the student incubation process. First, student entrepreneurs with no prior entrepreneurial

experience had less confidence during the process as they felt that they were not attuned to business terminology and were naive to important business concepts. The majority of student entrepreneurs explained this point:

> *"I had no business experience...It was a bit unnatural to me at the time talking about balance sheets etc".*

The lack of confidence means that the student entrepreneurs require the legitimacy of external experienced business people to continue to develop their ideas. They also need more support during the process from the incubator management actors and from external regional actors that are able to work as part of the student entrepreneur's team to develop the business. This was highlighted by the majority of student entrepreneurs:

> *"I was kind of grappling in the dark a little bit. I didn't have the experience, the language and even social enterprise in itself as an entity as a concept, was still only really developing itself...So there was a lot of vagueness and I think that the Enterprise Centre to their credit overcame this...they kept me on their books and gave me a hell of a lot of support".*

Second, student entrepreneurs that lacked prior entrepreneurial experience did not have developed networks and know who to engage and when to engage with them during the process to develop their ideas. This was reflected in the majority of student entrepreneurs' comments:

> *"I think one of things that is hardest when you are starting up a business is knowing the right people to speak to and when and I think that is almost impossible and...I think there were some times when I was speaking to certain professionals at way too early a stage and it wasn't necessarily useless...it could have been more useful if I had waited another couple of months".*

As a result, the student entrepreneurs rely more on incubator management actors and external actors they engage with through the incubation process to direct them to the right contacts. The majority of student entrepreneurs explained this point:

> *"We are two guys still not massively clued up on business stuff and even just who would you talk to for this who would you talk to for that. You could always go and ask one of the people in the Careers Service and they would be like right, well we will find the right person".*

When looking to industrial experience, it was found that prior industrial experience in the same sector the entrepreneur is starting a business positively affects how the entrepreneurs progressed through the student incubation process. First, student entrepreneurs with prior industrial experience in a given sector are more easily able to recognise opportunities in those sectors which means they came to the student

incubation process with a more solid idea to develop. This was explained by the majority of student entrepreneurs with industrial experience:

> *"Having worked at X organisation full-time doing research into techno-economic modelling for pre-commercial demonstrators I thought there has got to be an angle here. I thought there is the emergence of offshore renewable and the money that was going into X organisation. I reported to the commercial director at X organisation so I learned a few things there. I thought tall ships could catalyse cross-sector engagement into the potential for the offshore renewable sector to bring new growth to the North East...Because I worked at X organisation I had this technical insights/commercial insights".*

Second, student entrepreneurs with prior industrial experience are able to access resources more easily during the process as they have built up their own networks and could tap into those networks during the process. This was highlighted by the majority of student entrepreneurs with industrial experience:

> *"My former boss who was the commercial director of X organisation was a mentor informally. We would go for a pint every now and then and have a chat".*

Third, student entrepreneurs with prior industrial experience are more confident in their needs when engaging with the incubator management actors and external organisations and are able to communicate their needs with more clarity to these actors. This was explained by many of the student entrepreneurs with industrial experience:

> *"It* (prior industrial experience) *may have benefited me in understanding and undertaking a way forward in establishing a business, which may have subsequently provided clarity in knowing what I wanted when speaking to Careers along with other support partners".*

When looking to education, it was found that prior education affects student entrepreneurs during the process. First, as student entrepreneurs received their education from the University the student incubation process is based within, they have more confidence during the process as they are familiar with the North East region having recently spent time at the University as students. The student entrepreneurs were also more confident to attend University entrepreneurial events. This was reflected in many of the student entrepreneurs' comments:

> *"I felt like I could go to this make it fly thing because I had been a University student and knew Newcastle".*

Prior education also enables the student entrepreneurs to access resources more easily at the University, know who to contact and not contact at the University with developing their businesses. The majority of student entrepreneurs highlighted this point:

"I think for us yes because we were setting something up for the University and we obviously as Newcastle graduates I think that helped us massively. I think if we were two random guys from the South who had just chosen Newcastle for the uni that we wanted to set up at I think we would have struggled but the fact that we had graduated a year before and won awards at the University's business awards I think it massively helped us get it into the University".

Second, prior education, specifically a PhD, helps the student entrepreneurs gain access more easily to resources they need during the process as it gave me them more credibility with external actors. This was reflected by student entrepreneurs with PhDs:

"A doctor before your name trades very, very well. Instantly. It opens doors more than it would otherwise because they assume someone with a white beard very intelligent is going to come in".

Apart from prior entrepreneurial experience, industrial experience and education, the family background of student entrepreneurs was also found to be important during the process. All student entrepreneurs stemmed from families with businesses. First, student entrepreneurs coming from a family background of self employment, such as a family business, also affects whether they start a business as it made the concept of being in business a legitimate career possibility. This point was highlighted by one incubator management actor who was exposed to many groups of student entrepreneurs:

"I think that we see a lot of students who go self employed seem to have a family background of self employment, either with a parent or a sibling, but normally somebody quite close to them. It seems to be quite a common trait at Newcastle University...it is something I've noticed over the last four and a half years here".

This was also reflected by the majority of student entrepreneurs:

"I think my father setting up his company...seeing it grow made me realise that you can start a business. From a young age, that has probably had an effect".

Second, student entrepreneurs with a family background of self employment have more confidence during the process as they receive intangible support such as encouragement from the family member involved in a business. The student entrepreneurs are also more familiar with the fluctuation of the *"ups and downs, successes and failures"* which means they are less affected by the highs and lows during the process. The majority of the student entrepreneurs highlighted the confidence aspect:

"That is purely because of the background of X (stepfather) *who gave me that you can be more business-like".*

Third, student entrepreneurs with a family background in self employment also utilise their family's knowledge as a resource during the process. This was highlighted by the majority of student entrepreneurs:

> *"My stepdad helped an awful lot...in actually helping us develop the business plan. He gave us the guidance what to do forecasting which was very difficult for us to get our heads around".*

Finally, from the incubator management perspective, student entrepreneurs with a family background in self employment are more appreciative of the incubation processes resources. This is reflected in one incubator management actor's comment:

> *"It* (family background in self employment) *makes them more appreciative of us I think, because they know what the end goal is likely to be. They can see a point in it. Other people who maybe toying with starting a business but aren't really that serious about it or haven't got that commitment to it will at some point in the process just pretty much down tools and give up on it, or they'll say 'I can't see the point of the business plan' or 'I can't see the point of the cash flow forecast'. Those with a background in self employment, they can see the benefit of that most of the time".*

Overall, the student entrepreneurs found it difficult to adapt to the role of an entrepreneur during the process which meant they could be less proactive and less easily develop their spin-offs. The next section will briefly summarise the findings from the student incubation process.

4.2.5 Summary

The above section shed light on the student incubation process in relation to its incubation components and how they function, the incubator's objectives and resources and how they affect the process, the RIS and its role in the process and the entrepreneur's background and experience and how that affected how their incubation journeys (see Table 4.3 for overview of the main findings). The student incubation process is a mechanism by which any student entrepreneur with any idea is provided and referred to types of business support depending on their needs. There is no selection process to recruit student entrepreneurs. The repercussions of the lack of selection process on the entrepreneurs is that they felt there was less credibility as any student entrepreneur could be supported by the process and as a result felt less confident with their ideas. The business support process is not one process that every student entrepreneur has to engage with which means the interactions between the student entrepreneur and incubator management actors can be a onetime formal or informal interaction or many interactions across a period of time. However, it was found that

Original constructs	**Student Incubation Process**
Incubation process	*No selection process* *Business support process* - Most actors delivering support do not have prior entrepreneurial experience - Support delivered in one type of co-production modality - Student entrepreneurs are not 100% physically incubated - No availability of innovation resources
Incubator objectives and resources	New venture creation is secondary objective Not a well-resourced process
The role of the regional environment	*Regional organisations* - Mostly used public sector regional organisations -Strategically utilised regional organisations -Highly dependent on regional organisations -Transaction costs for student entrepreneurs to engage with regional organisations is free *Socio-economic and cultural setting* - Regional organisations not open to engage with student entrepreneurs because of their student status - Lack of entrepreneurial spirit meant student entrepreneurs surrounded by individuals with low aspiration levels - Lack of regional talent did not affect student entrepreneurs
Entrepreneurial characteristics	- Student entrepreneurs are homogeneous in relation to no prior entrepreneurial experience - Student entrepreneurs are heterogeneous in relation to their industrial experience and are positively affected by prior consonant industrial experience - Student entrepreneurs are positively affected by their education; education indirectly made them more familiar and confident with the university and the region - Student entrepreneurs were homogenous in their prior family backgrounds in business and are positively affected by their prior family backgrounds in business

Table 4.3: Summary of findings from the original constructs and the student incubation process (Author's own)

internal actors are engaging with the student entrepreneurs in mainly one-time of co-production modality (e.g. “proactive crisis intervention”) instigated by the entrepreneur which negatively affects them and potential new venture creation during the student incubation process. Additionally, most incubator management actors do not have entrepreneurial experience which negatively affects the student entrepreneurs and their willingness to engage during the incubation process.

The incubator’s objectives and resources were found to affect how the incubation process functions and potential new venture creation. The creation of spin-offs was a secondary objective to the developing the entrepreneurial capacity of the student entrepreneurs which meant that the student incubator allocated limited resources to the process. Student entrepreneurs had to pool different sources of funding to accommodate the processes’ limited financial resources negatively affecting potential new venture creation. Other objectives of the process also affected the lack of selection process, how incubator management actors engage with student entrepreneurs, how the process is structured and the time frame of the process.

Apart from the use of internal knowledge and actors, it was found that the process also heavily draws from the RIS in which it is based. Incubation management actors utilise regional actors to provide support to student entrepreneurs to build their social capital and to provide feedback on the process. Student entrepreneurs also draw from regional organisations and actors of the RIS as a resource to bring legitimacy to the student entrepreneur’s ideas, as a resource for incubation/office space, as service providers, as mentors, to work as part of their teams, to acquire funding from regional competitions they sponsor and to learn from regional workshops they sponsor. The more regional organisations and actors enabled business support processes through the provision of resources, the more likely success of potential new venture creation in the context of the incubation process. The student process was found to utilise strategically and had a high dependency on regional organisations and actors.

The regional socio-economic and cultural setting of the RIS was found to affect negatively the way entrepreneurs progress their ideas during the process as they engage with regional organisations that are not open to innovation and are surrounded by individuals with low aspiration levels as a result of a non-entrepreneurial regional spirit. The regional socio-economic and cultural setting of the RIS also provided the student

entrepreneurs with networks which they leverage to develop their ideas and access to regional finance.

The student entrepreneur's experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affected them during their incubation journey. All student entrepreneurs (except one) did not have prior entrepreneurial experience which negatively affected the way they were able to progress through the incubation process. They had less confidence and networks and were overall more dependent on the incubation process for support. Industrial experience in the same sector the entrepreneur is starting a business also positively affected how the student entrepreneurs progressed through the process facilitating opportunity identification, access to resources and confidence during the incubation process. The student entrepreneurs were indirectly affected by their education which provided them with more confidence as they were more familiar with the region having spent time at the University and were more easily able to access university resources. All student entrepreneurs were positively affected by their family backgrounds during the process which accommodated for their lack of entrepreneurial experience.

Apart from the above findings, five other inductively-derived constructs (risk aversion, incubation management learning, social capital, entrepreneurial knowledge and duty of care) were found to be important for explaining how the student incubation process functions (see Table 4.4 for an overview). The process was found to have a predominantly medium approach to risk aversion by controlling the financial exposure to the university limiting funds to the student entrepreneurs. There was some evidence of incubation management learning for the process to improve the overall incubation journey for the entrepreneurs. The development of the student entrepreneur's social capital dominated the operation of the model as it was the main objective of the process. The student entrepreneurs were also provided with entrepreneurial knowledge during the process including workshops, seminars and business plan competitions. Finally, student entrepreneurs were provided with a duty of care including long term perspectives on the challenges of starting a business to protect them from any future negative repercussions. The next section will analyse the university incubation process which represents the third and final type of incubation process analysed in this thesis.

Inductively-derived constructs	Student Incubation Process
Risk aversion	Medium approach to risk -Restricted funding levels
Entrepreneurial knowledge	Priority - access to a plethora of workshops and seminars
Social capital	Main Priority - Most of business support delivered by regional actors - Access to networking events and established its own -Facilitated introductions to regional actors
Incubator management learning	Limited strategic management learning
Duty of care	Positive use of duty of care - Student entrepreneurs provided with long term perspective on challenges of starting a business

Table 4.4: Summary of findings from the inductively-derived constructs and student incubation process (Author's own)

4.3 The university incubation model

The university incubation process was established in the early 1990s. Since its establishment, thirty-one academic entrepreneurs have been supported and spun-off from the process in sectors including ageing and health, sustainability, engineering and IT. The creation of spin-offs is a third strand objective in relation to the University's main objectives which are to be a world-class research intensive University and deliver teaching and facilitate learning. The process focuses on supporting academic entrepreneurs to commercialise ideas based on their research through a team of BDMs. There is no physical incubation space as academics are based within their academic departments. Incubator management actors include the Director of the TTO and BDMs that act as intermediaries between the TTO and the academic.

4.3.1 Incubation process

It has been suggested that the university incubation process is a combination of incubation space, internal university actors such as the academic department which the spin-off is originally spun, the TTO, the central management of the university, resources and external resource providers such as venture capitalists and industrial partners (Lockett et al., 2002). While this notion was supported by the findings from the University incubation process analysed in this thesis, it was also found that the process

also includes a selection process. The beginning of the University incubation process is difficult to define as academic entrepreneurs have been based within the university when they establish their ideas. As a result, the process, similar to Lockett et al's (2002: 250) conceptualisation is from "the initiation of 'blue-sky' research projects through to the gestation of opportunities for commercial applications as an outcome of that research and onwards into the creation of a spin-out venture". However, the analysis here will focus on the point in time when the academic entrepreneur decides to exploit their idea through the TTO.

It is important to mention that at the time of interviews with the academic entrepreneurs, the TTO was going through a restructuring process from a University centralised system to a faculty-based system. As a result, it was found that the academic entrepreneurs' perspectives of the university incubation process prior to the restructuring are different from academic entrepreneurs' perspectives during restructuring. Some academic entrepreneurs were exposed to both periods. These perspectives are reflected in the text below and the differences are highlighted when necessary.

The first stage of the process involves an academic entrepreneur trying to uncover who within the University to approach and receive support from to pursue their idea. For the academic entrepreneurs in the pre-restructured process, it was difficult to find the right person to engage with. Academic entrepreneurs relied on colleagues within their academic departments who had previously started spin-offs for advice on who to engage with. The majority of academic entrepreneurs explained the use of academic colleagues:

> *"Through friends of mine who I know for example that have set up companies. I remember talking to them about what they had been advised. So basically just colleagues as well...he gave me the name of X. He said she would be quite good to talk to".*

During restructuring, it was much clearer for the academic entrepreneurs who they should be engaging with. Academic entrepreneurs who were exposed to both periods highlighted this point well:

> *"I think historically you needed to know who the right person who to go to whereas now I think with the new unit it is very clear there is a commercial development unit and the movement from it being university centralised which kind of left it ambiguous with who you went to, it has kind of been broken down and it is clear that there is a unit in the medical faculty that you go and talk to about ideas".*

Once the academic entrepreneur establishes contact with the TTO, the next stage in the process involves a selection process which is utilised to decide which academic

entrepreneurs to support to progress their ideas. The main actors involved in selecting academic entrepreneurs include BDMs that have been allocated to a particular academic entrepreneur. However, at a later stage other internal TTO actors, internal university actors external to the BDD such as the Vice Chancellor and senior external regional business actors, also become involved. Apart from filling in an invention record questionnaire (IRQ) form and having an initial meeting with a BDM, which will be discussed below, the academic entrepreneur has no role in the selection process as they are *required* to rely on the BDMs to take their idea through a series of selection stages. As a result, the academic entrepreneurs are unclear of the steps and criteria utilised for the selection process. This is still true for the restructuring period. The majority of academic entrepreneurs highlighted this point:

> *"I don't know the decision making process, who is on what committee, what you need to fill in, how to go forward, no that hasn't been explained".*

The selection process is built around selection criteria which BDMs utilise to select academic entrepreneurs to support. It has been suggested that the selection criteria for entry into a university incubator are focused on the individual entrepreneur's competencies such as "the ability of the founders to work with others to put together a business plan in a flexible and responsive manner" (Patton et al., 2009: 628). This notion was not supported by the findings from the University incubation processes selection criteria which are dominated by criteria based around the idea such as the evaluation of IP and its value, an evaluation of the idea's market potential and a commercial evaluation[30]. The individual competencies and commercial acumen of the academic entrepreneurs, while highlighted as important for new venture creation in the university context by one of the BDMs, are not accounted for as part of the selection criteria. This was confirmed by one of the BDMs from the university process:

> *"We do very little evaluation of the commercial acumen or potential commercial acumen of the academic and that's the glaring weakness I think...and I think we don't, as our process we need to evaluate that more...if someone was going to do a spin-out company they need to, ideally they have had some sort of exposure to business in the past. You can't really learn business in a training manual really. You have got to get out there and experience it".*

[30] The commercial evaluation looks at the idea's sales potential, competition, route to market, business model and business plan.

The first stage of the selection process requires an initial meeting between the academic entrepreneur and the BDM where the academic entrepreneur explains their invention, or idea, who was involved in the generation of the original idea and what the academic entrepreneur's relative contributions are. The academic fills out an IRQ form which represents the documentation of the invention or idea. Based on this form, the BDM undertakes an evaluation of the idea. The academic entrepreneur is not told why they have to fill out the IRQ form and where and to whom the form goes. This is also still true for the restructuring period. This lack of clarity is reflected in the majority of the academic entrepreneurs' comments:

> *"We had a meeting...and then he said fill out some kind of Invention Record which I did...He said it was going to some committee probably with another acronym and of course I had no idea what that committee is and who its members are and what they are looking at".*

The next stage of the selection process includes an evaluation or assessment of the idea produced by the BDM that has been allocated to a particular academic entrepreneur. The BDM evaluates the opportunity using a preliminary opportunity evaluation form. The preliminary opportunity form includes a series of points such as the opportunity description, list of all individuals and organisations that may have a claim to the IP via their contribution to the opportunity, initial patent search results, summarisation of key publications in the field/technology and market opportunity (Newcastle University, 2012). Based on this form, the BDM and other internal BDD actors make a decision on whether the opportunity should proceed to a more in-depth evaluation or to reject the opportunity.

If the opportunity can proceed, it goes through another more in-depth evaluation using an opportunity evaluation form which includes a series of questions about the marketability and the potential of the opportunity and the science/technology. The BDM then decides if the idea should be licensed or go down a spin-off route which is based on available resources. This is discussed in more detail in the next section (see section 4.3.2). If the idea is suggested for the spin-off route, the next stage in the process is to send the idea and evaluation to the University's Equity Committee along with an extensive business plan. This second stage of the process was summarised by one of the BDMs:

> *"So we do a preliminary evaluation and then internally within the business development department they say yes we want to spend some more time on this or no we don't. Then we will do a thorough evaluation and during that thorough*

evaluation stage we will decide if it is going to be a licensed opportunity or a spin out".

If the opportunity is rejected, the academic entrepreneurs are unable to continue to progress their idea and receive a letter from the University saying they will not be receiving support. For the academic entrepreneurs who were initially rejected from receiving support from the University incubation process, they felt demoralised as there were no opportunities for them to develop it further. This is explained by academic entrepreneurs who were initially rejected from receiving support:

"You got a letter saying no and good luck and there wasn't any support to advance it. It is very demoralising when you get knocked back from something which you are very passion about especially when you think you just found £200,000 pounds to make it real. To be told by big brother that you can't do that makes you re-evaluate your position and whether you should be moving to somewhere in the city where you do have those networks and you can make it happen".

The final stage of the selection process involves the BDM presenting the academic's ideas to the Equity Committee which is a body comprised of senior academics, senior external individuals and the Vice Chancellor of the University that make decisions on issues related to commercialisation. The chairman of the Equity Committee is a senior external actor from the region. The Committee discusses the evaluation of the opportunity, the University's equity participation and how much time the academic entrepreneur will need to spend on the spin-off. The discussion of the amount of time an academic can spend on the spin-off represents the University' use of 'duty of care' (a theme not yet discussed in the incubation literature) to protect itself by managing the potential impact of the creation of a spin-off on the academic entrepreneur's other duties such as teaching, administration and research activities. The Equity Committee process was summed up by one of the BDMs:

"If it goes down the spin-out route, then we have to produce a business plan and a proposal to equity...committee which is a body comprised of senior academics and external people who evaluate it...so what they want in an ideal world is they want something that's...got commercial legs, they get a good equity percentage and it doesn't involve 200% of the academic's time".

The Equity Committee, from the academic entrepreneur's perspective, was a mechanism to protect the university and reduce risk (a theme not yet discussed in the incubation literature) and was not about stimulating the development of businesses as academic entrepreneurs were not able to engage with the individuals on the Committee and spent long periods of time trying to get their ideas through the Committee. The majority of academic entrepreneurs highlighted this point:

"The BDD process was centred around the Equity Committee...this hurdle to jump to get approval to start the business and it requires like a 30 – 50 page business plan...which is really not about stimulating the business and getting out of its way, it is all about minimising or avoidance of any risk".

After the academic entrepreneurs make it through the selection process, they may receive types of business support to develop their ideas from the BDMs working in the TTO. While there is no consensus in the incubation literature on the totality of the business support process such as which actors are involved in the process, types of business support and how business support is deployed, it has been suggested that the university business support process is mostly concerned with leveraging external resources as many of the resources the spin-offs need may be located outside the university (Lockett et al., 2002). This conceptualisation partially fits with the findings from the University incubation process as the academic entrepreneurs that were part of the pre-restructured period were more reliant on external resources as they received *"limited"* support from the University incubation process. However, academic entrepreneurs restructuring in addition to external resources, also relied on internal resources and support from the BDMs. The pre-restructured business support process will be discussed below first followed by the restructured business support process.

The pre-restructured business support process was *"limited"* as the University only provided physical resources and human resources to the academic entrepreneurs. There was no formal process in place to help the academic entrepreneurs develop their ideas which meant the academic entrepreneurs were left to their own devices. The majority of academic entrepreneurs explained the limited support they received:

"I needed to know clearly what the patent situation was in this area and I had never read a patent in my life before that time and the help that I got was to be told that the patents were on CDs at the Newcastle Central Library and I ought to get myself down there and read some".

In addition to the limited amount of support, the quality of the support was substandard. One such example is represented by the University incubation processes inability to provide access to adequate talent such as potential CEOs and board directors to work as part of the academic entrepreneur's team. The academic entrepreneurs were *forced* to take on individuals as part of their team that did not have sufficient skills. The majority of academic entrepreneurs explained the substandard support:

"We were then pushed by the BDD to take X on as our acting CEO and he wasn't the right person. He didn't understand the business model and we didn't want him but they told him in front of us that that is what was going to happen".

Apart from the limited amount of support, the delivery of the support to the academic entrepreneurs was non-facilitatory. The academic entrepreneurs explained that there was no co-production between the BDM and the academic entrepreneurs as the BDMs did not engage to help the academic entrepreneurs to progress their ideas. This point is highlighted by the majority of academic entrepreneurs:

> *"It was more like we were working for them than they were working for us...You never felt like they were right in there with you".*

In addition to the poor delivery of support, it was also found that the quality of the support differed depending on the BDM the academic entrepreneurs engaged with. One entrepreneur explained that when the first BDM she started receiving support from left the University, the new BDM that took his place helped progress the idea at a faster rate and gave her better support. This was reflected by academic entrepreneurs that were supported by multiple BDMs:

> *"When he came in and I must say things started moving when he took it over. Before that I had no idea what to do".*

As a result of the poor quality of support, it was found that the academic entrepreneurs were obliged to rely on external organisations to develop their ideas and often needed to get University central management actors such as the Pro-Vice Chancellor involved as an intermediary between themselves and the BDMs. Additionally, the poor quality of support had negative consequences on the ability of the academic entrepreneurs to be the first to market with their products as it took them more time to develop their ideas. The majority of academic entrepreneurs highlighted the use of external organisations over University support:

> *"Most of the advice we got in Newcastle was actually outside the University...X organisation...they were enthusiastic about our business and put a lot of effort into it so we got that interest and enthusiasm in Newcastle but not through the University".*

When looking to the restructured business support process, it was found that the support was more *"dynamic"* as the University provided more types of support, quality support and delivered the support in partnership with the academic entrepreneurs. BDMs were also brought in with prior entrepreneurial experience. Post-restructuring there was also more of a business support process the academic entrepreneur went through with the BDM which included looking at the patent landscape, writing a business plan and acquiring external funding. The types of support included more in-depth patent support, business development resources (e.g. business plan writing) and financial resources

(e.g. funding for patents and market research and help with financial forecasts). Academic entrepreneurs who were exposed to both periods of the process explained the difference in support post-restructuring:

> *"I would say this has been a total sea change in what is happening in that you can meet people, discuss things, have meetings in their offices, full consultation really, lots of help offered".*

The change in the quality of support given to the academic entrepreneurs was attributed by the academic entrepreneurs to the restructuring as it embedded the BDMs within the faculty and as a result created alignment of objectives between themselves and the academic entrepreneurs. Additionally, new BDMs were brought into the University with industrial experience and more commercial perspectives such as getting the idea to market as quickly as possible which helped the academic entrepreneurs to continue to progress their ideas faster. Academic entrepreneurs who were exposed to both periods explained the benefit of the restructuring:

> *"I think that transition from a centralised unit who didn't understand to somebody who was embedded into what we did day to day...has dynamically changed what we are doing".*

The changes also positively affected the communication between the academic entrepreneurs and the BDMs and the interaction between the two was more facilitatory. Academic entrepreneurs who were exposed to both periods explained how the restructuring affected their ability to engage with the BDMs:

> *"A dramatic difference...BDD as was centralised felt like there were too many barriers to actually taking anything anywhere and that was my experience of taking things to them. Whereas now my experience couldn't be changed anymore which is people are coming to me looking for ways to help me develop my ideas and that mindset is really driving us to push what we are doing beyond what I thought was possible. And it is also very good to have a central driver so not just you to be leading something but knowing that people behind you within the University believe in what you are doing and are there to help as is needed".*

Overall, there was little evidence that there was any incubator management learning. Until the recent restructuring in 2012, the experiences of the entrepreneurs demonstrated that the support provided was sub-optimal. There is no official end to the university incubation process as although the spin-off formally becomes its own entity, the academic entrepreneur usually remains within the University. Additionally, the University appoints an actor to sit on the spin-off's board of directors to remain in contact and have some control over the spin-off. It was also found that the University is

currently developing a new venture unit which will also provide post spin-off support to the academic entrepreneurs. The next section will discuss how the incubator's objectives and resources affect the university incubation process.

4.3.2 Incubator's objectives and resources

The second construct analysed in the university incubation model is the incubator's objectives and resources. The objectives of the University are to be a world-class research-intensive university, deliver teaching and facilitate learning and play a leading role in the economic, social and cultural development of the North East of England. The process is funded by public sector resources from Newcastle University. The findings from the university incubation process suggest that the incubator's objectives affects the resources dedicated to the process and the time given to academic entrepreneurs to develop companies during the university incubation process. In addition to objectives, it was found that the incubator's financial resources and policies towards entrepreneurship also determine how the process functions. These points are discussed in detail below.

The University's first and second objective, to be a world-class research-intensive university and deliver teaching and facilitate learning means that the creation of spin-offs is a third strand objective. Consequently, resources to support the process are limited. To accommodate the lack of resources, the university incubation process undertakes a *"risk-averse"* strategy which has large impacts on process. First, the incubator's risk-averse mentality means it tries to control IP and requires the academic entrepreneurs to give up rights to half their company. This negatively affects the process and the development of ideas within the process as the academic entrepreneurs are fighting a *"battle of wills"* between themselves and the University to each acquire equity in the company. Additionally, giving up half the spin-off's equity up front makes it more difficult for the academic entrepreneur to raise VC funding as a large portion of the equity has already been given to the incubator. The majority of academic entrepreneurs explained the negative effect of the University's risk-averse mentality:

> *"The one thing I think that was very key for small companies is time you know every second counts when you look back and I would say that some of the negotiations...dragged on much longer than they should have you know, my saying in all of this is 100% of nothing is nothing so you are better to be pragmatic about it and work quickly, have the thing up and running and delivering, you know and you can't be looking for full economic recovery from a venture from day one that's not going to happen in a University spin out....in retrospect if things had been done*

quicker and more pragmatically we might have been further ahead at a given time than we were".

Importantly, there was evidence that the University did not need to place so much emphasis on trying to force the academic entrepreneurs to give up equity as the academic entrepreneurs felt a sense of loyalty to the University and wanted to share the equity. Many academic entrepreneurs explained this point:

"We actually wanted the University to own and have a stake in the company".

Second, the incubator's risk-averse mentality also affects the ability of the academic entrepreneur to engage with external actors in a timely manner as they are first required to obtain a confidentiality agreement (CDA) from the incubator. The negative impact of this on the process was highlighted by many academic entrepreneurs:

"It stifled the University ideas coming out...you can't talk to an academic unless you...sign a CDA. It takes so long, you can spend six months trying to get a CDA...I think it's actually, hugely counterproductive...there are some universities that are better at it than others. I thought Newcastle was dreadful, dreadful".

Third, the risk-averse mentality means that the BDD unit has developed a strict selection process which is more about *"minimising...risk"* than about *"stimulating...business"* creation. This was discussed in the above selection process Section 4.3.3.

The creation of spin-offs as a third strand objective of the incubator also affects the time academic entrepreneurs are given by the incubator to work on establishing a business as their main focus is research and teaching. This causes *"tension"* and *"undue strain"* on the academic entrepreneurs as they have a lack of time to devote to the spin-off. The lack of time also means that many opportunities are remaining in the process longer. The majority of the academic entrepreneurs explained the negative impact of the lack of time to work on their spin-off on the process:

"I have this company this spin-out but they are very much against...too many people taking too much time off to run their businesses so who is going to run them...and that basically goes to show that they are not very pro entrepreneurship ok...actually nobody wants to take the responsibility saying if you have a spin-out we will automatically give you so much time for a year for the first two years to get your company off the ground but nobody has made this decision. These are quite important decisions from the point of view of the entrepreneur".

While academic entrepreneurs are given the opportunity to buy out their teaching time, they have to pay a significant amount of money to their department which is not feasible

with an early stage spin-off's budget. This was explained by some of the academic entrepreneurs:

> *"We did get to a point where I said where it was suggested that the company should buy my time out on a correct financial basis but when we looked into the figures it would have bankrupted our company so basically I just had to carry on working in my spare time".*

In one case where an academic entrepreneur could afford to buy out his time, after providing the incubator with the required funds, he was not relieved of his teaching and administrative duties as he could not obtain the support of his Head of Department. The academic entrepreneur explained his frustration with this issue when he noted:

> *"We agreed that the company would buyout 20% of my time so we gave the University £10,000 a year and...I went to the Head of the Department and said alright* (we) *are buying out 20% of my time, can I drop some lectures and practicals? No. So basically we donated 10,000 quid a year for a year and I was relieved of none of my duties within the University".*

When looking to the incubator's resources and how the resources affect the university incubation process, it was found that the lack of resources influences the quality of BDMs the process is able to attract which impacts the quality of support the academic entrepreneurs receive[31]. This point is reflected by one of the BDM's comments:

> *"I think it is unlikely that you are going to find an experienced business development person for example say someone in the pharmaceutical industry is doing licensing are they going to move into an academic institution...Those people in commercial, in larger companies would be very highly paid individuals and the reality is you are not going to get that in the University environment".*

Second, the lack of resources also directly affects the quality of business support the academic entrepreneurs receive as there is not a significant budget to pay for things such as patents or proof of concept which means that the academic entrepreneurs have to find money from elsewhere. The gaps in funding did not enable the process to *"really hum"* and work for the academic and incubator. From the BDMs perspective, the lack of resources also negatively affects the interaction between the BDMs and the academic entrepreneurs as the BDMs are not properly equipped to financially help the academic entrepreneurs progress their ideas which causes tensions between the two. One of the BDMs explained this point well when he noted:

[31] The restructuring process started to hire new BDMs with industrial experience.

"When I first came into University the key issue that I saw in all of that was that there was no budget to do anything. There was a very small patent budget which was by no means anywhere near what was required so the first conversation was always very difficult cause you had to then ask the academic, 'Have you got any funds in your budget to file a patent application?' and if they didn't, often quite rightly a lot of them said, 'the University owns the IP so why should I use my own money to do it?' So that was always a bit difficult. Almost impossible...so to go in and try and offer help without really having anything in your toolbox other than a bit of expertise, maybe a pair of hands to help them do stuff was quite difficult".

The lack of resources also affects whether the academic entrepreneur's ideas are licensed or a spin-off is created. If an idea requires a large amount of funding, the university chooses to go down the license agreement route. This is reflected in one of the BDM's comments:

"I think a big issue is funding. If something is going to take an awful lot of funding and an awful lot of time and it is perhaps going into a market where there are very big players, very big international players I think we almost always look down the licensing route initially. If it is something where really a spin out company is going to take an awful lot of money, an awful lot of time, we would be diluted down to nothing by the end of it. We will probably go to licensing".

This negatively affects the process as it forces the academic entrepreneurs down a route that is not sufficient for their business model. It also slows down the process as the academic entrepreneurs have to try to fight to get their ideas commercialised in the right way. Many academic entrepreneurs explained this point:

"X (the BDM) *came and said he wouldn't support a spin-out company that whatever product we produced he would license which wasn't a solution to us at all and so we didn't proceed at that time and while we sort of kept in touch, they didn't offer a solution to where we were because obviously we needed to produce the X* (products) *and a license just wasn't a solution for us".*

Apart from the objectives and resources, it was also found that University's policies towards entrepreneurship affect the university incubation process. The academic entrepreneurs highlighted that the University's entrepreneurship policies continuously change and are made up of *"conflicting messages"* on whether the University supports entrepreneurship which may be a direct result of the continuous change of Vice Chancellors. This negatively affects the academic entrepreneurs during the process as it makes them question the incubator's commitment towards supporting them and their overall momentum of going through the process. Many academic entrepreneurs explained the negative effect of the conflicting messages on the process:

"There was a lot of conflicting messages huge amount of conflicting messages. Sometimes they would say you are allowed to do entrepreneurial work, the next day

they would say you are not allowed to do this...for start-ups you can't have 'today you have a different contract, tomorrow you have a different contract' then you don't know who to rely on so it is quite, I would say that...has made me more weary".

Apart from the University's policies towards entrepreneurship, it was also found that the hierarchy of actors in the university also affects the University incubation process as the BDMs are unable to quickly make decisions during the process as they had to receive approval from various actors within the university such as the Vice Chancellor and the Head of the Department. One BDM explained this point well when he noted:

"You can't make quick decisions always and there are lots of people to consider it is not an easy process at all".

The next section will discuss the role of the RIS in the university incubation process.

4.3.3 The role of the RIS

The third construct analysed is the RIS which is a combination of the interaction of regional organisations/actors and the regional socio-economic and cultural setting. It has been suggested that external relationships are important to the functioning of university incubation processes as many of the resources spin-offs may require are located outside the university's walls (Lockett et al., 2005). These external organisations include other universities, venture capital firms, business angels, industrial partners, public support agencies and property-based incubators that provide human, financial, physical, technological, organisational and social resources (ibid). While this notion was supported by the findings from the university incubation process, it was also found that regional organisations/actors of the RIS play a role as sponsors of regional competitions which the academic entrepreneurs take part in, as resources to develop and test the academic entrepreneur's ideas, as contributors to workshops/seminars academic entrepreneurs participate in, as service providers for academic entrepreneur companies, as a resource to provide advice to the academic entrepreneurs, and as a resource to work as part of the entrepreneur's team. These findings are discussed below.

First, academic entrepreneurs take part in regional competitions which are sponsored by regional firms and public sector organisations. Regional competitions enable the academic entrepreneurs to acquire funding, visibility, legitimacy and links with other business support organisations. The funding enables the academic entrepreneurs to test their products at an early stage of the business and gives them legitimacy and

confidence to continue to develop their ideas. Academic entrepreneurs who took part in regional competition highlighted their benefit:

> *"We started applying for research money to test the product and as part of that we came across the X Awards…we won first prize that from that I think was where we got the contact with X organisation…and everything else has grown from that so I see that award as being the little acorn because it was an X organisation endorsement it meant that we could then use that saying well this has been recognised by X organisation and that gave a lot of strength to the idea as well to take it forward".*

Second, regional public sector organisations are utilised as a resource by the academic entrepreneurs as a means of testing their products. This enables the academic entrepreneurs to develop demand-led products. The benefit of engaging with regional organisations to test their products was highlighted by many academic entrepreneurs:

> *"That pretty much underlay the development of the spin-off. It was the key, it was the edge we had over the competition if you like. It was the reason why we could develop effective diagnostics in Newcastle which bigger companies couldn't do as well because they didn't have the means of testing their products out in the clinic and that was an impediment. So it truly was an opportunity born of Newcastle University science together with the clinic".*

Academic entrepreneurs also utilise regional firms as service providers to develop their business ideas. These regional organisations include law firms, patent agents, market research organisations, accountancy firms and business consultants. The benefit of utilising service providers was reflected by the majority of academic entrepreneurs:

> *"*(I) *brought in X organisation...they have been very important to the development of this business".*

Fourth, regional public sector organisations provide free business support to the academic entrepreneurs during the university incubation process. This support includes help with writing business plans, developing business models, managing the academic entrepreneur's grant money, providing expertise in drawing up contracts, support in writing regional grant applications and market research and entering into negotiations with the university on the academic entrepreneur's behalf. The majority of academic entrepreneurs highlighted how they benefited from engaging with regional organisations that provide business support:

> *"They managed all the X money which was a very big thing...They gave us the whole of their purchasing department support to do the first contract with X organisation...They put all the expertise in drawing it up cause it was a very high risk contract...so that involved a lot of the time of X who is their top person in charge*

of purchasing. He invested a lot of time with helping us with that and that was very helpful".

Regional organisations/actors also provide advice and mentoring during the university incubation process. These actors include other small biotechs, entrepreneurs who have previously started spin-offs, other regional Professors and consultants in the academic entrepreneur's specific research area and CEOs of existing organisations. The benefit of engaging with these regional organisations/actors was highlighted by the majority of academic entrepreneurs:

"We talked to a number of entrepreneurs who had been involved with other start-ups you know it is very helpful because you know you get a lot of tips on how to write a business plan, which funds have got money you know and so on and so on".

Fifth, regional actors are utilised by the university incubation process to join the academic entrepreneurs' spin-offs as potential commercial directors, CEOs and Chief Financial Officers (CFOs). The academic entrepreneurs expressed their frustration with these individuals as they found them to be unhelpful:

"One of the things they did was they tried to get a Commercial Director in and they suggested a number of people…who were I suppose considered to be entrepreneurial successful business men…and they were a disaster…they knew NOTHING about what we were doing. They didn't understand us AT ALL. They didn't understand our motivation, they didn't understand what we were about, they had no technical knowledge of the business and we had about two of those".

Academic entrepreneurs also utilised other regional public sector organisations and actors to gain power over the University to legitimise their ideas, to force the University to take their ideas seriously and to gain a larger IP percentage. Many academic entrepreneurs explained how they utilised regional organisations in this way:

"They first of all entered into negotiations with the University on our behalf to say if you don't join we are going to form the company anyway and you won't be partners. They then argued why the University didn't own all the IP which I think was very important for the company as well".

Finally, public sector regional organisations/actors provide start up money for the academic entrepreneurs during the university incubation process. Access to regional finance will be discussed in detail below.

Apart from the role of regional organisations/actors, it was found that the university process does not utilise strategically and is advertently highly dependent on regional organisations/actors. Academic entrepreneurs directly approach regional organisations/actors because of the limited support they receive from the process. The

non-strategic use of the regional organisations/actors means that the transaction costs of engaging with regional organisations are significantly increased as academic entrepreneurs try to find the right individuals to engage with and to get the University's approval as an equity shareholder. It was also found that the transactions between the academic entrepreneurs and regional organisations/actors are also not free. Since the university process is not well-resourced, academic entrepreneurs found it more difficult to obtain the services of regional organisations/actors.

Apart from regional organisations, it was found that the regional socio-economic and cultural setting of the RIS also plays a role in the university incubation process. While it was found that regional organisations/actors are utilised by the academic entrepreneurs during the university incubation process (as discussed above), the level of the openness and mentality of regional organisations is dependent on the academic entrepreneur. Less senior academic entrepreneurs highlighted that it is more difficult to engage with regional actors. However, more senior academic entrepreneurs are able to easily engage with regional actors.

The entrepreneurial spirit, another element of the regional socio-economic and cultural setting of the RIS, did not play a role in the University incubation process. It was the lack of entrepreneurial spirit within the University rather than the region that affected the academic entrepreneurs. Academics entrepreneurs were not surrounded by individuals with entrepreneurial aspirations within the University which was discouraging when they are trying to start a business. The majority of academic entrepreneurs highlighted this point:

> *"I think you are seen as a renegade academic by innovating and developing things but even contemplating a commercial interest and it is something I have struggled with cause our funders are telling us to impact...I don't think there is a culture engrained in academia in general...about developing ideas with a commercial slant".*

Access to networks, which is the fourth element of the regional socio-economic and cultural setting of the RIS, plays a role in the university incubation process. While academic entrepreneurs have existing academic networks when they enter the university incubation process, they leverage regional entrepreneurial networks during the university incubation process. Many academic entrepreneurs explained this point:

> *"The Super Mondays group have been really interesting...I just think they do a really good job of creating a network within which as an individual within a scientific company I can get some really useful information and meet some really interesting*

people".

Access to regional finance, another element of the regional socio-economic and cultural setting of the RIS, also plays a role in the university incubation process. During the university incubation process, academic entrepreneurs access regional finance to develop their ideas, to establish proof of concept and to pay for external service providers such as patent agents and lawyers. Regional finance includes regional grants such as innovation grants and Smart Awards, VC funding, finance from banks, funding from charitable organisations and public sector funding. Regional finance is utilised by the academic entrepreneurs to compensate for the lack of resources provided by the university incubation process. The benefit of access to regional finance was highlighted by the majority of academic entrepreneurs:

> *"This guy who is running X organisation...came up with this 20 grand to which I think the spin-off probably owes its existence. There wasn't any money...in the University so that was key".*

The quality and availability of regional talent, the last element of the regional socio-economic and cultural setting of the RIS also affects the university incubation process. The quality of regional actors as potential CEOs and CFOs to work as part of the academic entrepreneur's teams was poor. This was highlighted in the above section which discussed regional organisations. The next section will discuss how the individual entrepreneurial characteristics of the academic entrepreneurs affected their incubation journey during the university incubation process.

4.3.4 Entrepreneur type

The fourth construct analysed is the entrepreneurial characteristics of the academic entrepreneurs which are further defined by entrepreneurial experience, industrial experience, education and family background. When looking to entrepreneurial experience, it was found that prior entrepreneurial experience positively affects how the academic entrepreneurs progressed through the university incubation process. First, academic entrepreneurs with prior entrepreneurial experience have more confidence during the university incubation process. This was explained by the majority of academic entrepreneurs with prior entrepreneurial experience:

> *"I wasn't totally naive...'cause a lot of academics have never done anything entrepreneurial before and I think that's an important distinction. You see two classes of academics who got into this – one is a group who have been exposed to*

this before either maybe they were in industry or they have done something themselves and I think that helps, it stratifies the outcome".

Confidence as a result of prior entrepreneurial experience means that in a difficult commercialisation environment with a highly selective selection process, the academic entrepreneurs are able to continue to fight for their ideas to be supported by the university incubation process. The majority of academic entrepreneurs with prior entrepreneurial experience explained this point:

"I wasn't scared and I think that is one big thing. You really can't be scared to do something like that especially when it flies in the face of what everyone wants you to do and business development didn't want to develop any businesses as far as I could see so continuing to knock on their door to get permission to do this took a certain amount of courage".

Second, prior entrepreneurial experience also enables the academic entrepreneurs to utilise their business knowledge during the university incubation process which makes them more easily able to go through the process as they are able to draw from their knowledge as and when they need it. The majority of academic entrepreneurs with prior entrepreneurial experience explained this point:

"I already have started a company so I knew my way around. I knew what I needed to do there and I knew what I wanted to do so I wasn't as ignorant when we first started up".

Prior entrepreneurial experience affects how much support the academic entrepreneur requires from the university incubation process. Academic entrepreneurs with prior entrepreneurial experience need less support from the process. A BDM who was engaged in supporting many academic entrepreneurs through the university incubation process highlighted this point:

"The academics...come in a very different...They are as different as people in everyday life so you will have some people who are very commercially astute...but then there are others who are completely and utterly naive...they have got the same job they are both academics...but they are going to need completely different support...so...this guy here is going to need somebody full time holding his hand all the time whereas this guy might not just need it but he might not want it either".

Academic entrepreneurs with prior entrepreneurial experience need less business support as they are able to rely more on themselves and their business knowledge during the university incubation process. This is reflected in the majority of comments from academic entrepreneurs with prior entrepreneurial experience:

"I think that is because the people involved have written quite a few of them (business plans)*...So we haven't talked about an overall what it will look like because we have written quite a few of them between us. I think it is kind of implicit what we need to do for the next stage".*

From the opposite perspective, academic entrepreneurs with no prior entrepreneurial experience do not have the confidence to fight for their ideas to be supported by the university incubation process. This means it takes longer for the academic entrepreneur to move from an idea stage to an actual spin-off. Academic entrepreneurs with no prior entrepreneurial experience highlighted this point:

"I ran into a problem that the BDM who was assigned to me had a small experience of the X business and I think a little knowledge is dangerous. He started to tell me what my invention was capable of and what it shouldn't do things like that...as a person by yourself you haven't really got, especially then I didn't have the confidence to really stick my neck out".

Second, academic entrepreneurs with no prior entrepreneurial experience had no business knowledge they could utilise during the university incubation process. This means that they were less confident in presenting their ideas and less knowledgeable on business concepts. This was explained by all the majority of academic entrepreneurs with no prior entrepreneurial experience:

"They were pretty naive presentations I can tell you. We had no idea what a business model was".

The lack of business knowledge as a result of no prior entrepreneurial experience negatively affects the academic entrepreneurs and their ability to make the correct business decisions during the university process. This was explained by the majority of academic entrepreneurs with no prior entrepreneurial experience:

"We raised money and we gave up nearly half the company in the process and we didn't raise anywhere near enough money to warrant giving up half the company. Now I know that and it is still causing us problems now, 'cause we trying to raise more money and if a company already owns half of you then that makes it more difficult for the next people coming in. We were just naive".

The lack of business knowledge also means that academic entrepreneurs do not have an understanding of who to engage with during the university incubation process and what markets are appropriate for them to approach. The majority of academic entrepreneurs with no prior entrepreneurial experience highlighted this point:

"We were sort of talking about this and I said you know this looks like it could have an application in electronics and he agreed and we sort of said where in the world

do they make lots of electronics, Japan, that sounds like a good idea. You know completely naive".

Third, academic entrepreneurs with no prior entrepreneurial experience require more support during the university incubation process as they do not have the business knowledge to rely more on themselves and are less confident. The majority of academic entrepreneurs with no prior entrepreneurial experience explained this point:

"I am confident that it will be successful because we are seeking the right advice from external people for the different types of experience we need whether it be in the X industry or the business development and so on so I will hold my hands up and say no I don't have any experience and I am happy to sort of defer that to the people who have".

When looking to industrial experience, it was found that prior industrial experience in the same sector the academic entrepreneur is starting a business positively affects how the academic entrepreneurs progressed through the university incubation process. First, it was found that academic entrepreneurs with prior industrial experience in a given sector are able to recognise opportunities more easily in those sectors during the university incubation process. This was explained by academic entrepreneurs with industrial experience:

"But the more general question is how did we together realise it was a business opportunity. Well we were working in the field and aware of the need for improved diagnosis...I was working in a clinical virology department, they work in a clinical pathology department which had a routine commitment to diagnose disease in patients in Newcastle Hospital so we all knew what was lacking and because we had expertise with these monoclonal antibodies we realised what they could do so it was pretty obvious that they could be used to improve diagnosis".

Second, academic entrepreneurs with prior industrial experience also have networks from working in industry and, therefore, can more easily access those networks and be more active in their role in the university incubation process. The majority of academic entrepreneurs highlighted this point:

"What has been very important is that I have a background in industry and I know all the movers and shakers around the world and hence I could pick the phone up and ask can you please help us out?".

When looking to education, it was found that prior education positively affects the academic entrepreneurs during the process as it provides the *"technical competence"* which they utilise for their spin-offs during the university incubation process. This point was explained by the majority of academic entrepreneurs:

"It (education) *gives the technical know-how. These are businesses that are based on my own science and technology experience. So it has given me that".*

Apart from prior entrepreneurial experience, industrial experience and education, family background also affected the academic entrepreneurs during the process. Academic entrepreneurs with a family background of self employment are able to utilise the business knowledge gained from exposure to the family business during the university incubation process. Academic entrepreneurs with a family background of self employment expressed this:

"My father had been in business...so I did have some kind of inkling...you...know how to behave in terms of you don't spend money that you haven't got. If you borrow too much and then spend it you know you are putting yourself into a difficult position".

Additionally, academic entrepreneurs with a family background in business were also found to utilise family members to contribute financial resources to their spin-offs during the university incubation process. Academic entrepreneurs with a family background in business highlighted this point:

"My sister...sold her business so she knows entrepreneurial people and her husband is also...They are kind of entrepreneurial so it is possible that I could tap into their money or tap into their approaches".

From the opposite perspective, academic entrepreneurs with no prior family history in business had not been exposed to business knowledge and, therefore, understanding business concepts during the university incubation process took longer. Academic entrepreneurs with no prior family history in business explained the impact it had on them:

"But it has taken a long time to figure out because I don't really have any background like I didn't have a family...business".

Additionally, family members that were not in business were found to affect negatively the academic entrepreneurs as they did not act as role models for the academic entrepreneurs and were not supportive of their endeavours. Academic entrepreneurs with no prior family history in business explained this point:

"I grew up in a family where there was no one who did science and technology and both my parents were like in humanities and linguistics. My other sister studied economics. My father was an economist. There were some mathematics around but to actually try and run a business and do things other than what you have to do and go to your office and work at your job people in the family think I am slightly crazy and they don't even understand why I do these things".

The above discussion demonstrated that academic entrepreneurs are heterogeneous and

prior entrepreneurial experience, industrial experience, education and family background positively affects how the entrepreneurs progressed through the university incubation process. The next section will summarise briefly the findings from the university incubation process.

4.3.5 Summary

The above section shed light on the university incubation process in relation to its incubation components and how they function, the incubator's objectives and resources and how they affect the process, the RIS and its role in the process and the entrepreneur's background and experience and how that affected how their incubation journeys (see Table 4.5 for overview of the main findings). The university incubation process is "the initiation of 'blue-sky' research projects through to the gestation of opportunities for commercial applications as an outcome of that research and onwards into the creation of a spin-out venture" (Lockett et al., 2002:250). However, the core of the process begins when the academic entrepreneurs approaches the TTO to develop their ideas into a spin-off. Post contact, the process is dominated by a risk-averse selection process. It was found that the selection approach is a non-balanced screening process which utilises a single actor and a single selection criterion (e.g. the business idea). The use of one actor in the decision making process (e.g. the BDM) negatively affected potential new venture creation as there were fewer individuals screening the idea. The limited selection criteria also meant that the academic entrepreneurs were not included in the selection process and were less able to understand how they would be potentially supported, what their role would be in the process and did not enable the BDM to engage properly to gain an overall understanding of the idea.

After the selection process, academic entrepreneurs receive types of business support to develop their ideas. For academic entrepreneurs who were exposed to the process pre-restructuring, they received limited support from internal university actors and relied on external organisations for support. There was no co-production between the academic entrepreneur and incubator management which negatively affects the entrepreneurs and potential new venture creation in the context of the university incubation process. Additionally, it was found that most incubator management actors did not have entrepreneurial experience which was found to affect negatively the entrepreneurs. In the restructuring phase, there was evidence that the quality of business support was positively changing and that BDMs with experience were being recruited.

Original constructs	**University Incubation Process**
Incubation process	*Selection process* - Highly selective and risk-averse - Selection criteria: business idea - Academic entrepreneurs does not play an active role - One actor (internal) in the decision making process - No standardised time frame *Business support process* - Most actors delivering support do not have prior entrepreneurial experience - No co-production - Academic entrepreneurs are not physically incubated - No availability of innovation resources
Incubator objectives and resources	New venture creation is tertiary objective Not a well-resourced process
The role of the regional environment	*Regional organisations* - Mostly used public sector regional organisations -Unstrategically utilised regional organisations -Inadvertently highly dependent on regional organisations -Transaction costs for entrepreneurs to engage with regional organisations are not free *Socio-economic and cultural setting* - Willingness of regional organisations to engage with academic entrepreneurs depended on their status - Academic entrepreneurs affected by lack of entrepreneurial spirit in University rather than region - Lack of regional talent affected quality of CEOs academic entrepreneurs could choose
Entrepreneurial characteristics	- Academic entrepreneurs heterogeneous in relation to prior entrepreneurial experience and are positively affected by their prior entrepreneurial experience - Academic entrepreneurs are heterogeneous in relation to their industrial experience and are positively affected by prior consonant industrial experience - Academic entrepreneurs are positively affected by their education; used their education (i.e. PhD) to provide technical know-how which business ideas were based upon - Academic entrepreneurs were heterogeneous in their prior family backgrounds in business and are positively affected by their prior family backgrounds in business

Table 4.5: Summary of findings from the original constructs and the university incubation process (Author's own)

The University's objectives and resources were found to affect how the incubation process functions and potential new venture creation. The creation of spin-offs was a tertiary objective to research and teaching which meant that the university incubator allocated limited resources to the process. As a result, despite not having the necessary expertise, academic entrepreneurs had to undertake many activities themselves instead of hiring service providers such as patent attorneys. Other objectives of the process also affected the time given to academic entrepreneurs to develop spin-offs during the university incubation process.

In relation to the RIS, it was found that academic entrepreneurs from the process heavily draw from the RIS as there is limited support from internal actors. During the restructuring stage, the university incubation process drew from organisations in the RIS as contributors to workshops/seminars the university put on, as service providers for academic entrepreneur companies and as a resource to work as part of the entrepreneur's team. The more regional organisations and actors enabled business support processes through the provision of resources, the more likely the success of potential new venture creation. The university process was found to utilise unstrategically and was inadvertently dependent on regional organisations and actors. The non-strategic use of regional organisations and actors meant that transaction costs of engaging was significantly increased for the academic entrepreneurs.

Apart from the lack of regional talent such as potential CEOs for the academic's spin-offs, the weak regional socio-economic and cultural setting of the RIS had a limited negative effect on the academic entrepreneurs. It was the lack of entrepreneurial spirit within the university which had a negative impact. Academic entrepreneurs were found to benefit from regional entrepreneurial networks to develop their ideas and from access to regional finance to compensate for the lack of resources provided by the university incubation process.

The academic entrepreneurs' experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affected them during their incubation journey. Academic entrepreneurs with prior entrepreneurial experience had more confidence, were able to utilise their business knowledge and required less support from the university process. The opposite is true for novice academic entrepreneurs. Industrial experience in the same sector the entrepreneur was starting a business also positively affected how the academic entrepreneurs progressed

through the process facilitating opportunity identification and access to resources and networks. As a result, they were more active in their role in the university incubation process and were less reliant on the process. Prior education provided the academic entrepreneurs with the technical know-how to write patents and to develop products and services to develop the spin-offs during the university incubation process. Finally, academic entrepreneurs with a family background of self employment were positively affected during the process while the opposite is true for academic entrepreneurs that were not exposed to a family business background.

Apart from the above findings, the five other inductively-derived constructs (risk aversion, incubator management learning, duty of care, social capital and entrepreneurial knowledge) were also found to be important for explaining how the university incubation process functions (see Table 4.6 for an overview). The process was found to have a high approach to risk aversion including a highly selective selection process, common use of CDAs, tight control over IP and restricted funding levels which negatively affected the academic entrepreneurs. The lack of incubation management learning meant that the process did not improve itself for the needs of the academic entrepreneurs and remained sub-optimal negatively affecting potential new venture creation. The development of the academic entrepreneur's social capital was not a priority of the process because of the common use of CDAs and tight control over IP which negatively affected the academic entrepreneurs. The process did not accommodate novice academic entrepreneurs by providing entrepreneurial knowledge during the process which meant they were forced to utilise external resources including resources from the student process. Finally, the process implemented a negative use of duty of care including limiting the time academic entrepreneurs could spend on developing their spin-off to protect the University, its objectives and manage the potential impact of the creation of a spin-off on the academic's other duties.

Inductively-derived constructs	**University Incubation Process**
Risk aversion	High approach to risk - Highly selective selection process - Common use of CDAs - Control IP - Restricted funding levels
Entrepreneurial knowledge	Not a priority - Limited resources - Academics getting knowledge elsewhere

Social capital	Not a priority - Common use of CDAs
Incubator management learning	No learning
Duty of care	Negative use of duty of care - Academic entrepreneurs limited in time they could spend on spin-off to protect other duties such as teach, administration and teaching activities

Table 4.6: Summary of findings from inductively-derived constructs and the university incubation process (Author's own)

4.3.6 Conclusions

From the individual analysis of the three incubation processes discussed above, it is apparent that there are differences between the processes. These differences revolve around the incubation process components and how they function, the individual processes objectives and resources, the role of the RIS and how it is used and the entrepreneurial characteristics of the individual entrepreneurs and how they affect the entrepreneurs in each process. Additionally, other differences around themes which stemmed inductively from the data analysis process (as indicated in the above text) were also found which include risk aversion, the development of the entrepreneur's entrepreneurial knowledge, the development of the entrepreneur's social capital, incubator management learning and duty of care. The differences between the processes around all of these themes will be discussed in-depth in the next chapter.

Chapter 5: Accounting for differences in incubation processes

While the previous chapter presented the analysis of the individual incubation processes (i.e. the regional incubation process, the student incubation process and the university incubation process) across the fours constructs outlined in the methodology chapter (the incubation process, the incubator's objectives and resources, the role of the RIS and entrepreneurial characteristics) and highlighted newly found inductive constructs, this Chapter discusses the findings from the cross-case analysis of the three incubation processes, focusing on the differences of the effects of the four constructs. In addition to analysing the differences in the effect of the four constructs across the cases, the thesis also analyses the differences in the five new inductively-derived constructs (risk aversion, entrepreneurial knowledge, social capital, incubator management learning and duty of care). The Chapter explores how differences in these constructs affect the entrepreneurs in each process. The comparison of the three incubation models provides rich insights that inform the study and lay the basis for the discussion in Chapter 6. The Chapter is structured around the nine constructs.

5.1 Incubation process

When looking to the *incubation process* construct, it was found that there are two main differences between the three approaches to incubation. The first is that they differ in their (selection) components which affect the way entrepreneurs are able to engage with the processes. The second distinction is that the components function differently across the three processes. For the selection component, the variation in how the components function is a reflection of differences in selection criterion, number of actors involved in the decision making and time frame of the process. For the business support component, the variation in how the components function is a reflection of the differences in the entrepreneurial backgrounds of the actors involved, the way business support is delivered and the types of business support offered. These two findings will be discussed in more detail below.

In the regional approach, a *relatively* discerning selection component is utilised to recruit competent entrepreneurs. This meant that the entrepreneurs went through

multiple steps during the selection process and the barriers to engage were relatively *high*. The majority of entrepreneurs explained this point:

> *"There were multiple steps. To begin with it was a CV and cover letter. Then we had a telephone interview. We had an assessment centre day. Then multiple interviews in Newcastle and presenting to the team a PowerPoint presentation. We spoke to some of the key stakeholders in the company and after that we had psychometrics online, two sets psychometrics online, a telephone psychometrics and a big wait and finally the acceptance and then an offer".*

In the student approach by comparison, there is no selection component as in this approach direct selectivity was not an option that was possible as each student had to be treated fairly. This meant that there were *low* barriers for the student entrepreneurs to engage with the process initially and receive business support to progress their ideas. The lack of selection process also meant that being supported by the student incubation process brought *less* credibility to the student entrepreneurs. The majority of student entrepreneurs explained the low barriers to engage with the process:

> *"The University* (the student process) *is really low barriers. Literally anybody can walk in with any business idea and they would entertain it and help you develop it. No barrier whatsoever…In terms of credibility it is not the same at all because you can equally engage with them as a student who is only interested in getting academic qualification…for a module towards a degree with no actual interest with setting up the business permanently".*

Finally, in the university approach, a highly selective and risk-averse selection component is used to select academic entrepreneurs to support. In comparison to the regional approach, this meant there were even higher barriers for the academics to engage with the process initially as the University had a strong attitude towards risk[32]. The majority of academic entrepreneurs explained this:

> *"Any budding entrepreneur, academic has this hurdle to jump to get approval to start the business and it requires like a 30 – 50 page business plan for the Equity Committee".*

The second main difference, in addition to the components of each approach, was how the selection and business support components function. First, in the selection component, there is a difference in the use of selection criteria. In the regional incubation process, the selection criteria are based on the individual competences of the entrepreneur and the business idea which represents a "balanced screening" dimension (Aerts et al., 2007: 260) of more than one factor. For the entrepreneur, the focus on their

[32] The theme of risk aversion is discussed in depth in section 6.5.

competences meant they played an *active* role in the selection process which enabled them to understand what their potential position will be in the process, to obtain initial feedback on their business ideas and to engage with incubator management actors to gain a sense of their capabilities. The majority of entrepreneurs highlighted this point:

> *"I sent in a letter and CV and after awhile I heard back and got invited to come in for an interview with the CEO and Finance Director and HR Adviser...so we had a chat and the interview was interesting I mean I didn't really understand the IM fully until I had that first interview".*

On the contrary, the university incubation processes selection criterion does not focus on the academic entrepreneur's competencies but rather is focused on the business idea or one factor which represents an unbalanced screening process. For the academic entrepreneur, it meant that they did not play a role in the selection process. This negatively affects their ability to understand the process, how they will be supported and does not enable the BDM to engage properly with the academic to evaluate their idea accurately. The majority of academic entrepreneurs explained that they did not play any role in the selection process:

> *"Nobody's ever asked me* (an academic entrepreneur) *to come and do a pitch to them about what the business is, nobody has ever asked me what I saw as the potential income from this nobody's ever asked me anything from the University. It has been through the BDM…I think that they could listen to the people who are doing the spin-outs you could come and do a pitch. You could come and ask the person directly who understands the business and that process then wouldn't have been as it was".*

Second, the number of actors involved in the selection process also differs between the processes. In the regional process, there are multiple (internal and external) actors involved in the selection decision to have input from more than one actor which also represents a "balanced screening" process (Aerts et al., 2007: 260) with multiple decision makers. One incubator management actor highlighted this point:

> *"Along with presenting the ideas to us, we also ask them* (the entrepreneurs) *to present it to the advisory panel members…as part of the selection process to get a wider pool of people to judge the right candidate".*

Contrastingly, the University approach only utilises one actor (the BDM) at the beginning of the selection process. This means there is an unbalanced screening process which is based on one decision maker who acts as a gatekeeper for academics to be able to commercialise their ideas. The majority of academic entrepreneurs explained this point:

> *"I filled in his form and the next thing I found was that he* (the BDM) *circulated to some very important people in the University his assessment of what our company is…which basically said we would have a turnover maximum of a £100,000 which was a killer you know and that he basically wouldn't support it. He never spoke to me. He didn't pre-circulate it to me before he circulated his vision of what we were doing and I had to then send out an email to very important people in the University saying X* (BDM) *doesn't understand his job basically and that I contested this whole assessment and procedure".*

Third, the time frame of the selection processes also differed between the approaches to incubation. In the regional incubation approach, the selection process is purposely standardised at eight weeks to manage the expectations of the entrepreneurs. This enabled the entrepreneurs to enter the process quickly to begin to progress their business ideas. The majority of entrepreneurs highlighted how they benefited from a short, well-managed selection process:

> *"The whole process was very, it seemed quite well coordinated and went through it quite quickly particularly the interview with the presentation stuff".*

On the other hand, in the university approach, there was no standardised time frame for the selection process. This meant that ideas could remain in the selection process for a long period of time without progressing. An academic who was exposed to both the regional and university approach highlighted the difference in time frames and how it affects negatively the academic entrepreneurs:

> *"This guy* (academic entrepreneur) *that had been trying to start a business for eight years…would have had a business up and running within 12 months at Science City* (the regional incubation process)*".*

Fourth, there was also a difference between the entrepreneurial experiences of the actors involved in providing business support to the entrepreneurs. In the regional process, the main actors providing business support include an innovation director and CEO, both of which have prior entrepreneurial experience. This had a positive effect on the entrepreneurs as it means that they have more credibility with the entrepreneurs and as a result contribute to the their "readiness…for co-production"[33] (Rice, 2002:179). The majority of entrepreneurs highlighted this point:

> *"They* (incubator management actors) *had hands on experience of building their own companies in the past so…maybe the way I always spoke to them, I think they had more weight for me because they had the private sector knowledge".*

[33] "Readiness of entrepreneurs for co-production" refers to the entrepreneur's willingness to engage with incubator management actors (Rice, 2002:179).

In the student approach by comparison, the main actors delivering business support include the Assistant Director, development officers and business advisers most of whom do not have prior entrepreneurial experience but rather have experience of delivering business support in a public sector environment. The lack of consistency of actors involved in the process with entrepreneurial experience had a negative impact on the student entrepreneurs as the quality of business support changed depending on who the student engages with. Student entrepreneurs' "readiness for co-production" (Rice, 2002:179) is also negatively affected as they were less willing to engage with actors without entrepreneurial experience. The majority of student entrepreneurs explained this point:

> *"A lot of them…never had done anything and they are telling you how to do it…it wastes a huge amount of time…So that is why having someone like X involved for example was excellent because he could say look I have done this I have done that and instantly you listen because the guy has done it".*

Finally, in the university process, most BDMs did not have prior entrepreneurial experience which meant they were less able to provide appropriate business support to the academic entrepreneurs[34] and were less in touch with the realities and requirements for succeeding in business. The academic entrepreneurs who were exposed to BDMs with and without entrepreneurial experience explained the importance of engaging with BDMs with experience:

> *"I don't think they have had the right people in the BDD…I think the appointments now, for example we have got X…recruited from industry who came in and said right your patent is looking like this but to be honest you don't need a patent you just need to be first to market. And that experience of well if we don't get the patent we want it is not the end of the world then this is the route we need to travel down and those people with those experiences give you confidence to move quickly in what you are doing".*

Fifth, there was also a difference in the *way* the incubator management actors delivered business support during the processes or what Rice (2002:163) calls "modes of co-production". In the regional incubation process, most of the business support was delivered in a broad range of co-production modalities; "reactive crisis intervention"[35],

[34] This has recently changed as a result of the re-structuring that has taken place which provided some evidence that some BDMs are being recruited with business experience.

[35] "Reactive crisis intervention" is when the entrepreneur initiates contact with the incubator manager and is focused on a particular issue and is of a limited duration.

"proactive crisis intervention"[36] and "proactive developmental intervention"[37] between the Innovation Director or CEO and the entrepreneur (Rice, 2002:175). The entrepreneurs valued these broad types of interactions as it enabled them to engage with incubator management actors in different ways at different points of their incubation journey. The majority of entrepreneurs highlighted this:

> *"We've had one chance to sit down and really go over where are we, what's the business model, are we still on track with that, how many people we've got signed up, what are you doing in the immediate term to try and rectify that, and what's your plan going forward to try and remedy it...And aside from that proper sit down meeting..., the rest of the support has been delivered in...where I've said to the Innovation Director, "Can I have two seconds?" and we'll sort of run through it, chat and things like that…And to be honest I prefer to work like that otherwise you just end up having meetings for meetings sakes".*

In the student incubation process, the business support was delivered in one type of interaction or "reactive crisis intervention" where the student entrepreneur requested help with an issue or a problem and the business support was of a limited duration (Rice, 2002:174). Incubator management actors in the student approach were less proactive in engaging with students. The majority of student entrepreneurs explained this type of interaction:

> *"Whenever there is a problem I knew I could phone up X...They would talk it through with you there and then on the phone".*

Finally, in the pre-restructured university incubation process, there was no co-production between the BDMs and the academic entrepreneurs as the BDMs were not collaborative in their approach to supporting the academics[38]. This negatively affected the academic entrepreneurs during the process. The majority of academic entrepreneurs explained this:

> *"I think what didn't work well was still the us and them model, you know that they were the guys in suits they were sort of doing us some big favour and in reality what we really should have been doing was rolling up our sleeves and working together much more".*

[36] "Proactive crisis intervention" is when the incubator manager proactively engages with the entrepreneur in providing business support on an episodic basis (Rice, 2002).

[37] "Proactive development intervention" refers to the ongoing interaction between the incubator manager and entrepreneur which focuses on the development needs of the entrepreneur and their spin-off (Rice, 2002).

[38] There was evidence that this was changing as some of the academic entrepreneurs interviewed highlighted that there was more co-production in the restructuring TTO.

Sixth**,** there was a difference in the *types of support* offered by the three processes including physical resources, innovation resources, financial resources[39] and learning resources[40]. First, when looking to physical resources, it was found that the resources differed between the three models. In the regional process, entrepreneurs are physically incubated 100% of the time in an incubation space within the incubator which includes desk space, computers, printers and meeting rooms. The benefit of being located in the incubation space is that entrepreneurs are co-located with incubator management actors and can engage as and when issues arise. The majority of entrepreneurs explained the benefit of being co-located with incubation management actors:

> *"It's useful knowing that the Innovation Director is there whenever we need to run ideas by".*

In the student approach by comparison, student entrepreneurs did not spend 100% of their time in an incubation space as the process does not focus on the physical incubation of students. Rather, student entrepreneurs have access to a given space which includes desks, computers, printers and meetings rooms which they are able to utilise by making appointments. The lack of physical incubation meant it was more difficult for the student entrepreneurs to access support as and when they needed it and build a relationship with incubator management actors. The majority of student entrepreneurs highlighted this point:

> *"Quite often it is the timing thing and maybe it is only the students there, whatever title they have, you know the part-timers they might be the only person in there so who and how to engage. You know X comes in from X organisation every now and again but I think I wasn't really sure of the hours on who is where and when and it was more I would just turn up and who was there, yeah, not really a relationship building up there with any individual".*

Finally, the pre-restructured university incubation process did not have any physical space that academic entrepreneurs could utilise. This meant that the academic entrepreneurs were siloed in their academic departments, were less able to engage with other academics starting businesses and to build a relationship with BDMs to obtain support. The majority of academic entrepreneurs explained this issue:

[39] The differences in financial resources across the three processes are discussed in depth in the next section (see section 6.2) so they will not be further discussed here.

[40] Learning resources are discussed in-depth in section 6.6. which focuses on the development of human capital. As a result, it will not be discussed further here.

"There was nobody based in the medical faculty…embedded into what we did day - to-day".

Second, there was also a difference in the availability of innovation resources across the three processes. In the regional approach, innovation resources such as innovation frameworks and idea databases played an important role at the beginning of the process to enable the entrepreneurs to evaluate their ideas and to build high growth propositions to meet the objectives of the incubator. The majority of entrepreneurs explained this:

"So the CEO's book he's got methodologies to follow, patterns to follow and finding success in innovation. So there's lots of open innovation things going on in lots of ways to review it but also things, experiences of how to make sure that you're constantly evaluating the opportunity to make sure you don't get distracted in something which is really a dead end".

In the student approach by comparison, no innovation resources were provided to the student entrepreneurs to develop their ideas. This negatively affects their ability to evaluate successfully their business propositions. The majority of student entrepreneurs reflected this point:

"I can't recall getting that much insight from working with the University (student process)*…It is…about encouragement rather than necessarily about innovation".*

Finally, in the university incubation process, innovation resources were also not provided to academic entrepreneurs. Similar to the student approach, academics were therefore, not able to evaluate and develop their ideas appropriately during the process. The majority of academic entrepreneurs explained this point:

"How do you get resource of people from the University freed up to help you shape a proposition...It doesn't seem to be there…and that has been a bit of a frustrating challenge to me to try and get the assistance we need to try and develop it".

The above discussion highlighted that the two main differences between the three incubation processes are the components that make up each process and how the components function. The next section will discuss the differences between the three processes in relation to their objectives and resources.

5.2 Incubator's objectives and resources

When comparing the three incubation processes' objectives and resources, it was found that there are differences between the three. In relation to objectives, the main difference is that the creation of spin-offs has a different priority in the three processes which affects the components and resources allocated to each process. In relation to resources, the main difference is the quantity of resources allocated to the processes and

the public sector funding requirements. These findings will be discussed in more detail below.

First, as mentioned above, there was a difference in the priority of the spin-off objective in each process. In the regional process, the creation of spin-offs is a primary objective. As a result, the incubator dedicated a plethora of resources to the process which the entrepreneurs could utilise to develop their spin-offs. This will be discussed below. Additionally, the selection process and criteria utilised to recruit entrepreneurs to the process were based on picking winner ideas for entrepreneurs to have more chances of achieving the primary objective (see Section 5.1).

On the contrary, in the student approach, the creation of spin-offs is a secondary objective to developing the entrepreneurial capacity of students. As a result, there were not many resources dedicated to the process. This will also be discussed below. Additionally, the secondary objective means there is no selection process to enable any student entrepreneur to engage initially and receive support to develop their ideas (see Section 5.1).

Finally, in the university process, the creation of spin-offs is a tertiary priority or 'third strand' objective to research and teaching activities. This meant that not many resources are dedicated to the process. This will also be discussed below. Additionally, as a result of the creation of spin-offs being a third strand objective, the process also undertook a risk-averse selection process to protect the University (see Section 5.5 for a full discussion on this point).

Second, when comparing the resources dedicated to each incubation process to achieve its objectives, it was found that while all three processes are funded by public sector resources, there was a difference in the *amount* of resources allocated to the processes and public sector funding requirements. The regional approach is a well-resourced process. Entrepreneurs had the necessary funds for procuring service providers, proof of concept and were also provided with a salary to be able to devote 100% of their time to developing their spin-offs. The benefit of the well-resourced process was explained by the majority of entrepreneurs:

> *"The salary package…allows you to concentrate only on starting your business rather than in most cases you have to work and then try and start a business on a night or a weekend and trying to do that is impossible and if every time you need to ring somebody then they are not in so, so yeah being able to work on your business between 9 and 5 is crucial really so that has been excellent having the salary".*

By comparison, the student approach is not a well-resourced process. Student entrepreneurs had to pool different sources of funding to accommodate the processes limited financial resources and often looked to other sources of funding which could accommodate their needs. This meant it took them longer to develop their spin-offs. The majority of student entrepreneurs explained this point:

> *"I think they were relatively small figures it was a couple hundred quid here and a couple of hundred quid there. And really I just discounted it…it wouldn't pay a university researcher for more than a couple of hours, that sort of funding. So, yeah, too small to have an impact".*

Finally, the university model is also not a well-resourced process. This negatively affected the academic entrepreneurs as they are not provided with funding to be able develop their ideas and are forced to undertake activities themselves instead of hiring experts. The majority of academic entrepreneurs explained this:

> *"They expect academics to produce somehow something that looks like a patent which is absurd if you ask me…I am completely unqualified…and you know you have to do it* (write the patent) *several times before you get it right so yeah I think it is absurd. It is optimistic at best".*

Third, apart from the difference in the *amount* of resources allocated to the processes, there was also a difference between public sector funding requirements. The regional approach was the only process to be negatively affected by its funder's requirements as it forced the entrepreneurs to go through a procurement process, affected the incubator's internal processes, indirectly dictated the amount of money entrepreneurs should spend and limited who the entrepreneurs could engage with during the process. The majority of entrepreneurs explained the negative impact of the public sector funding requirements:

> *"The support framework was really hampered by the fact that it was public sector money because for anything support wise to happen it…IMs* (entrepreneurs) *needed to select people that were on a panel a kind of tender support panel, not only was that a really lengthy process so it hampered the efforts of the IMs…it also meant that the choice was fairly limited".*

The above discussion highlighted that there are three differences between the three incubation processes in relation to their objectives and resources. The next section will discuss the differences between the three processes in relation to the role of the RIS in each incubation process.

5.3 The role of the RIS

In looking across all three incubation models, another recurrent theme that connected all three cases' differences was the role of the RIS (specifically the role of regional organisations/actors and the socio-cultural setting) in the incubation processes. First, in relation to the role of regional organisations/actors, it was found that there was a difference in the *types* of regional organisations/actors each process used, *how* each process used regional organisations/actors, *how much* each process utilised regional organisations/actors and the *financial costs* the entrepreneurs incurred as a result of utilising regional organisations/actors. Second, there was a difference in the socio-economic and cultural setting of the RIS (specifically level of openness and mentality of regional organisations/actors, the entrepreneurial spirit of the region and regional talent) and how it affected each process. These findings will be discussed in more detail below.

First, there was a difference in the *types* of regional organisations/actors each process uses. The regional approach utilises mostly private sector regional organisations/actors to support the entrepreneurs while the student approach and university process mostly utilise public sector regional organisations/actors. The importance of links with private sector organisations is that these types of organisations remind incubator management actors (because of their business focus) of their objective to support entrepreneurs rather than just meeting the needs of funders. One incubator management actor from the regional process highlighted this point nicely:

> *"I think the organisation* (incubator) *have to really focus on really having a very good business understanding as well as understanding obviously the needs of the funders, be it the RDF or whoever. Therefore, I think it is absolutely vital that we keep those links with both large and smaller private sector businesses".*

For the entrepreneurs, links with private sector actors and organisations means they are supported by individuals with real world business experience which affects their willingness for co-production and potential new venture creation.

Second, there was a difference in *how* each process uses regional organisations/actors of the RIS. In the regional process, regional organisations/actors are utilised strategically by both incubator management actors and entrepreneurs during the process. Incubator management actors purposefully utilise actors from the RIS to contribute to the processes selection component to get a wider pool of people to judge potential entrepreneurs. They also utilise regional actors to sit on the advisory panel to provide additional business support to the entrepreneur and to be part of a panel of service

providers which the entrepreneurs procure from to develop their spin-offs[41]. The strategic use of regional organisations/actors is explained by an incubator management actor:

> *"We put in place an advisory panel who listened to their* (entrepreneurs) *ideas as if they were a panel of investors and the advisory panel consisted of entrepreneurs, business angels and venture capitalists and corporate R&D. So the advisory panel gives feedback to them so internally I act in a critical way but the advisory panel allows me also to sit on the side of the entrepreneur and try and provide input and advise towards them presenting an affective business".*

Entrepreneurs also utilise strategically regional organisations/actors during the process to develop and test their ideas, as a knowledge resource, as mentors to provide business advice and guidance and as actors to work as part of their team to develop their spin-offs. The majority of entrepreneurs explained this point:

> *"We spoke to a few doctors and some NHS procurement people and the products we were trying to propose just didn't have, there wasn't enough confidence in them".*

In the student approach by comparison, incubator management actors also utilise strategically regional organisations of the RIS. However, regional organisations/actors are not only utilised to contribute to internal panels that provide advice to the student entrepreneurs to help them develop their spin-offs, they are also intentionally used to provide support and feedback to improve the process. An incubator management actor highlighted this point:

> *"We've been asked for our opinion on certain university plans and things that they wish to implement, and we have our input into that, which hopefully they find useful".*

On the contrary to the entrepreneurs from the regional process, student entrepreneurs are less strategic in their use of regional organisations/actors as a result of their lack of entrepreneurial experience and networks and are more reliant on actors from the process to provide support and direction on who to engage with[42]. The majority of student entrepreneurs highlighted the use of the process to tap into other available regional support:

[41] While it was highlighted that the panel of service providers provided issues to the entrepreneurs during the process, the point here is to highlight that incubator management actors utilised strategically regional organisations from the RIS during the process to benefit the entrepreneurs.

[42] While it was highlighted that student entrepreneurs with prior industrial experience were more easily able to access resources during the process, this was in relation to access to regional mentors rather than business support.

"Their most useful thing was almost acting as an axle around which other support became available".

Finally, the university approach does not utilise regional organisations/actors strategically during the process. Rather, academic entrepreneurs directly approach regional organisations/actors because of the limited support they receive from the process. The non-strategic use of the regional organisations/actors means that the transaction costs of engaging with regional organisations are significantly increased as academic entrepreneurs try to find the right individuals to engage with and to get the University's approval as an equity shareholder [43] . The majority of academic entrepreneurs explained this point:

"We ran up much bigger legal costs because of this whole process".

Third, there was also a difference in *how much* each process uses regional organisations/actors of the RIS. The regional process is somewhat dependent on regional organisations/actors as there is also 'in-house' business expertise within the incubator via incubator management actors. Internal business support, while complemented by regional organisations/actors, is also delivered by internal actors within the incubator. The majority of entrepreneurs explained this point:

"It is not purely about Science City Company (internal support), *it is also about your external support as I say people like X and…I spoke to X organisation…X organisation…all those…external companies…in the North East".*

The student incubation process, in comparison, is highly dependent on regional organisations/actors to function as the business support process is mostly delivered by bought-in external regional actors that provide business support to student entrepreneurs. One incubator management actor highlighted this point:

"Our model doesn't really rely on me having any first-hand experience, which is handy...We have business advisors and the business advisors we buy in from X organisation".

Finally, the university approach is inadvertently highly dependent on regional organisations/actors as a result of the lack of internal expertise and support provided to the academic entrepreneurs. This was explained in the above comment.

[43] While there was evidence that the university incubation process post-restructuring was positively changing which was discussed in the university incubation process section in the previous chapter, there was no evidence how this affected the use of the RIS in the process.

Fourth, a difference was also found in the *financial costs* incurred by the entrepreneurs from engaging with regional organisations/actors. In the regional incubation process, the transaction between the entrepreneurs and regional organisations/actors are not free but rather entrepreneurs have to pay for their services. Paying for regional organisations' services did not affect the entrepreneurs as the process is well-resourced and provides the entrepreneurs with funding to procure services. The majority of entrepreneurs explained this:

> *"The money…allows you to buy-in services for you to increase your knowledge, it takes you beyond yourself which is what it's all about, how can you package something which is going to increase in value which you can offer something which is worth something and money helped that. It was proof of concept funding where you could develop something and just show people, give people an example of what you can do".*

On the other hand, in the student approach, services acquired from regional organisations/actors are free services which the process negotiates for the benefit of the student entrepreneurs. This is beneficial for the student entrepreneur as the process is not well funded and would otherwise not be able to afford to pay for these types of services. The majority of student entrepreneurs highlighted this point:

> *"We managed to get £1500 worth of legal support which helped us with our privacy policy and terms...It was 1500 quid which we otherwise we couldn't afford".*

Finally, the transaction between the academic entrepreneurs and regional organisations/actors are not free in the university approach. However, unlike the regional process, the university process is not well-resourced and as a result, academic entrepreneurs found it more difficult to obtain the services of regional organisations/actors such as patent experts to progress their spin-off. The majority of academic entrepreneurs explained this issue:

> *"The big problem we are having…is that you don't have any funding for patents…if it is a new technology* (and) *you don't have patents then effectively you don't have a new technology because anyone else can just go and do whatever they like you have no protection and in the end someone can just come along and just sort of start doing it".*

Apart from the role of regional organisations and actors, there was also a difference between the processes in relation to the role of the socio-economic and cultural setting (specifically level of openness and mentality of regional organisations/actors, the entrepreneurial spirit of the region and regional talent) in each process. First, in regards to level of openness and the mentality of regional organisations/actors, in the regional

approach, regional organisations/actors were not open to engage with the entrepreneurs as a result of their tie to a regional incubator with regional development objectives. Private sector regional organisations expected the entrepreneur's services for free and public sector regional organisations with similar objectives were in competition with the entrepreneurs. This negatively affected the entrepreneurs as it was difficult to engage with regional organisations/actors and as a result they missed out on regional knowledge to develop their companies. The majority of entrepreneurs explained the difficulty they experienced when trying to engage with regional organisations/actors with a similar regional development objective:

> *"X organisation seem to think that they are in competition with Science City* (the regional incubator) *and therefore won't speak to someone from Science City...I tried to call. I tried to speak to them at conferences and they are all a bit like eww Science City...I know they try to support business start-ups and sustainability as well".*

In the student approach by comparison, while the level of openness and mentality of regional organisations/actors to engage was also low, it was not a result of the students tie to the University but rather that regional organisations/actors did not want to engage with students. This made it more difficult for the student entrepreneurs to develop their companies during the process. The majority of student entrepreneurs explained this issue:

> *"We tried to get in touch with someone that manages X…and he just doesn't return calls he is not really interested like it is just so frustrating. We could do a great job for them".*

Conversely, in the university approach, the mentality of the regional organisations/actors depended on the status of the academic entrepreneur. Senior academics had more external credibility than less senior academics which made it easier for them to engage with regional organisations/actors. Senior academics explained this point:

> *"I was in an unusual position* (senior within the university) *because I knew X personally you know it was different for me, and I was the immediate line manager of the head of X for example so it was possibly those things".*

Second, there was also a difference in the entrepreneurial spirit of the region and how it affected each process. In the regional process, the lack of entrepreneurial spirit of the region negatively affected entrepreneurs as regional organisations/actors were not willing to take risks on engaging and collaborating with the entrepreneurs. The majority of entrepreneurs explained this point:

"Just some people won't do things so like I am sure there are loads of things X could do for instance, could have got involved but they weren't willing to take any risk whatsoever".

In the student process, the lack of entrepreneurial spirit of the region meant that the student entrepreneurs were negatively affected while starting a business. However, unlike the regional process, it meant that student entrepreneurs were surrounded by regional actors with low aspiration levels. The majority of student entrepreneurs highlighted this issue:

"You are sitting on the bus, you are sitting on the metro you are talking to people not interested to talk so the whole idea of an entrepreneurial buzz is a PR campaign".

In the university process, academic entrepreneurs were less affected by the lack of entrepreneurial spirit in the region and more affected by the lack of entrepreneurial spirit in the University which created a discouraging entrepreneurship environment. The majority of academic entrepreneurs highlighted this point:

"It is not the city per say but it is the University".

Third, there was also a difference in how the lack of regional talent affected the three processes. In the regional approach, the entrepreneurs were the most negatively affected by the lack of regional talent as they were asked to source from regional organisations/actors as a result of the processes regional development objectives. The lack of regional talent meant the non-academic/student entrepreneurs were selecting from substandard service providers to develop their business. The majority of entrepreneurs explained this point:

"NSC has an allegiance to hiring people in the North East so it is a bit of a confliction because I want to get the best people to work on the project to get the best chance of success but because you have to try and hire people in the North East whenever possible…it is a whole horrible cycle of not being able to give your business the best opportunity. That is probably one of my frustrations".

Dissimilarly, in the student approach, the lack of regional talent did not seem to affect the student entrepreneurs. This may be because they were less frequently engaging with regional organisations/actors as a result of their lack of prior entrepreneurial experience. In the university process, the lack of regional talent affected the quality of CEOs the entrepreneurs could select to become part of their spin-off team. As a result, academic entrepreneurs were forced to take on CEOs without the right skill set to lead their spin-offs during the process. The majority of academic entrepreneurs reflected this point:

"They (the University) *tried to get a Commercial Director in and they suggested a number of people a carpet salesman whereas other people the University knew about who were I suppose considered to be entrepreneurial successful business men who for whatever reason were prepared to put a few hours in if we paid them a few hours to give us business advice and they were a disaster. I mean I won't say they were idiots they obviously weren't idiots but they knew NOTHING about what we were doing".*

The above discussion highlighted that there was a difference between the role of regional organisations/actors and the socio-economic and cultural setting in each process. The next section will discuss the differences between the three processes in relation to the entrepreneur type (i.e. non-academic/student entrepreneurs, student entrepreneurs and academic entrepreneurs) and their entrepreneurial characteristics (i.e. entrepreneurial experience, industrial experience, education and family background).

5.4 Entrepreneur type

Another recurrent theme that connected all three cases' differences was the entrepreneur type and their entrepreneurial characteristics. First, it was found that the entrepreneurs differed in their entrepreneurial experience which positively and negatively affected them during the processes. Across the three entrepreneur types, student entrepreneurs did not have entrepreneurial experience and found it more difficult to adapt the role of the entrepreneur than academic and the non-academic/student entrepreneurs. Second, the entrepreneurs also differed in the way they used their education in each process. Third, the entrepreneurs also differed in their family backgrounds which affected them during the processes. These findings will be discussed in more detail below.

First, in the regional process, the entrepreneurs were homogenous in relation to their prior entrepreneurial experience. This positively affected them during the process as they were more easily able to identify and reject opportunities, utilise business knowledge, access resources and engage with incubator management actors during the process. The majority of entrepreneurs with prior entrepreneurial experience highlighted this point:

"I guess yeah having gone through the start-up process (previously) *and…hitting a lot of barriers has really helped because the Science City process is quite a rapid one. You can't afford to go down the alley too far before your time runs out so it was useful to have gone through quite a complicated start-up and made those mistakes to be able to apply that sort of experience really".*

In the student incubation approach by comparison, student entrepreneurs were homogenous in relation to their lack of prior entrepreneurial experience. This negatively

affected their success in the process. Students had less confidence, lacked established networks and did not know when to engage with external actors to develop their ideas. They had more difficulty in their incubation process journeys. Overall, student entrepreneurs in comparison to the two other types found it more difficult to adapt to the role of the entrepreneur. The majority of student entrepreneurs explained this point:

> *"We didn't have any experience. We knew nothing…And we got into a lot of difficulties…We had to protect the IP. At this point, we hadn't even heard of what IP was. We were completely naïve".*

Finally, in the university-led approach to incubation, academic entrepreneurs were heterogeneous in relation to their prior entrepreneurial experience. Academic entrepreneurs with prior entrepreneurial experience had more confidence, business knowledge and needed less support during the process while the opposite was true for academics that lacked prior entrepreneurial experience. The majority of academic entrepreneurs with entrepreneurial experience explained this:

> *"It* (prior entrepreneurial experience) *gave me some experience about what is involved with setting up a company and how to run it and what are the legal challenges, administrative challenges and things. So once I kind of found that out, then it became easier to go for something bigger which was (the current company)".*

Second, it was found that entrepreneurs differed in the way they used their education in each process. In the regional incubation approach, the entrepreneurs utilised their education, specifically knowledge gained from their MBAs, to assess more easily opportunities during the process and develop their business ideas. The majority of entrepreneurs with MBAs highlighted this point:

> *"I noticed with all of the different IMs* (entrepreneurs) *most of them had MBAs so we all had an idea of how to develop ideas".*

Dissimilarly, in the student incubation process, prior education indirectly made the process easier for the student entrepreneurs as they were familiar with the University and North East region. They had more confidence to attend regional and University events. The majority of student entrepreneurs explained this point:

> *"I felt confident within the University grounds and stuff like that".*

Finally, in the university process, prior education, specifically a PhD, provided the technical know-how or competence which their business ideas were based upon. The majority of academic entrepreneurs reflected this point:

> *"I think the educational background supplied the core technical competence".*

Third, it was found that entrepreneurs differed in their family backgrounds and the amount they utilised their family background. While in the regional approach, the entrepreneurs did not have a prior family history in business, the student entrepreneurs in comparison all had family backgrounds in business which accommodated for their lack of entrepreneurial experience during the incubation process. Students continuously drew from their family backgrounds during the incubation process including business knowledge gained from their exposure to a family business. This contributed to an overall confidence in their decisions, an awareness of the realities of the start-up process, and an appreciation for the incubation processes resources. Student entrepreneurs explained the role of their family backgrounds in business:

> *"I guess having a background where you see people running their own businesses whether they are big or small successful or not you sort of it becomes inherent in your decisions".*

Finally, in the university approach, unlike the student entrepreneurs, academic entrepreneurs were heterogeneous in their family history in business. Academics with a family business used business knowledge and financial resources gained from their exposure to the business during the process while the opposite was true for academics that lacked a family business history. Academic entrepreneurs that lacked a family business background explained this point:

> *"I probably would have grown up knowing all these things but I don't unfortunately…I don't really have a family background which is very practical".*

The next section will discuss other themes that emerged from the data which demonstrated other important differences between the three incubation approaches. These themes include risk aversion, entrepreneurial knowledge, social capital, incubator management learning and duty of care all of which are discussed in the following sections (5.5 to 5.9).

5.5 Risk aversion

In looking across all three incubation models, another recurrent theme that connected all three cases differences was the *attitude towards risk.* In the regional incubation approach, risk was managed by incubator managers being selective in terms of who they selected to the process and how much support they gave spin-offs, with most going towards those sectors that tied into the overall raison d'être of the incubator. This meant that those peripheral to these sectors received less attention and had to be more self-

reliant. Some of the entrepreneurs that chose to start businesses outside the sectors of the objectives of the incubator highlighted this point:

> *"One spin-off, because it was engineering some people didn't see it as science...I thought it was quite a nice tie in with science but a lot of the time that company was shunned. I don't think we got any press for that spin-off. I don't think they released anything...I remember all the marketing for that company was done by myself because it wasn't something Science City felt they could spin out themselves...it just goes to show even within Science City different people support you in different ways depending on their confidence in that project so one spin-off, it tied in very well with NSC...the other spin-off not so much, therefore, I had less coverage, less support".*

In the student incubation process by comparison, risk was managed differently, by limiting the funds to student entrepreneurs in order to control the financial exposure for the University, as in this approach direct selectivity was not an option that was possible as each student had to be treated fairly. As a result, student entrepreneurs had to pool money from different sources in order to gather the capital they needed. The majority of student entrepreneurs explained this point:

> *"They are very much looking at…starting little and gaining enough money…£250 to do this whilst it is useful it is a really small way of thinking about it. It is taking companies along time…to get their money because they were pooling money from like competition wins different things like that and it is just like a long drawn out process".*

Additionally, in comparison to the university approach, the student incubation process is not risk-averse when deciding to go forward with supporting ideas as the level of risk is left to the student entrepreneur. One incubator management actor highlighted this point:

> *"Our job is not…to tell you* (the student entrepreneur) *your idea is good, bad and whether it's going to happen or not going to happen. Our job is to help you figure out whichever answer to that yourself. Even if you figure out that the idea isn't going to happen it doesn't mean we'd stop you from pursuing that idea because you might have a particularly open attitude to risk and you want to just go for it anyway. We're not going to stand in the way".*

Finally, in the university-led approach to incubation, risk dominated the operation of the model, manifesting itself in several ways in order to exert tight control, including a highly selective choice about which entrepreneurs to support and who not to support, common use of CDAs, tight control over IP, and restricted funding levels. This tended to have an adverse effect on the academic entrepreneur throughout the process. The majority of academic entrepreneurs highlighted this point:

> *"It* (the process) *was really not geared towards helping anybody. It was geared towards protecting the University from any potential risk which entrepreneurship is all risk-based".*

The above discussion highlighted that each process has a different attitude to risk and these different approaches affect the entrepreneurs in each process. The academic entrepreneurs were the most negatively affected by the university incubation processes attitude towards risk as it manifested itself throughout their incubation experience. The next section will discuss the differences in the theme of the development of the entrepreneur's entrepreneurial knowledge.

5.6 Entrepreneurial knowledge

Another recurrent theme that connected all three cases differences was the development of the entrepreneur's entrepreneurial knowledge. In the regional approach, while entrepreneurs were provided access to a small amount of seminars and workshops, the development of the entrepreneur's entrepreneurial knowledge was not a main priority as a result of the processes short incubation period (six to twelve months). However, it was found that the entrepreneurs were less concerned with learning type resources as they entered the process with prior entrepreneurial experience and were more concerned with practical help related to their specific businesses. The majority of entrepreneurs explained this point:

> *"There was access to that* (seminars) *but I just find them a bit useless. What you need is practical help"*.

In the student incubation process by comparison, the development of the student entrepreneur's entrepreneurial knowledge was a priority to address their lack of prior entrepreneurial experience. The process facilitated access to a plethora of external workshops and seminars as well as organised internal workshops and business plan competitions to enable the students to acquire appropriate business knowledge during the process. The majority of student entrepreneurs highlighted the benefit of the access to workshops:

> *"I attended the…Newcastle University Enterprise Programme which was in the evenings on a Tuesday and Thursday from 6 till 8 and local entrepreneurs would come in and tell their story how they had been successful and there was workshops after that so I attended most of those which…was very useful"*.

Finally, on the contrary, in the University-led approach to incubation, the development of the academic entrepreneur's entrepreneurial knowledge was not a priority due to the processes limited resources. As a result, the academic entrepreneurs with no prior entrepreneurial experience were forced to utilise external resources to develop their entrepreneurial knowledge. Interestingly, an academic entrepreneur explained that she

utilised the seminars organised by the student incubation process to develop her knowledge and acquire business expertise. The majority of academic entrepreneurs highlighted that the university model did not provide any support or tools towards idea development:

> *"I think universities have no culture of this* (idea development) *'cause it will be, your idea isn't good enough. How can we shape it to become better…that is a really different mindset"*.

The above discussion highlighted that there are differences between the three incubation processes in relation to their emphasis on the development of the entrepreneur's entrepreneurial knowledge. The next section will discuss the differences in the theme of social capital.

5.7 Social capital

The theme of *social capital* also connected all three cases differences. In the regional incubation approach, the development of the entrepreneur's social capital involved providing the entrepreneurs with access to networking events, regional and national contacts and a panel of regional entrepreneurs. The regional networks leveraged by the entrepreneurs were mostly facilitated by actors involved in the incubation process. The majority of entrepreneurs highlighted the benefit of access to the processes network:

> *"I think the network is quite valuable certainly in Science City and that has helped me while I was there and since, the network of the First Fridays and people who I have engaged with and who have helped me with my project now so that is really a very positive result from working with Science City I think"*.

In the student approach by comparison, the development of the student entrepreneur's social capital dominated the operation of the model, manifesting itself in several ways, including delivering most of its business support by regional actors, providing access to and establishing its own networking events and facilitating introductions to regional actors through an established panel. The majority of student entrepreneurs explained the benefit of the introductions by the process:

> *"I…have been introduced to…a venture capital firm right back at the very beginning and again the Careers Service basically facilitated that introduction and that was at a networking event…So through being with the Careers Service and going to the networking events that they held we were already known to the venture capital firms which I think is very helpful when it comes to actually pitching for investment because they obviously need to know that you have a very good track record, you are not just a stranger"*.

Finally, in the University-led approach to incubation, the development of the academic entrepreneur's social capital was not a priority of the process because of the common use of CDAs and tight control over IP. This tended to have an adverse effect on the academic entrepreneur as it did not enable them to engage easily with potential collaborators to develop their businesses. The majority of academic entrepreneurs highlighted this point:

> *"I would say just go back and have a look at the roots of most universities in Northern industrial towns like Newcastle, it was funded by local business people like…Lord Armstrong…Armstrong wasn't signing CDAs. He would meet them…in the local community so I think a civic university encourages its people to get out to form those connections and doesn't worry about IP…That's how business happens. You meet someone you talk to them you get some ideas, you think you can work together…If you bump into somebody and say oh I can't talk to you until my business development guy sends you a CDA which you have to sign, the University CDAs are things like, I have never seen anything like it".*

The above discussion highlighted that there are differences between the three incubation processes in relation to their emphasis on the development of the entrepreneur's social capital. The next section will discuss the differences in the theme of incubator management learning.

5.8 Incubator management learning

Incubator management learning was also found to be an important theme which differed across the three incubation processes. In the regional approach, strategic management learning was purposely built into the selection[44] and business support components[45] of the process which both changed over time to *"refine"* and *"improve"* the overall incubation experience for the entrepreneurs. The strategic management learning is explained by an incubator management actor:

> *"With the first group* (of entrepreneurs) *it was pretty much we were trialling it for the first time and we learned from that and you try to improve when you are working with the second group and then when you are working with the second group you do certain things that you didn't do with the first group and you try to improve on that and you learn something new which you then try to take to the third group which is what we have done as well so we have been learning".*

[44] One example of learning in the selection process is reflected in the continuous change of the selection criteria utilised to recruit entrepreneurs to the process (see section 4.1.1 for an in-depth discussion on this point).

[45] An example of learning in the business support process is the change to the actors involved in the process (see section 4.1.1 for an in-depth discussion on this point).

The entrepreneurs from the first group of entrepreneurs that went through the regional incubation process and were exposed to support changes during the process highlighted how they benefited from the newly introduced support:

> *"Later on they introduced the innovation panel. They started to bring in a panel of experts from industry which could help you evaluate your proposition further. I thought that was really handy".*

In the student approach by comparison, it was found that there was less strategic incubator management learning during the process. An incubator management actor explained that the process remained relatively the same over a four year period:

> *"Well it has evolved…in the past we never had the development officers, and it was very much a case of students and grads would come in, and their first port of call would be the business advisor. That was my experience when I first started in 2008, so reception would book the appointment and then you'd deal with anybody and everybody, and it's only been really over the last year that they've put in place this new process of utilising the interns more and better…I think it changed because it made sense to change, and because of the staff that you have, it makes sense to use them and to use what they're good at".*

This meant that the process changed less over time to accommodate the needs of the student entrepreneurs which negatively affected them during the process. Some of the student entrepreneurs explained this point:

> *"They kept trying to fit us into this mould, you have to fit into this mould but the mould wasn't the shape for us".*

Finally, in the university incubation process, there was no evidence that there was any incubator management learning. Rather, the experiences of the academic entrepreneurs highlighted that the process, until its recent restructuring, has remained relatively "suboptimal" with many of the same BDMs who started in 2003 delivering poor quality business support. The majority of academic entrepreneurs highlighted this point:

> *"I would say absolute minimum* (amount of support)*…on a scale from 1 to 10, it was about 1".*

The above discussion highlighted that there are differences between the three incubation processes in relation to incubator management learning which affected the entrepreneurs differently during the processes. The next section will discuss the differences in the theme of duty of care.

5.9 'Duty of care'

In looking across all three business incubation models, another recurrent theme that also connected all three cases differences, was *duty of care* or support provided to the entrepreneurs 'to protect' them during the processes. While the notion of duty of care was not found in the regional approach, it manifested itself differently in the student and university incubation process. In the student approach, duty of care meant that student entrepreneurs, which were not yet considered *"adults"* by the university, were provided with a long-term perspective on the challenges of starting a business to protect the students from any future negative repercussions. This point is reflected in an incubator management actor's comments:

> *"There's a great deal of care put into the whole process…there is that sense of duty of care that you have at the University…Usually I make clients aware that running a business is not often easy. We have a duty to make them aware of things that can go wrong, e.g. partnerships have a habit of splitting up, just as relationships in real life don't last forever".*

This type of support was welcomed by the student entrepreneurs and made them feel that they could count on the process to look out for their interests and needs at all times during the process. The majority of student entrepreneurs highlighted this point:

> *"I think it is fair to say that the Careers Service always looked after us…They were very much holding our hands".*

On the contrary, the university incubation processes use of duty of care was focused on limiting the amount of time the academic entrepreneurs could spend on developing their spin-off to protect the University, its objectives and manage the potential impact of the creation of a spin-off on the academic's other duties such as teaching, administration and research activities. This negatively affected the academics during the process as they were not given sufficient time to develop their spin-offs. The majority of academic entrepreneurs explained this point:

> *"You may be able to negotiate half a day off in a week. You and I know that you cannot run a business, a start-up needs far more than half a day a week. You couldn't even run a tea shop on that. So my question is what do they expect you to do".*

The above discussion highlighted the differences between the three incubation processes in relation to how duty of care is manifested in each process.

5.10 Conclusions

From the comparative analysis of the three incubation processes across the constructs discussed above, it was found that there are important differences between the processes which affect the successful incubation of entrepreneurs (see Table 5.1 for an overview). First, there were differences found between (selection) components of each process which affect the way entrepreneurs are able to engage with the processes. Second, how the components (the selection process and business support process) of each process function also differed. Third, differences were found in relation to the processes objectives and resources and how these differences affected the entrepreneurs during the process. Fourth, the non-academic/student, student and academic entrepreneurs differed in their entrepreneurial experience, education and family background. Finally, there were also differences found between the role of the RIS in each process, specifically the *types* of regional organisations each process used, *how* each process used regional organisations/actors, *how much* each process utilised regional organisations/actors and the *financial costs* the entrepreneurs incurred as a result of utilising regional organisations/actors.

Original Constructs	**Regional Incubation Process**	**Student Process**	**University Process**
Incubation process	*Selection process* - Relatively discerning - Selection criteria: business idea and entrepreneur's competences - Entrepreneur plays an active role - Multiple actors (internal and external) in the decision making process - Time frame standardised *Business support process* - Actors delivering support have prior entrepreneurial experience - Support delivered in broad range of co-production modalities - Entrepreneurs physically incubated - Availability of innovation resources	*No selection process* *Business support process* - Most actors delivering support do not have prior entrepreneurial experience - Support delivered in one type of co-production modality - Student entrepreneurs are not 100% physically incubated - No availability of innovation resources	*Selection process* - Highly selective and risk-averse - Selection criteria: business idea - Academic entrepreneurs does not play an active role - One actor (internal) in the decision making process - No standardised time frame *Business support process* - Most actors delivering support do not have prior entrepreneurial experience - No co-production - Academic entrepreneurs are not physically incubated - No availability of innovation resources
Incubator objectives and resources	New venture creation is primary objective Well-resourced process	New venture creation is secondary objective Not a well-resourced process	New venture creation is tertiary objective Not a well-resourced process
The role of the regional environment	*Regional organisations* -Mostly used private sector regional organisations -Strategically utilised regional organisations -Somewhat dependent on regional organisations	*Regional organisations* - Mostly used public sector regional organisations -Strategically utilised regional organisations -Highly dependent on regional organisations	*Regional organisations* - Mostly used public sector regional organisations -Unstrategically utilised regional organisations -Inadvertently highly dependent on regional organisations

The role of the regional environment	-Transaction costs for entrepreneurs to engage with regional organisations are not free *Socio-economic and cultural setting* - Regional organisations not open to engage with entrepreneurs because of tie to regional incubator - Lack of entrepreneurial spirit meant the regional organisations/actors not willing to take risks on collaborating - Lack of regional talent affected quality of organisations/actors	-Transaction costs for student entrepreneurs to engage with regional organisations is free *Socio-economic and cultural setting* - Regional organisations not open to engage with student entrepreneurs because of their student status - Lack of entrepreneurial spirit meant student entrepreneurs surrounded by individuals with low aspiration levels - Lack of regional talent did not affect student entrepreneurs	-Transaction costs for entrepreneurs to engage with regional organisations are not free *Socio-economic and cultural setting* - Willingness of regional organisations to engage with academic entrepreneurs depended on their status - Academic entrepreneurs affected by lack of entrepreneurial spirit in University rather than region - Lack of regional talent affected quality of CEOs academic entrepreneurs could choose
Entrepreneurial characteristics	- Entrepreneurs are homogeneous in relation to prior entrepreneurial experience and are positively affected by their prior entrepreneurial experience - Entrepreneurs are positively affected by their education; used education to assess opportunities and develop business ideas - Entrepreneurs had no prior family backgrounds in business	- Student entrepreneurs are homogeneous in relation to no prior entrepreneurial experience - Student entrepreneurs are positively affected by their education which indirectly made them more familiar and confident with the university and the region - Student entrepreneurs were homogenous in their prior family backgrounds in business and are positively affectively by prior family business backgrounds; used family to accommodate for lack of entrepreneurial knowledge	- Academic entrepreneurs are heterogeneous in relation to prior entrepreneurial experience and are positively affected by their prior entrepreneurial experience - Academic entrepreneurs are positively affected by their education; used their education (PhD) to provide technical know-how which business ideas were based upon - Academic entrepreneurs were heterogeneous in their prior family backgrounds in business and are positively affected by their prior family backgrounds in business

Table 5.1: Summary of findings from original constructs and how they differ across each process type (Author's own)

In addition to the four original constructs utilised to compare the three processes, five other constructs were found which also explain essential differences between the processes (see Table 5.2 for an overview).. First, the theme of risk aversion manifested itself differently in each process. Second, there were differences found in the three processes approach to developing the entrepreneur's entrepreneurial knowledge and social capital. Third, incubator management learning differed across all three processes which affected the entrepreneurs during the process. Another theme which explained differences across the three approaches was 'duty of care' or type of support to protect the entrepreneurs during the process.

The next Chapter will focus on the discussion which will address the research questions and explain how the findings from the comparative analysis of the three incubation processes discussed above and from the individual incubation process analysis in Chapter 4 contribute to the existing literature.

Inductively-derived constructs	**Regional Incubation Process**	**Student Incubation Process**	**University Incubation Process**
Risk aversion	Low approach to risk - Selective selection process	Medium approach to risk -Restricted funding levels	High approach to risk - Highly selective selection process - Common use of CDAs - Control IP - Restricted funding levels
Entrepreneurial knowledge	Somewhat of a priority - access to seminars and workshops	Priority - access to a plethora of workshops and seminars	Not a priority - Limited resources - academics getting knowledge elsewhere
Social capital	Somewhat of a priority - Access to networking events, external contacts - Facilitated by incubation management actors	Main Priority - Most of business support delivered by regional actors - Access to networking events and established its own -Facilitated introductions to regional actors	Not a priority - Common use of CDAs
Incubator management learning	Strategic management learning - built into selection and business support process	Limited strategic management learning	No learning
Duty of care	Did not use duty of care	Positive use of duty of care - Student entrepreneurs provided with long term perspective on challenges of starting a business	Negative use of duty of care - Academic entrepreneurs limited in time they could spend on spin-off to protect other duties such as teach, administration and teaching activities

Table 5.2: Summary of findings from inductively-derived constructs and how they differ across each process type (Author's own)

Chapter 6: Unpacking Incubation: A Conceptual Model

In the previous empirical Chapters 4 and 5, the three incubation processes under study in this thesis were discussed and compared across four deductively-derived constructs (the incubation process, the incubator's objectives and resources, the entrepreneur and the role of the RIS) and five inductively-derived constructs (risk aversion, entrepreneurial knowledge, social capital, incubator management learning and duty of care). The purpose of this chapter is to address the research questions outlined in Chapter 1 by linking the findings from the previous two chapters -- that reported on within- and across-case studies -- to the conceptual model of the incubation process sketched out as an output of the literature review in Chapter 2. The empirically elaborated incubation process model is summarised in Figure 6.1.at the end of the chapter. It outlines how the different components inter-relate and specifies the nature of key construct effects on potential new venture creation in the context of the incubation process. The conceptual model adopts an integrated approach accounting for the incubated entrepreneur and their experience and background, the objectives and resources of the organisation that provides incubation support, the regional context the process is based within and the internal components of the process, examining how these elements work together in an integrated way to affect incubation. It also includes the inductively-derived constructs which stemmed from the empirical analysis. This model provides a more holistic perspective on how the incubation process functions as it attempts to conceptualise and discuss all of the components that affect successful incubation. To ensure clarity for the reader, each of these relationships is numbered in the text below (e.g. [1]) as well as in the model. In each numbered section, the original research question is outlined and addressed through propositions which have been developed from this starting point apart from research question two (*How do incubation processes differ?)* which is addressed throughout this chapter. The reason for this is because there were differences found between incubation processes across all of the constructs.

6.1 Incubation process components [1]

As mentioned in the literature review in Chapter 2, there is a shortage of studies devoted to analysing the incubation process (Hackett and Dilts, 2004b). Existing studies use

different terms for the process components which suggests there is little consensus in the literature on the elements that make up the incubation process.

Some studies include actors such as the incubator manager and entrepreneur in their conceptualisations, while others just include sub-processes such as the business support process or the selection process. These sub-processes are often not discussed in detail. Based on this gap, the first research question was developed: *How does the incubation process function?* Section 1.1 and 1.2 specifically address this research question.

Selection process [1.1]

The selection process is the beginning of the incubation process and is utilised by incubator management actors to select entrepreneurs to be supported by the process (Hackett and Dilts, 2004a). Existing literature does not provide an in-depth understanding of the selection component and often uses different terms to describe it in process models - e.g. 'selection and monitoring' (Campbell et al., 1985) and 'selection performance' (Hackett and Dilts, 2004a, Hackett and Dilts, 2008). Additionally, there is little consensus in the literature on the actors or selection criteria involved in the decision-making process as some studies suggest it is one actor such as the incubator manager (Smilor, 1987) or more than more actor (Rasmussen and Sørheim, 2006).

It was found that incubator management actors utilise selection criteria to recruit entrepreneurs to the process which may include criteria based on the entrepreneur's characteristics and/or the business idea. The use of multiple selection criteria, (e.g. focused on the idea and the entrepreneur) was found to represent a more effective selection process and positively affected potential new venture creation. The reason for this is that focusing on both the idea and the entrepreneur enabled incubator management to screen for both the quality of the individual, who is the key actor incubated and who has a particularly important influence on the ability of ventures to spin-off from the incubation process (Phan et al., 2005), and the quality of the idea which is the seed which the entrepreneurs developed into a spin-off during the process. For the entrepreneurs, the use of multiple selection criteria positively affected their ability to succeed in the incubation process for two reasons. First, the focus of the criteria based on their capabilities means that they were highly involved in the selection process. This enabled them to understand what their potential role will be in the process, to obtain initial feedback on their business ideas and to engage with incubator management actors to gain a sense of their capabilities. It also enabled incubator

management actors to get a better sense of the entrepreneurs' capabilities and their willingness and motivation to pursue their idea (Patton et al., 2009). Second, the focus on the criteria based on their idea means they entered the process with a proposal that they established and were highly motivated to develop. This finding supports the findings from Aerts et al (2007) that a selection process that uses multiple selection criteria is a balanced screening process and positively affects tenant survival rates. However, the findings in this thesis shed light on why the use of multiple selection criteria positively affects the success of potential new venture creation.

It was also found that the selection process is moderated by the involvement of incubator management. Processes that use multiple actors in the selection process are able to utilise a wider pool of people to judge the right candidate increasing the entrepreneur's chances of success. This means that more people will have screened the idea before it enters the incubation process. This insight supports the findings from Aerts et al (2007) that a selection process that considers multiple decisions makers is a more balanced screening process. Based on the above discussion, the following proposition was developed to address the first research question:

P1: The higher the degree of involvement of incubator management and the use of multiple selection criteria, the more effective the selection process, and the more likely the success of potential new venture creation.

It was also found that there were differences in the selection process components between the three incubation process types which is a reflection of differences in the objectives of the process, the stages of the process, selection criterion, the number of actors involved in the decision making and the time frame of the process. First, it was found that the objectives of the process determined if a process utilises a selection process and how the process structured their selection process. The regional incubation process, to achieve regional development objectives, used a discerning selection process to recruit competent entrepreneurs to limit their failure rate (Aerts et al., 2007). The implication for the non-academic/student entrepreneurs was that while there was an initial barrier to engage with the process, it also meant that if they were selected to the process, they had more credibility with external regional organisations/actors. This helped them more easily develop their spin-offs during the incubation process. In the university process, creating spin-offs was a third strand objective that created a risk-averse selection approach. The selection process was utilised to block academic entrepreneurs from creating a spin-off to protect the University. The implication for the

academic entrepreneurs was there were exceptionally high barriers for them to engage with the process. Unlike the two other processes, the student process did not use a selection process as its main objective was to build the entrepreneurial capacity of the student entrepreneurs. The lack of a selection component meant that there low barriers for the student entrepreneurs to engage initially with the process. This correlates with the findings from Aerts et al (2007) that not all incubators have a selection component as it may vary with the mission and objectives of each incubator (Smilor, 1987).

Second, there were differences in the stages the entrepreneurs were required to go through across the three process types. The stages that entrepreneurs go through during the selection process have barely been discussed in the literature. In the regional process, entrepreneurs are required to go through multiple stages during the selection process.[46] The steps included a preliminary telephone interview with incubator management actors, psychometric testing, a personality questionnaire, a second interview and a presentation to external regional actors who sit on the selection committee. The entrepreneur was highly involved in the process. In the university process, the academic entrepreneurs were required to go through one stage during the selection process. This included a meeting with the BDM to discuss their idea and filling out an IRQ form to formalise it. The lack of involvement of the academic entrepreneurs in the university process negatively affected potential venture creation as it affected their ability to understand the process, how they would potentially be supported and did not enable the BDM to engage properly with the academic to evaluate accurately their ideas.

Third, there was also a difference found in the selection criteria used across the three processes. For regional and university incubators, the literature suggests that both types utilise selection criteria based on market and personal factors (Lumpkin and Ireland, 1988). The findings here contradict this point as it was found that the regional and university processes differ in their selection criteria. The regional processes criterion focused on the entrepreneur's individual competences and the potential business idea or multiple factors representing a more balanced screening process (Aerts et al., 2007). The university process only selected entrepreneurs based on the business idea or one factor which represented an unbalanced screening process.

[46] It was also found that the stages change over time as a result of incubator management learning to better accommodate the incubator's objectives. This will be discussed in-depth in the incubator management learning Section 1.3.

Fourth, the number of decision makers in the selection processes also differed across the three incubation processes. In the regional process, there are multiple actors (both internal and external) involved in selection decision to have input from more than one actor to increase the chances of incubatee survival. The university process used one decision maker at the beginning of the selection process (e.g. the BDM) to select academic entrepreneurs to the process which represented an unbalanced screening process. The University's approach had a negative effect on the academic entrepreneurs as essentially the BDM acted as a gatekeeper for commercialisation and put 100% power and control in the hands of one actor.

Business support [1.2]

After the entrepreneurs go through a selection process and are accepted into the incubation process, it was found that the rest of the process is focused on providing access to different types of business support. Existing literature does not provide an in-depth understanding of the business support component and often uses different terms to describe it in process models - e.g. 'monitoring of business services' (Campbell et al., 1985), 'support systems' (Smilor, 1987), 'co-production' (Rice, 2002) and 'monitoring and business assistance intensity' (Hackett and Dilts, 2004a, Hackett and Dilts, 2008). The main types of business support include physical resources, business development resources, innovation resources, financial resources and learning resources[47]. This links with existing incubation literature which also found these to be the main types of business support offered during the incubation process (vonZedtwitz and Grimaldi, 2006).

Business support is delivered by incubator management and regional organisations[48]. It was found that a more effective business support process involved incubator management actors with prior entrepreneurial experience. The reason for this is that incubator management actors with entrepreneurial experience positively affected the entrepreneur's readiness for co-production (Rice, 2002) as they had more credibility with the entrepreneurs which increased their willingness and motivation to engage. It was also found that incubator management actors that utilised a *broad* range of co-production modalities (i.e. "reactive crisis intervention", "proactive crisis intervention

[47] Financial resources and learning resources are discussed in-depth below.

[48] The role of regional organisations/actors will be discussed in depth in Section 6.2.

and proactive developmental intervention") positively affected the entrepreneurs as it enabled them to engage with incubator management actors in different ways at different points of their incubation journey (Rice, 2002). This confirms Rice's (2002) finding that the use of a broader range of co-production modalities is important as it can lead to more positive incubation outcomes (Rice, 2002). Based on the above discussion, the following proposition was developed to address the first research question:

> **P2: The broader range of co-production modalities used by incubator management with entrepreneurial experience, the more effective the business support process, and the more likely the success of potential new venture creation.**

It was also found that there are difference in the business support process of the three incubation processes including the types of business support offered, the entrepreneurial backgrounds of incubator management delivering the support and the way business support is delivered. First, it found that there are differences in the types of business support incubation processes offer to entrepreneurs. This finding contradicts existing literature which suggests that incubators offer the same services (Bergek and Norman, 2008, Bruneel et al., 2012) and follows the findings from vonZetwitz and Grimaldi (2006) that there are differences in the service profiles of incubators. These include four main types of business support: physical resources, innovation resources, financial resources and learning resources[49]. In relation to physical resources, it was found that the regional incubation process physically incubates the non-academic/student entrepreneurs 100% of the time in an incubation space within the incubator which includes desk space, computers, printers and meeting rooms. The benefit of the entrepreneurs being physically incubated is that it means they are co-located with incubator management actors and can engage as and when they need support (Rice, 2002) positively affecting potential new venture creation.

The student process does not focus on the physical incubation of student entrepreneurs but rather provides students access to desks, computers, printers and meeting rooms on an appointment basis. This means that unlike the entrepreneurs from the regional process, the student entrepreneurs do not spend 100% of their time in an incubation space and are not co-located with incubator management actors which made it more difficult to build a relationship with incubator management actors and get the support they needed when they needed it. The academic entrepreneurs from the university

[49] Financial resources and learning resources are discussed in-depth below.

incubation process are also not physically incubated but are rather based in their siloed academic departments which also made it difficult for them to engage with the BDMs and build a relationship to obtain business support, negatively affecting potential new venture creation. The importance of co-location supports the findings from Rice (2002) who found that co-location is significant for the engagement between incubator management and entrepreneurs.

The other type of support difference is the incubation processes provision of innovation resources. There are limited incubation studies that discuss innovation resources[50]. This is surprising as innovation resources are discussed as being important for new venture creation specifically at the earlier stages of entrepreneurial processes such as opportunity recognition and evaluation (Bessant and Tidd, 2007). In the regional incubation process, innovation resources including an innovation framework developed by the incubator's CEO and access to idea databases played an important role to help the entrepreneurs develop high-growth spin-offs, especially at the beginning of the process when the entrepreneurs were evaluating potential business ideas. These types of resources benefited the non-academic/student entrepreneurs as they helped facilitate the opportunity recognition and evaluation process, shortening the incubation time frame. This was particularly important for an incubation process with a short incubation window. In the student and university process, innovation resources were not provided. The lack of innovation resources was found to affect negatively both entrepreneur types' opportunity recognition and evaluation process. In relation to the university incubation process, this finding is similar to a recent by study Harrison and Leitch (2010:1253) that found that the university support for venture development, in identifying the market opportunity for a particular idea or technology, is significantly lacking which suggests that "commercial decisions are taken without access to all of the appropriate expertise and advice". This suggests that the student and university incubation processes need to provide more innovation resources to their entrepreneurs.

Second, there were also differences found in the entrepreneurial backgrounds of incubator management delivering the business support. The literature suggests that the delivery of quality business support during the incubation process depends on the

[50] There are two exceptions. One is a conceptual paper by Hackett and Dilts (2004a) that mentions that incubators may help in the macro-management of the innovation process. However, no further explanation is given. The other is a policy report from the EU (2010) which highlights innovation-based incubators.

background and proficiency of incubator management actors (vonZedtwitz and Grimaldi, 2006, Rice, 2002, Nolan, 2003). Previous studies found that incubator actors delivering support in publicly-funded incubators, such as regional incubators and university incubators, have no entrepreneurial experience and, therefore, were less able to transfer competencies and knowledge directly to their incubatees (vonZedtwitz and Grimaldi, 2006). While the findings from this thesis confirm that incubator management actors with entrepreneurial experience positively affect the entrepreneurs during the incubation process, the findings suggest that incubator management actors across public sector incubators are heterogeneous in relation to their entrepreneurial experience.

In the regional incubation process, it was found that incubator management actors have prior entrepreneurial experience which had a positive effect on the entrepreneur's readiness for co-production or willingness to positively engage affecting potential new venture creation (Rice, 2002). In the student incubation processes, most of the incubator management actors do not have prior entrepreneurial experience but rather have experience of delivering support in a public sector environment. This negatively impacts potential new venture creation as it affects the student entrepreneur's readiness for co-production as they are less willing to engage with actors without entrepreneurial experience (Rice, 2002). Finally, in the university incubation process, it was found that most of the BDMs do not have prior entrepreneurial experience which meant they were less able to provide appropriate business support to the academic entrepreneurs and were less in touch with the realities and requirements for succeeding in business. This correlates with the findings from an existing study from Siegel et al. (2003) which found that academic entrepreneurs expressed dissatisfaction with the skills of TTO personnel. This suggests that incubation processes should recruit incubator management with entrepreneurial experience.

Finally, there was also a difference found in the way business support was delivered by incubator management actors across the three processes. Existing literature suggests that the way business support (e.g. modes of co-production) is delivered by incubator management actors is important as it can lead to different incubation outcomes (Rice, 2002). The findings from this thesis confirm this point but also highlight that there are differences in the way business support is delivered by incubation process types. The regional incubation process utilises a *broad* range of co-production modalities (i.e. "reactive crisis intervention", "proactive crisis intervention and proactive developmental intervention") which positively affected the entrepreneurs as it enabled them to engage

with incubator management actors in different ways at different points of their incubation journey (Rice, 2002). In the student incubation process, the business support was delivered in *one* type of interaction (i.e. "reactive crisis intervention") where the student entrepreneurs requested help with an issue or a problem and the business support is of a limited duration (Rice, 2002:174). Incubator management actors were not proactive in initiating the engagement with the student entrepreneurs. In the university incubation process, there was no co-production between the BDMs and the academic entrepreneurs as the BDMS were not collaborative in their approach when engaging[51]. This negatively affected the academic entrepreneurs during the process as it did not enable them to get the business support they needed from the BDMs which affected potential venture creation.

Incubator management learning [1.3]

While this theme was not included in the original model discussed at the end of Chapter 2, it inductively emerged from the data as important for understanding the incubation process. The theme of learning in existing incubation literature focuses on how incubators facilitate entrepreneurial learning in the firms they incubate (Patton and Marlow, 2011, Warren et al., 2009). However, there are limited studies that discuss incubator management learning. The organisational learning literature highlights that learning within organisations is associated with the development of new knowledge which is essential for firm innovation capability and firm performance (Hurley and Hult, 1998, Calantone et al., 2002) and to satisfy the needs of customers. The findings from this thesis link with this literature and highlight that incubator management learning is important for refining the selection and business components of the process to work better for the benefit of the entrepreneurs and potential new venture creation. Incubator management learning facilitates improvements in the use of appropriate selection criterion used during the selection process and the types of business support offered. The findings contradict those from a recent study from Bruneel et al (2012) which suggests that individual incubators do not change over time and highlight that changes to the incubation process are necessary to improve the process and delivery of services for entrepreneurs.

[51] As was mentioned previously, there was evidence that this was changing.

The findings also highlight that incubation processes differ in their levels of learning and who incubation processes learn from which affects potential new venture creation. In the regional incubation process, *strategic* management learning was built into the selection and business support components of the processes which changed over time to refine and improve the overall incubation experience for the entrepreneurs. The learning that took place was based on *internal* learning from past incubatees or individuals going through the process. Strategic learning is highlighted as specifically important to firms as it enables the use and leveraging of knowledge within and across the boundaries of organisations to its greatest strategic advantage (Sánchez and Heene, 1997). However, in the student and university process, there was little or no incubator management learning which meant the processes changed less over time to accommodate the needs of the student and academic entrepreneurs. In the student process, the little learning that did occur was based on *external* learning from regional actors and experience of other firms rather than past incubatees. This suggests that the student and university process should build more learning in their processes as it is affects potential new venture creation.

Risk Aversion [1.4]

While this theme was also not included in the original model discussed at the end of Chapter 2, it emerged inductively from the data as important for understanding the incubation process. The theme of risk aversion has rarely been discussed in the incubation literature. The findings from this study highlight the importance of considering how different entrepreneurial contexts (e.g. incubation processes) approach risk as it was found to affect potential new venture creation. Risk aversion in the incubation processes moderates the way incubator management select entrepreneurs to the process and how they deliver business support. However, it was also found that all three processes differed in the level and approaches to risk aversion. Out of the three processes, the university incubation process had the highest level of risk aversion which dominated the operation of the model. Risk aversion manifested itself in several ways in order to reduce the University's risk including a highly selective choice about which entrepreneurs to support and who not to support, common use of CDAs, tight control over IP and equity and restricted funding levels. This approach to risk aversion had the most negative effect on the academic entrepreneurs during the incubation process as it limited their ability to engage with external actors, increased transaction costs with service providers, slowed down the incubation process, limited the amount of support

they received and created a risk aversion culture in the University around commercialisation. This suggests that including a highly risk-averse approach in incubation processes is counterproductive to potential new venture creation. This finding is similar to existing literature around university commercialisation which highlights that universities may be diminishing and counterproductive to the spin-off process (Harrison and Leitch, 2010) as they adopt an extremely conservative negotiation stance in regards to IP and risk aversion which negatively affects start-ups that need to respond quickly to changes in the competitive environment (Siegel et al., 2003).

Despite being located within the same organisation (i.e. the University), it was found that the student incubation process took a completely different approach to risk aversion than the university incubation process. The student process maintained a low level of risk aversion in comparison to the university process as it did not have a selection process leaving risk decisions to the student entrepreneur. It also did not take an IP stake from the student's ideas which had a positive impact on the student entrepreneurs as they felt encouraged by the process to continue with their ideas rather than the process being a barrier[52]. In the regional process, the approach to risk aversion was also relatively low in comparison to the university process. While, the attitude to risk was mostly focused on selecting the right entrepreneurs through a balanced screening process and criteria, the process also demonstrated negative risk-averse practices. This included limiting the amount of support they provided to entrepreneurs who started businesses not directly related to the incubator's required sectors. These negative practices stemmed from their large dependency on public funding and the need to look good in the eyes of policy actors in order to gain increased income and demonstrate objectives (Aaboen, 2009). The above suggests that the incubation processes should maintain low levels of risk aversion as processes with high levels of risk aversion will negatively affect potential new venture creation.

Duty of Care [1.5]

'Duty of care' has also not been discussed in the incubation literature. While this theme was not included in the original model discussed at the end of Chapter 2, it also emerged inductively from the data as important for understanding the incubation process. The findings from this thesis suggest that duty of care moderates the way

[52] The one exception is that postgraduate students were required to discuss their ideas with the TTO to determine if the University would take an IP stake.

incubator management actors engage with entrepreneurs during the incubation process. However, there were differences in the way duty of care manifested itself across the three processes.

While it was found that the regional incubation process did not exercise the use of duty of care, there were differences in how the student and university incubation process exercised duty of care. In the student process, duty of care was used to protect the students from any future negative repercussions stemming from new venture creation by providing them with a long-term perspective on the challenges of starting a business. This positive use of duty of care provided the students with an intangible sense of encouragement during the process which gave them the confidence to continue developing their businesses.

However, in the university process, duty of care was exercised in a negative manner by limiting the amount of time the academic entrepreneur could spend on developing their spin-off during the process to protect the *University*, its objectives and manage the potential impact of the creation of a spin-off on the academic's other duties such as teaching, administration and research activities. This was found to affect negatively the academic entrepreneurs as they were not given sufficient time to develop their spin-offs during process. This finding suggests that universities are still not willing, unconditionally, to prepare the way for academic entrepreneurialism (Tuunainen, 2005). A study from Tuunainen (2005) found similar findings in relation to the university commercialisation process where the university used a particular set of local bureaucratic procedures to define the boundary between academic research and private business in struggles to control issues at stake including the allocation of teaching loads between faculty members, the ownership of research tools and materials and the intellectual property rights of the researchers. Tuunainen (2005) concluded that the attempt to pursue corporate activity alongside academic work within an ordinary academic department was beset with complexities and controversies. This suggests that the university incubation process can learn from the student incubation processes positive use of duty of care which can be used similarly to encourage academic entrepreneurs during the process by explaining the realities of entrepreneurship and its implications while at the same time allowing them the freedom to balance their own workload. It also suggests that incubation processes should use a duty of care positively as when used negatively it can affect potential new venture creation.

Objectives and Resources [1.6]

As was highlighted at the end of the Chapter 2 literature review, within the incubation literature there is a gap in understanding how an incubator's objectives and resources affect the incubation process (Clarysse et al., 2005, Hackett and Dilts, 2004b). Based on this gap, the third research question was developed: *How does an incubator's objectives and resources affect how the incubation process functions and influence potential new venture creation?* It was found that an incubator's objectives dictate the quantity of resources it allocates to the incubation process. As was discussed in the previous empirical chapters, while all three processes aim to support the creation of new spin-offs, the priority of this objective differed across the three processes which affected the quantity of financial resources the processes allocated to achieve this objective. This affected the quality of business support the entrepreneurs received. In the regional incubation process, the creation of spin-offs was a main priority and, therefore, the process allocated sufficient financial resources to achieve this objective, including a salary for the entrepreneurs, funding to develop prototypes and to procure service providers. This positively affected potential new venture creation as the entrepreneurs had necessary funds to develop their spin-off. This finding contradicts existing literature which suggests that regional business incubators do not provide financial support to their start-ups (vonZedtwitz and Grimaldi, 2006).

In the student process, the spin-off objective was a secondary objective which meant the incubator allocated limited financial resources to the process. As a result, the student entrepreneurs had to pool different sources of funding negatively affecting potential new venture creation. There was also less one-on-one support and more qualified incubator management actors were used later in the process to conserve its resources. In the university process, the priority of the creation of spin-offs was a tertiary objective which also meant the University allocated limited resources to the process. This negatively affected the academic entrepreneurs as they were not provided with the appropriate funding to develop their spin-offs and were often forced to undertake activities themselves instead of hiring experts. The limited resources of the university process also affected the quality of the BDMs the process is able to attract and also forced academics down the wrong commercialisation route to conserve resources. This links with the suggestion from Mustar et al (2006) that university spin-offs encounter specific barriers and challenges since the university usually lacks resources and that spin-off companies report "more negative than positive experiences of resource

acquisition and support" in the university context (Harrison and Leitch, 2010:1244). Based on the above discussion, the following proposition was developed to address the third research question:

> **P3: The greater the level of the resources the incubation process provides to achieve its objectives, the more effective the business support process, and the more likely the success of potential new venture creation.**

Other incubatees

From the original conceptual model at the end of Chapter 2, 'other incubatees' has been removed as it was found that the relationships among entrepreneurs and other incubatees is not as sophisticated as previous research indicates (Sherman and Chappell, 1998, Bollingtoft, 2012, Bollingtoft and Ulhoi, 2005). The relationship among entrepreneurs and other incubatees was not found to be important for knowledge sharing as the entrepreneurs were engrossed in developing their own companies during the incubation process. Additionally, some of the entrepreneurs were in competition with each other and did not want to share knowledge. Similar to the findings from Totterman and Sten (2005), the relationship between the entrepreneur and other incubatees was limited to very basic information exchange related to the daily incubation process issues rather than knowledge exchange. This suggests that incubation processes should not spend time on promoting interaction between incubatees as it does not play a large role in potential new venture creation.

6.2 The regional innovation system [2]

As discussed in Chapter 2, existing incubation process studies fail to account sufficiently for the regional context despite the recognition in the literature that the process is 'geographically anchored', draws on external organisations to function (Bollingtoft and Ulhoi, 2005: 267, Hackett and Dilts, 2004b, Bergek and Norman, 2008) and may be influenced by the socio-economic and cultural setting it is based within (Clarysse et al., 2005). This is a particularly important point, as the entrepreneurship literature has suggested that engaging the 'context' (e.g. spatial dimension) in researching topics of entrepreneurship is essential (Zahra and Wright, 2011, Zahra, 2007) as the context "simultaneously provides individuals with entrepreneurial opportunities and sets boundaries for their actions" (Welter, 2011: 165). Based on this gap, the fifth research question was developed: *How and in what ways do the principal*

elements of the RIS play a role in the incubation process and influence potential new venture creation?

The findings from this thesis highlight the importance of considering the RIS in conceptualisations of the incubation process as it was found that it draws from *regional* organisations/actors to function and that entrepreneurs and incubator management are affected by the socio-economic and cultural setting of the RIS. Additionally, the findings also highlight that the RIS is more complex than the literature suggests which is that it affects all actors in the same way. It was found that the RIS does not affect all actors the same way as all three incubation processes utilise regional organisations/actors differently and are affected differently by the socio-economic and cultural setting of the RIS. All these points are discussed further below.

Regional organisations [2.1]

Existing incubation literature suggests that incubation processes rely upon external support of organisations and actors to provide key resources to the entrepreneurs that the process lacks (Lockett et al., 2002, Rice, 2002). The findings from this thesis confirm this point as all three processes did not have all the necessary resources to support the entrepreneurs. However, there is little consensus on the geographical orientation of these organisations, the types of organisations and the role of these organisations. This is because the term for these organisations is different in each process model – e.g. 'expert network' (Campbell et al., 1985), 'incubator affiliation' (Smilor, 1987), 'external network of the incubator' (Rice, 2002) and 'external resource providers' (Lockett et al., 2002). The findings suggest that entrepreneurs were found to be engaging with mostly *regional* organisations/actors to develop their spin-offs. These regional organisations/actors stem from both the knowledge generation and diffusion subsystem and the knowledge application and exploitation subsystem of the RIS including KIBs, venture capitalists, public support agencies, regional development agencies, other emerging and existing firms and universities. However, the three processes utilised different types of regional organisations and actors which will be discussed below.

There is also little consensus on the role of regional organisations/actors in the process. It was found that entrepreneurs utilise regional organisations/actors during the incubation process as a knowledge resource, as mentors, as team members, to test ideas, for funding, to legitimise their ideas, to influence other regional organisations to engage

with them, to provide incubation space, as business support providers and as services providers to develop their spin-offs during the incubation processes. Incubator management actors utilise regional organisations/actors to assess the entrepreneurs during the process, as funders for the incubation process, to provide business support, to contribute to training workshops and as actors in the selection process.

The ability of the entrepreneurs to engage with regional organisations/actors was influenced by their mentality or openness to engage which will be discussed in the section below which explores the socio-economic and cultural setting. It was found that the less willing regional organisations and actors are to engage with entrepreneurs to provide resources and business support which the incubation processes lacks, the less likelihood of success of potential new venture creation. The reason for this was that entrepreneurs missed out on regional knowledge, potential partnerships, access to markets and product development opportunities which made it more difficult to develop their businesses. Based on the above discussion, the following proposition was developed to address the fifth research question:

> **P4: The more regional organisations and actors enable business support processes through provision of resources, the more likely the success of potential new venture creation.**

The findings also highlight that there are differences between the processes in relation to the types of regional organisations/actors they utilise, the role of regional organisations/actors in the processes, the strategic use of regional organisations/actors and their dependency on regional organisations/actors. First, there was as difference in the types of regional organisations/actors the processes utilised. The regional incubation process mostly used regional firms from the knowledge application and exploitation subsystem while the student incubation processes used business support organisations from the knowledge creation and diffusion subsystem of the RIS because of its limited resources. Academic entrepreneurs from the university incubation process also mostly used regional public sector organisations. This suggests that the processes' resources also affect the types of regional organisations/actors they engage with.

Second, there were also differences in relation to the role of regional organisations/actors in the three processes. In the regional process, regional organisations/actors were used as panel members for the selection process and as funders for the process. In the student incubation process, regional organisations/actors were used to acquire feedback to improve the process, to provide incubation space and

to deliver most of the internal business support to the entrepreneurs. Finally, in the university incubation process, regional actors were utilised as potential commercial directors, CEOs and CFOs

Third, it was found that the three incubation processes differed in their strategic use of regional organisations/actors to enable entrepreneurs to benefit from economies of scale reducing the time, cost and hassle of 'getting up and running' (Hansen et al., 2000). The regional and student processes were found to use regional organisations/actors strategically while the university process, unstrategically, used regional organisations/actors. As a result, academic entrepreneurs, similar to the findings of Harrison and Leitch (2010), had to be self-reliant in their own use of regional organisations/actors. This meant that in the university process the academic entrepreneurs could not benefit from economies of scale and there were higher transaction costs for the academic entrepreneurs when engaging with regional organisations/actors which negatively affected potential new venture creation.

Fourth, the incubation processes were also found to differ in their dependency on regional organisations/actors. Resource dependence theory suggests that organisations require the support of external resources and are interdependent with other organisations (Pfeffer, 1987). The regional incubation process, while relying on regional organisations for many services and informal mentoring and support, had a lower dependency on regional organisations/actors than the other two processes. This was because it also provided the entrepreneurs with in-house business expertise. The student incubation process, in comparison, was highly dependent on regional/organisations actors as the processes in-house business support was essentially delivered by bought-in external regional actors. The university incubation process was, inadvertently, highly dependent on regional organisations/actors as it lacked internal resources and expertise. This contradicts findings from a recent study by Harrison and Leitch (2010) that found that during the venture creation process, university spin-offs make relatively little use of external service provision as they rely on services through the TTOs.

Socio-economic and cultural setting [2.2]

The literature suggests that the socio-economic and cultural setting of the RIS effects new venture creation (Roberts, 1991). However, existing incubation process models have not considered the socio-economic setting and how it affects entrepreneurs during the incubation process. The findings from this thesis highlight that a RIS with a weak

socio-economic and cultural setting negatively affects the entrepreneurs and their ability to develop new ventures during the incubation process. First, the mentality of regional organisations/actors, which was described as not open to innovation or willing to engage, negatively affected potential new venture creation during the incubation process. As mentioned above, the entrepreneurs missed out on regional knowledge, potential partnerships, access to markets and product development opportunities which made it more difficult to develop their businesses.

Second, the lack of entrepreneurial spirit of the region, which also influences the mentality of regional organisations/actors, also negatively affected potential new venture creation during the incubation process. It meant the entrepreneurs were surrounded by individuals with low aspiration levels and had to rely more on themselves to develop their businesses. This made it more difficult for them to develop their spin-offs during the incubation processes. This supports the findings from Saxenian (1996) that regions lacking a supportive culture negatively affects new venture creation.

Third, lack of availability of talent in the region also negatively affected potential new venture creation in the context of the incubation process. It limited the quality of regional organisations and actors the entrepreneurs could choose from to act as service providers and potential team members (e.g. CEOs and CFOs) to develop their businesses. For incubator management actors, it also limited the quality of entrepreneurs and ideas they could select to be supported by the incubation processes. This supports the findings from Neck et al (2004) that highlight that regional talent is an important element of the entrepreneurial system that contributes to new venture creation. Based on the above discussion, the following proposition was developed to address the fifth research question:

P5: Regional innovation systems with weak socio-economic and cultural settings fail to support new venture creation in the context of the incubation process.

The findings also highlight that the socio-economic and cultural setting in a weak region is more complex than the RIS suggests which is that in the context of the new venture creation process, the socio-economic and cultural setting will affect all regional organisations/actors the same way (Cooke et al., 1997) and that all elements of the socio-economic and cultural setting of the RIS will be weak. The socio-economic and cultural setting was found to affect the three incubation processes and entrepreneurs in

the processes differently. First, it was found that there were different reasons why regional organisations/actors did not want to engage with the non-academic/student entrepreneurs and student entrepreneurs (apart from a general risk aversion mentality). Non-academic/student entrepreneurs from the regional incubation process had more difficulty engaging with regional organisations/actors because of their tie to a regional incubator that had regional development objectives. Private sector regional organisations/actors expected to receive the entrepreneur's services for free while public sector organisations/actors with similar objectives were in competition with the regional incubator and, therefore, were not willing to engage with entrepreneurs. This finding contradicts the suggestion from Smilor (1987) that when the incubator is perceived as a reflection of community goals it is able to acquire more broad-based support leveraging assistance from professional and others in the community to provide business expertise to entrepreneurs.

Student entrepreneurs from the student incubation process had difficulty engaging with regional organisations/actors because of their student status while academic entrepreneurs with a low career status also had more difficulty engaging. This links to the findings from the existing literature that there is a significant positive effect of status on the likelihood of new venture creation as potential founders who have achieved high status in their careers have more legitimacy to convince others more easily to reallocate resources to new ventures (Shane and Khurana, 2003).

Second, there were differences in how the entrepreneurial spirit of the region affected the entrepreneurs across the three processes. In the regional process, the lack of entrepreneurial spirit meant that regional organisations/actors were less willing to take risks which meant that the entrepreneurs had to rely on themselves more to progress their spin-offs. In the student process, the weak entrepreneurial spirit negatively affected the student entrepreneurs as it meant they were surrounded by individuals with low aspirations which was discouraging for them while they were trying to start a business. Interestingly, in the university process, the lack of entrepreneurial spirit played less of a role than in the other two processes. It was the lack of entrepreneurial spirit and culture within the *University* rather than in the region which negatively affected the academic entrepreneurs. This contradicts a recent study by Harrison and Leitch (2010) which found that the constraining influence of the regional environment imposed a fundamental constraint on the development of spin-offs and their ability to transform knowledge into high growth potential businesses. This suggests that the university

incubation process should pay more attention to developing an entrepreneurial culture in the university.

Third, there were also differences in how the availability of regional talent affected the entrepreneurs and incubator management actors across the three processes. While the student entrepreneurs from the student incubation process were not affected by the lack of regional talent, the entrepreneurs in the regional process were negatively affected as they were constrained to select from subpar regional organisations/actors because of the incubator's regional development objectives. Incubator management actors from the regional process also had a limited talent pool of entrepreneurs they could chose from which affected the quality of individuals that could be supported by the process. In the university process, the lack of regional talent negatively affected the academic entrepreneurs as the quality of CEOs and CFOs available to work as part of their spin-off development was poor.

It is also important to highlight that despite the conceptualisation in the RIS literature that a socio-economic and cultural setting of a weak RIS will demonstrate low levels of networking and lack of regional finance (Cooke et al., 1997), the findings contradict this point. All three entrepreneur types benefited from networking and access to regional finance. Regional networks were utilised by the entrepreneurs to access potential collaborators, information, service providers, customers and to engage with VCs during the incubation processes. Incubator management actors utilise regional networks to gain access to regional organisations and actors to support the entrepreneurs during the incubation process. Regional finance provided salaries for entrepreneurs during the incubation processes, VC funding, funds to develop their ideas, to establish proof of concepts and to pay for external service providers such as patent agents and lawyers. These findings demonstrate that the socio-economic and cultural setting of the RIS is more complex than is suggested in the literature and a weak socio-economic and cultural setting may not necessarily be weak in all of its aspects.

6.3 Entrepreneurial characteristics [3]

As highlighted in the literature review in Chapter 2, the entrepreneur has been largely overlooked in existing studies and conceptualisations of incubation processes despite the recognition that they are the key individual being incubated and have an important influence on the ability of the venture to spin-off from the incubation process (Phan et al., 2005, Warren et al., 2009). Most studies focus on the incubator management actor's

perspective negating the entrepreneur. Additionally, no known existing incubation studies discuss how the entrepreneur's experience and background (prior entrepreneurial experience, industrial experience, education and family background) affect their ability to develop spin-offs in the context of the incubation process. Based on this gap, the second research question was developed: *How does an entrepreneur's experience and background (e.g. entrepreneurial experience, industrial experience, education and family background) affect their ability to start a new venture in the context of the incubation process?* It was found that entrepreneurs with prior entrepreneurial experience, industrial experience, education and those that utilise family members and their business knowledge were positively affected during the incubation process. There were also differences found between the entrepreneur types in relation to their experience and background which supports the suggestion from Ucbasaran et al (2009) that it is important to consider the heterogeneity of entrepreneurs. These differences will also be discussed below.

Entrepreneurial experience [3.1]

The findings from this thesis suggest that habitual entrepreneurs are positively affected by their prior entrepreneurial experience during the incubation process. First, habitual entrepreneurs were found to be able to identify and reject opportunities more easily during the process as they have the 'opportunity confidence' to evaluate ideas (Dimov, 2010). In the context of the incubation process, it meant that entrepreneurs could more quickly move on with ideas or fail quickly and cheaply. This implication was particularly important for the non-academic/student entrepreneurs as the regional incubation process was a time sensitive process where entrepreneurs were incubated from a six months to one year period. The easier identification and rejection of opportunities as a result of prior entrepreneurial experience is consistent with previous studies of habitual entrepreneurs (outside the incubation process context). These studies found that previous entrepreneurial experience enables entrepreneurs to exploit opportunities more easily as they have a "special alertness to spotting opportunities" (Westhead et al., 2004: 792, Ardichvili et al., 2003) and can more precisely assess the potential of the opportunity (Gist and Mitchell, 1992) which enables the entrepreneur to "discontinue early their efforts on lacklustre opportunities in pursuit of other, more appealing alternatives, as well as to remain committed and effective in pursuing those opportunities that remain attractive" (Dimov, 2010: 1145).

Second, it was also found that habitual entrepreneurs are more easily and willing to engage with incubator management actors (which is important for successful incubation) with entrepreneurial experience as they share a similar entrepreneurial world view. This finding links with Rice's (2002) insight that an entrepreneur's readiness to engage in co-production influences their interaction with the incubator manager and incubation success. However, it adds another level of understanding to Rice's (2002) conceptualisation by highlighting that the entrepreneur's willingness to engage is based on his/her and incubator management actors sharing similar world views which is enhanced by their entrepreneurial experience.

Third, it was found that habitual entrepreneurs enter the incubation process with valuable knowledge of the venturing process and, therefore, are more easily able to overcome business challenges and avoid making the same past mistakes during the process. Additionally, habitual entrepreneurs have the knowledge on what aspects of the business to focus and not focus on and are aware of potential future barriers. This was particularly important for the non-academic/student entrepreneurs in the regional incubation process as it was a time sensitive process. This finding is consistent with Dimov (2010) and Bruderl et al.'s (1992) view that prior entrepreneurial experience can increase the productivity of the entrepreneur in executing the tasks associated with establishing a new venture. The finding also links with the perspective in the literature that prior entrepreneurial experience can provide valuable knowledge that can help an entrepreneur cope with, overcome or reduce the 'liability of newness' (Stinchcombe, 1965) or traditional problems and obstacles in new venture creation (Shane and Khurana, 2003, Politis, 2008).

Another finding was that habitual entrepreneurs were more easily able to access resources from external sources during the incubation process as they enter the process with their own networks. This meant the entrepreneurs required less support from incubator management actors during the process which facilitated their progression through the process. They could be more independent relying on their own networks. Linked to this point, it was found that prior entrepreneurial experience helped habitual entrepreneurs identify and utilise sources of information that prove essential at critical junctions of the start-up process which enables them to be more efficient during the incubation process (Cooper et al 1995). This links to the findings from Mosey and Wright (2007) and Shane and Khurana (2003) that habitual entrepreneurs will have broader social networks and findings from Westhead et al (2004) and Wright et al

(1997) that habitual entrepreneurs are more easily able to obtain external (financial) resources during the new venture creation process.

Fifth, apart from having 'opportunity confidence' discussed above, habitual entrepreneurs were also found to be confident in their ability to bring their venturing efforts to fruition during the incubation process. This confidence is especially important in the university incubation process as it represents a difficult commercialisation environment with a highly discriminatory selection process. For the academic habitual entrepreneurs, it means they are able to 'fight' for their ideas to be supported by the university incubation process. This finding links with Dimov's (2010: 1128) concept of 'start-up self-efficacy' or "evolving belief about their (the entrepreneur's) ability to bring the venturing efforts to fruition". Prior entrepreneurial experience provides entrepreneurs with start-up self-efficacy which makes them more likely to persevere in the face of adversity (ibid).

Finally, it is also important to highlight that while the existing literature suggests that along with assets there are also liabilities associated with prior entrepreneurial experience (Westhead et al., 2004), this finding was not corroborated with the findings from this thesis. Prior entrepreneurial experience was only found to benefit the entrepreneurs during the incubation processes as discussed above. Based on the above discussion, the following proposition was developed to address the second research question:

P6: Prior entrepreneurial experience positively affects the entrepreneur during the incubation process and increases the likely success of new venture creation.

There were also differences found between the entrepreneur types (i.e. academic, student and non-academic/student entrepreneurs) in relation to entrepreneurial experience. Out of the three entrepreneur types, student entrepreneurs were homogenous in relation to their lack of prior entrepreneurial experience and found it most difficult to adapt to the role of the entrepreneur. They had less confidence, lacked established networks and did not know when to engage with external actors to develop their ideas which meant they had more difficulty in the student incubation process.

Industrial experience [3.2]

The findings from this thesis also suggest that entrepreneurs were positively affected by their prior industrial experience during the incubation process. First, entrepreneurs with

prior industrial experience in the same sector of their potential new venture are able to more easily identify and reject opportunities during the incubation process as they have prior knowledge of markets and gaps in the market place. This was particularly important for the non-academic/student entrepreneurs in the regional incubation process as more easily identifying opportunities enables them to move more quickly through the process which is time sensitive. This finding correlates with existing literature which highlights that prior industrial experience, including prior knowledge of markets, prior knowledge of ways to service markets and prior knowledge of customer problems facilitates new opportunity identification as entrepreneurs discover opportunities related to information they already possess (Shane, 2000, Ardichvili et al., 2003, Dimov, 2010).

Second, it was found that entrepreneurs with prior industrial experience in the same sector of their venture are more easily able to access resources as a result of networks built up during their prior industrial experience. They also are more easily able to build new networks in the same sector because of their legitimacy stemming from their previous knowledge of that sector. This positively affects the entrepreneurs in the incubation processes as it enables them to be more active in the process to obtain necessary business support at specific junctures of the process and capitalise on existing relationships to develop their businesses. It also means they need less support from incubator management actors which is important for the student and university process which have limited resources. This links with existing literature which highlights that prior industrial experience enables an entrepreneur to be in an advantageous position to capitalise on established relationships with resources providers, customers (Dimov, 2010, Shane, 2000, Kor et al., 2007) as they have greater legitimacy than entrepreneurs without industrial experience (Shane and Khurana, 2003).

Third, it was found that entrepreneurs with prior industrial experience in the same sector of their venture are more confident in the resources they need to develop their business and when communicating with incubator management actors which reduces resources utilised from within the process. This is also particularly important for student and university incubation processes with limited resources. This confirms existing literature which suggests that prior industrial experience provides more profound knowledge of the value chain in which the venture will engage and thus better understanding of the key stakeholders involved in the start-up process as well as of ways to approach them (Cooper et al., 1994). Based on the above discussion, the following proposition was developed to address the second research question:

P7: Prior consonant industrial experience positively affects entrepreneurs during the incubation process, increasing the likely success of new venture creation.

Education [3.3]

Along with the other two entrepreneur characteristics discussed above, the findings from this thesis also suggest that entrepreneurs are positively affected during the incubation processes by their education. First, it was found that formal education affects the ability of the entrepreneurs to assess and exploit opportunities during the incubation process. Entrepreneurs with MBAs are able to utilise tools (e.g. SWOT analysis) learned from their courses to evaluate their potential business opportunities more easily. This is particularly important for the non-academic/student entrepreneurs in the regional incubation process which has a time-sensitive incubation process. This supports existing literature which suggests that an entrepreneur's education may enhance the opportunity recognition process through the facilitation of access to a broader knowledge base from which to draw (Arenius and Clercq, 2005, Ramos-Rodríguez et al., 2010).

Second, it was also found that entrepreneurs with an education from the same region in which they are developing their spin-off have more confidence attending regional entrepreneurial events and engaging with regional actors. This was found to be particularly important for the student entrepreneurs as the confidence stemming from their education helped compensate for their lack of entrepreneurial experience.

Third, entrepreneurs with an education from the same region which they are developing their spin-off were more easily able to access resources from the University to progress their ideas during the incubation processes. Additionally, exposure to University actors during their education also provided the entrepreneurs with knowledge of who to contact and not to contact during the incubation process to develop their business. Finally, prior education provided the entrepreneurs with the technical competence and knowledge during opportunity recognition, to develop their businesses during the incubation processes and to file patents which require the technical details of the invention to be described. This was particularly important for the academic entrepreneurs in the university incubation process. This finding links with Park's (2005) suggestion and findings that technical knowledge which is facilitated by education is also necessary alongside prior experience and industrial experience in new venture creation. Based on the above discussion, the following proposition was developed to address the second research question:

P8: Education positively affects the entrepreneur during the incubation process increasing the likely success of new venture creation.

There were also differences found between the entrepreneur types in relation to education and its role in the incubation process. All three entrepreneur types used their education differently. The non-academic/student entrepreneurs from the regional process utilised their education, specifically knowledge gained from their MBAs to assess opportunities more easily during the process and develop their business ideas. The student entrepreneurs' education indirectly made the student incubation process easier for student entrepreneurs as they were familiar with the University and the North East region and had more confidence to attend regional and University events. Academic entrepreneurs used their education to provide the technical know-how or competence to develop products or services and acquire patents.

Family background [3.4]

Unlike the other categories discussed above, an entrepreneur's family background has received less attention in the mainstream entrepreneurship literature focusing on new venture creation (Rogoff and Heck, 2003). However, in this thesis, it was found that entrepreneurs with a family background in business were positively affected during the incubation processes. First, entrepreneurs were positively affected by their family background as it provided them with more confidence during the process as they received intangible support such as encouragement from family members. They are also more familiar with the realities of starting a business including the 'ups and downs' from the exposure to family role models. This links with existing literature that suggests that entrepreneurs are affected by factors such as family role models during the new venture creation process (Busenitz and Lau, 1996, Ronstadt, 1984).

Second, it was found that entrepreneurs utilise family business knowledge to develop their businesses during the incubation process such as providing help with the development of business plans and financial forecasting. This implication is particularly important for the student entrepreneurs as it supplemented for their lack of entrepreneurial experience. This finding links with existing entrepreneurship literature that highlights that family members contribute financial and human resources, education and values that are critical to the entrepreneurs during new venture creation (Rogoff and Heck, 2003, Westhead et al., 2004, Chrisman et al., 2003).

Finally, from the perspective of incubator management actors (specifically from the student incubation process), entrepreneurs with a family background in business are more appreciative of the incubation processes resources. The appreciation of incubation process resources positively affects the incubator management actors and their willingness to engage in co-production with the entrepreneurs during the process (Rice, 2002). Based on the above discussion, the following proposition was developed to address the second research question:

P9: A family background in business positively affects the entrepreneur during the incubation process, increasing the likely success of new venture creation.

There were also differences found between the entrepreneur types in relation to their family background. Out of the three entrepreneur types, student entrepreneurs were homogenous in relation to having a family background. They drew the most from their family background including knowledge and support to compensate for their lack of entrepreneurial experience during the incubation process. This supports the findings from Robertson and Collins (2003) that many student entrepreneurs stem from families that run businesses.

Entrepreneurial knowledge [3.5]

Apart from the experience and knowledge that entrepreneurs may or may not bring with them to the incubation process (as discussed above), it was also found that the incubation process helps to develop an entrepreneur's entrepreneurial knowledge which has not yet been included in existing incubation process models. While this was not included in the original model discussed at the end of Chapter 2, it inductively came up from the data as important for understanding the incubation process. The findings from this thesis demonstrate that not only do entrepreneurs enter the incubation process with specific knowledge and experience but they also acquire knowledge through the process (Patton and Marlow, 2011) which helps them to develop their spin-offs. This is achieved through seminars and workshops that the entrepreneurs are provided with access to during the process which are facilitated by incubator management actors. The findings also suggest that incubation processes support the acquisition and development of knowledge differently as they have different objectives and resources which have implications for novice entrepreneurs.

In the regional incubation process, it was found that entrepreneurs were provided with access to a limited number of seminars and workshops as the development of the

entrepreneur's entrepreneurial knowledge was not a main priority as a result of the processes short incubation period. This did not affect the non-academic/student entrepreneurs as they all entered the process with prior entrepreneurial experience and were less concerned with learning type resources. In the student process by comparison, the development of the student entrepreneur's entrepreneurial knowledge was a main priority which was facilitated by enabling students to participate in business plan competitions, internal and external workshops and seminars. This positively affected the student novice entrepreneurs and the development of their spin-offs as they entered the process with no prior entrepreneurial experience. This links with the suggestion of Patton and Marlow (2011) that an incubation process that addresses a founder's inexperience and facilitates their ability to acquire appropriate knowledge has the potential to have a positive impact on the performance of novice entrepreneurs.

The university incubation process did not focus on the development of the academic entrepreneur's entrepreneurial knowledge which was a result of the processes objectives and limited resources. This negatively affected academic novice entrepreneurs and their potential new venture creation as their lack of experience was not compensated for during the process. As a result, the academic novice entrepreneurs were forced to spend time looking for external resources to develop their entrepreneurial knowledge. Some were found to be using resources from the student incubation process since it was located within the same incubator – i.e. the University. This finding links with another study of university spin-offs which also found gaps in the university's support for the personal development of the academic entrepreneur during the commercialisation process notably in identifying the market opportunity for the technology, technology development, explanation of alternative exploitation options, and career options for academic entrepreneurs which affected the strategic and operational development of the technology into a commercial venture (Harrison and Leitch, 2010).

Social capital [3.6]

Similar to the discussion above, while entrepreneurs enter the incubation process with networks, it was also found that the process also helps develop an entrepreneur's social capital which has not yet been included in existing incubation process models. While this was not included in the original model discussed at the end of Chapter 2, it inductively came up from the data as important for understanding the incubation process. The development of the entrepreneur's social capital is facilitated by incubator

management by providing access to appropriate networks to acquire resources and know-how (Bollingtoft and Ulhoi, 2005, Tötterman and Sten, 2005, Hansen et al., 2000, Bollingtoft, 2012). This benefits the entrepreneurs during the process, specifically novice entrepreneurs, who do not have networks or the knowledge on when to engage with external actors when they enter the process.

The findings also suggest that incubation processes support the development of an entrepreneur's social capital differently as they have different objectives and attitudes to risk which have implications for novice entrepreneurs. While it was found that the regional and student incubation process both support the development of the entrepreneur's social capital (more so the student process as it is one of its main objectives), the university incubation process does not support the development of the academic entrepreneurs' social capital because of its attitude to risk[53]. This had an adverse effect on the academic entrepreneurs as it did not enable them to engage easily with potential collaborators to develop their businesses. Additionally, unlike the student incubation process which compensated for the student novice entrepreneurs and their lack of social capital, the university incubation process did not compensate for academic novice entrepreneurs which meant they could not get access to the resources they needed to develop their spin-offs which negatively affected potential new venture creation. This finding contrasts with the findings from McAdam and McAdam (2008) that the university is critical in terms of facilitating and developing networks with other third parties for entrepreneurs during the new venture creation process and is line with suggestions by Muster et al (2006) that academic entrepreneurs face major challenges in developing their social capital because of the traditionally, non-commercial environment of universities. The findings from this thesis further highlight that it is not just that universities exist within non-commercial environments, but it is specifically the university's objectives and attitude to risk which are a barrier for the development of an academic's social capital during new venture creation and incubation processes.

6.4 Summary

In this chapter, findings from the empirical fieldwork have been brought together into a conceptualisation of the incubation process experienced by entrepreneurs and incubator management actors. The model contributes to the incubation literature providing new

[53]As discussed in the above section focused on risk aversion, this included the common use of CDAs and tight control over IP.

insights on how the incubation process functions. By adopting an integrated approach, which includes analysing how the process is affected by the objectives and resources of the organisation offering the incubation support, the experience and background of the entrepreneur, the role of the RIS, and the process components, the empirical analysis highlights key findings. First, the empirical analysis highlights the importance of the degree of involvement of incubator managers and the importance of using multiple selection criteria in the effective selection of incubatees which leads to a greater likelihood of success in new venture creation. It was also found that the broader the range of co-production modalities utilised by incubator managers who themselves had entrepreneurial experience, the more effective the business support process, and the greater the likelihood of success of new venture creation. In relation to objectives and resources, the findings suggest that the higher the degree of resources the incubation process provides to achieve its objectives, the more effective the business support process, and the greater the likelihood of success of new venture creation. Entrepreneurial characteristics such as prior entrepreneurial experience, industrial experience, education and a family background in business were found to affect positively the entrepreneur during the incubation process and increased the likelihood of new venture creation. In relation to the RIS, it was found that its principal elements, specifically regional organisations and the socio-economic and cultural setting, play a role in the incubation process and influence the potential success of new ventures. The more regional organisations and actors enable business support processes through provision of resources, the more likely the success of potential new venture creation. RIS with weak socio-economic and cultural settings fail to support new venture creation in the context of the incubation process. It was also found that there are clear differences between different incubation process types.

Five other inductively-derived constructs were also found to help explain how the incubation process functions, which are risk aversion, incubator management learning, duty of care, entrepreneurial knowledge and social capital. In relation to risk aversion, it was found that risk aversion moderates the way incubator management select entrepreneurs to the process and how they deliver business support. Processes that adopt a high level of risk aversion negatively affect potential new venture creation. The theme of incubator management learning highlighted that learning is important for refining the selection and business support components of the process to work better for the benefit of the entrepreneurs. Incubator management that build more learning into their

processes are more able to change the process overtime to accommodate entrepreneurs positively affecting potential new venture creation. In relation to duty of care, it was found that it moderates the way incubator management actors engage with entrepreneurs during the incubation process. A constructive use of duty of care positively affects potential new venture creation in the context of the incubation process. The theme of entrepreneurial knowledge highlighted that not only may the entrepreneur bring entrepreneurial experience to the process but they also acquire knowledge through the process. A process that compensates for the novice entrepreneur's lack of entrepreneurial experience positively affects potential new venture creation. Finally, in relation to the theme of social capital, it was found that the incubation process also helps to develop the entrepreneur's social capital. A process that accommodates novice entrepreneurs and their lack of networks positively affects potential new venture creation in the context of the incubation process.

The next chapter will conclude the thesis and provide an overview of the theoretical/conceptual, methodological and policy contributions, areas for future research, limitations of the study and briefly discuss learning points gained from the research process undertaken in this thesis.

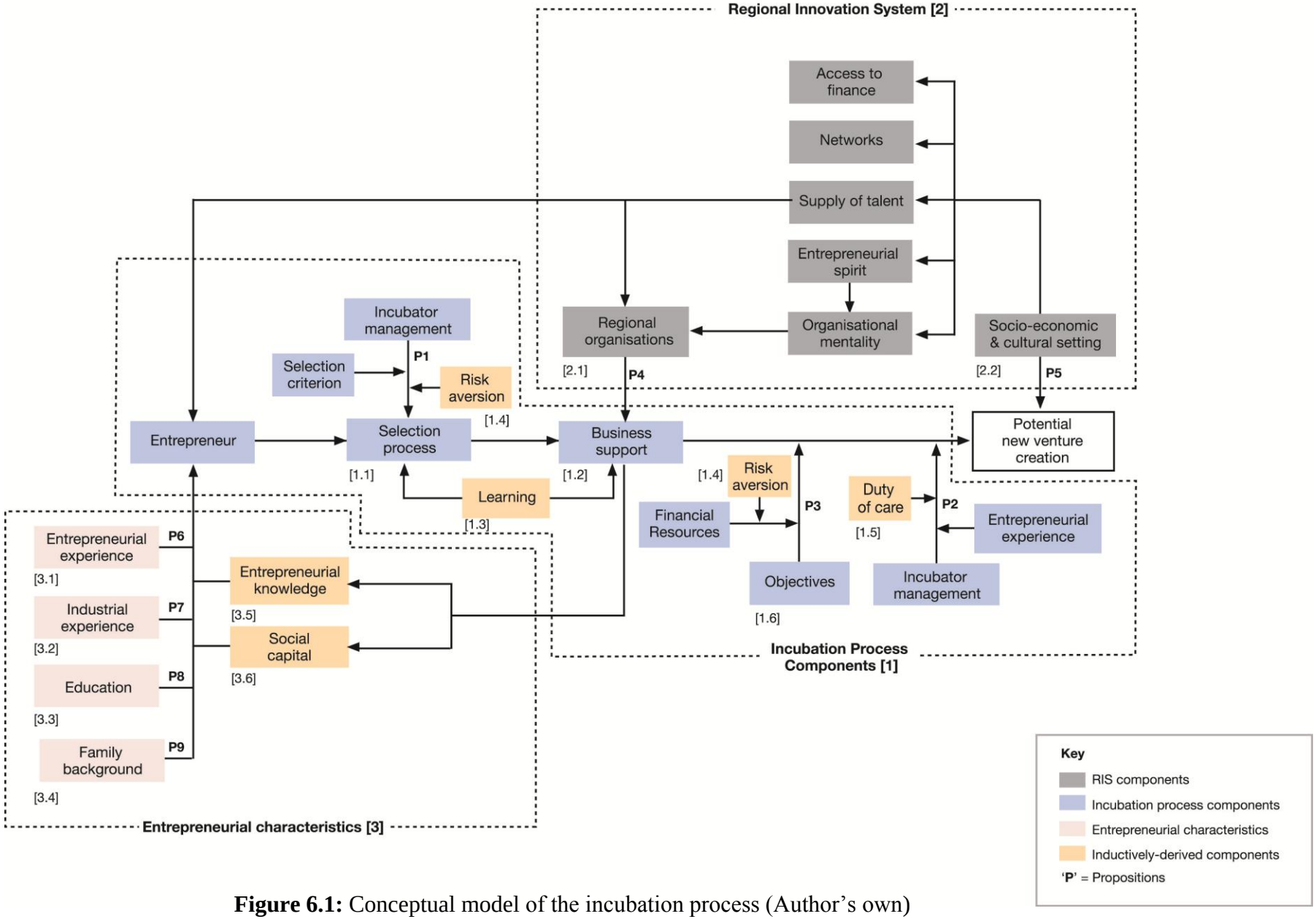

Figure 6.1: Conceptual model of the incubation process (Author's own)

Chapter 7: Contributions and Conclusions

This thesis has explored how the incubation process functions and provided insights into how and why incubation processes differ, and the affect of so doing. In Chapter 1, the context, aim, and research questions of the study were identified. In Chapter 2, the five main literatures (incubation literature, TTO, entrepreneurship education, RIS literature and entrepreneurship literature) pertinent to this focus were reviewed. The review demonstrated that there are in gaps in the incubation literature around the how the incubation process functions and identified the need for a more integrated and holistic approach. This thesis has responded to this gap adopting an integrated approach to explain how the incubation process functions and provided additional new constructs which are not evident in the incubation literature. In Chapter 3, the qualitative approach undertaken in the thesis was explained. It was highlighted that a qualitative approach was selected as it is based on inductive theory generation enabling the thesis to generate empirically-based knowledge to provide an in-depth understanding of how approaches to incubation function. The previous few existing studies have utilised surveys which was not an appropriate approach to capture an understanding of an in-depth process. Additionally, most studies do not focus on the entrepreneur's perspective which this thesis was designed around. Chapters 4 and 5 presented the findings from the analysis of the semi-structured interviews. In the previous discussion Chapter 6, the empirical findings from Chapter 4 and 5 were linked with the literature from Chapter 2 to build a conceptual model of the incubation process. This chapter concludes the thesis explaining the contributions to the literature, the implications for incubator management, university senior management, entrepreneurs, incubator funders and regional policymakers, discusses the development of the author of this PhD, addresses the limitations of the research and provides suggestions for further research.

7.1 Contributions

This thesis provides theoretical/conceptual contributions, methodological contributions and policy contributions. These will be further discussed in their respective sections below.

7.1.1 Theoretical/conceptual contribution

The thesis' central contribution is to the incubation literature by shedding important new light on how the incubation process functions. This contribution addresses the many observations in the literature that there has been little effort devoted to unpacking conceptually the variables associated with the incubation process (Hackett and Dilts, 2004b). When the process has been examined, it is usually approached in an *unintegrated* way focusing on one or two elements (e.g. the business support process). This has left a gap in understanding of the incubation process and, therefore, its management and has also potentially negatively affected successful incubation outcomes – e.g. potential new venture creation.

The conceptual model of the incubation process discussed in the previous chapter (see Figure 6.1) is an extension of existing incubation literature and process models as it adopts an *integrated* approach to explain how the incubation process functions. This includes accounting for the incubated entrepreneur and their experience and background, the objectives and resources of the organisation that provides incubation support, the regional context the process is based within and the internal components of the process, examining how these elements work together in an integrated way to affect incubation. This approach provides a more holistic perspective on how the incubation process functions as it attempts to conceptualise and discuss all of the components that affect successful incubation.

Not only does the thesis make a theoretical contribution by adopting an integrated approach to explain how the incubation process functions, but in doing so, the thesis identified new constructs not previously included in incubation process models (i.e. risk aversion, incubator management learning, entrepreneurial knowledge, social capital and duty of care) and all except social capital are also not evident in the existing incubation literature. These new constructs elaborate on existing findings by also shedding new light on how the incubation process functions.

The theme of risk aversion has rarely been discussed in the incubation literature. It was found that risk aversion moderates the way incubator management select entrepreneurs to the process and the amount of financial resources that are provided by the process. A process that maintains a high level of risk aversion negatively affects potential new venture creation as it limits the entrepreneur's ability to engage with external actors, increases transaction costs with service providers, slows down the incubation process,

limits the amount of support they receive and creates a risk-averse culture in the organisation that provides incubation support. This theme extends existing theory by explaining that not only do the objectives and resources of the organisation that provides incubation support affect how the incubation process functions but the organisation's approach to risk aversion also affects potential new venture creation in the context of the incubation process.

The theme of incubator management learning is also not evident in the incubation literature as most literature focuses on learning from the firm's perspective or how incubators facilitate entrepreneurial learning in the firms they incubate (Patton and Marlow, 2011, Warren et al., 2009). This theme extends existing theory by explaining that incubator management learning is important for refining the selection and business components of the process to work better for the benefit of the entrepreneurs and potential new venture creation. More specifically, incubator management learning facilitates improvements in the use of appropriate selection criteria during the selection process and the types of business support offered to the entrepreneurs. A process that implements a high level of learning positively affects new venture creation as it is able to refine and improve the overall incubation experience for the entrepreneurs.

The theme of duty of care has also rarely been discussed in the incubation literature. The findings from this thesis suggest that duty of care moderates the way incubator management actors engage with entrepreneurs during the business support process. This theme extends existing theory by highlighting that a process that implements a constructive use of duty of care positively affects potential new venture creation. It provides the entrepreneurs with an intangible sense of encouragement giving them confidence to continue developing their businesses while a negative use of duty of care means the entrepreneurs are not given sufficient time to develop their spin-offs during the process.

The two other constructs (e.g. entrepreneurial knowledge and social capital) inductively-derived from the empirical analysis relate to the incubated entrepreneur. As mentioned above, the entrepreneur including their background and experience has largely been ignored in the incubation literature. While it has been suggested in the technology transfer literature that university incubation processes help develop the commercialisation skills of entrepreneurs (Patton et al., 2009), the entrepreneurial knowledge theme has been rarely discussed in the incubation literature. The findings

contribute to existing knowledge by highlighting that not only do entrepreneurs enter the incubation process with specific business knowledge and experience but they also acquire knowledge through the process which contributes to the development of their spin-offs. This is achieved through seminars and workshops that the entrepreneurs are provided with access to during the process which are facilitated by incubator management actors. The findings also suggest that incubation processes support the acquisition and development of knowledge differently as they have different objectives and resources. Incubation processes that address the needs of novice entrepreneurs and facilitate their ability to acquire appropriate knowledge have the potential to have a positive impact on potential new venture creation.

While the theme of social capital has been discussed in the general incubation literature, it has not previously been included in incubation process models. The findings from the thesis confirm existing research which suggests that incubator management helps to develop an entrepreneur's social capital by providing access to internal and external networks to acquire resources and know-how (Bollingtoft and Ulhoi, 2005, Tötterman and Sten, 2005, Hansen et al., 2000, Bollingtoft, 2012, Hughes et al., 2007). This benefits the entrepreneurs during the process, specifically novice entrepreneurs, who do not have networks or the knowledge on when to engage with external actors. The findings from this thesis also extend existing knowledge by explaining that incubation processes support the development of an entrepreneur's social capital differently as they have different objectives. Incubation processes that address the needs of novice entrepreneurs and facilitate their ability to acquire networks have the potential to have a positive impact on potential new venture creation.

7.1.2 Methodological contributions

The thesis also provides methodological contributions. The first methodological contribution is the use of a multiple case study approach of three different incubation process types. From the literature review in Chapter 2, it was found that existing incubation literature fails to account for the heterogeneity of incubation processes. As a result, this thesis was specifically designed around accounting for these differences by selecting three different incubation approaches (a regional process, a university process and a student process) and comparing them across four constructs (the incubation process, the incubator's objectives and resources, the entrepreneur type and the role of

the RIS). This approach was found to provide an in-depth understanding of the incubation process and differences between incubation process types.

The second methodological contribution is the focus on the entrepreneur level of analysis. From the literature review in Chapter 2, it was found that most existing research focuses on the incubator management level of analysis despite the recognition that the entrepreneur is the key actor incubated (Phan et al., 2005). However, recent findings suggest that entrepreneurs may have a different perspective on how the process functions from incubator management actors (Patton et al., 2009). Additionally, existing research has ignored the experience and background of the entrepreneur which they bring with them when they enter the process. Focusing on the entrepreneur level of analysis provides an in-depth understanding of how the incubation process functions and how the entrepreneur's experience and background affects their incubation process trajectory and potential new venture creation.

The third methodological contribution is the particular research tool used to collect data which is semi-structured interviews. This approach was selected to collect in-depth data on how incubation processes function from the perspective of the entrepreneurs and incubator management. While semi-structured interviews are not a new research tool, previous studies on the incubation process are either conceptual or mostly utilise surveys to collect data on how the incubation process functions. Surveys entail the collection of data at a *single* point in time (Bryman and Bell, 2007). However, the incubation process is a complex process with multiple variables occurring across a period of time, sometimes three plus years. It is more appropriate to adopt dynamic methodologies such as semi-structured interviews to capture and understand the complex nature of the incubation process.

The fourth methodological contribution is the research design which included both retrospective cases and the real-time longitudinal tracking of cases to mitigate bias and "retrospective sense making" (Eisenhardt and Graebner, 2007:28). The longitudinal approach enabled a more in-depth understanding of how the process functions over time from entrepreneurs that are going through the process in *real* time. While a longitudinal approach is not a new research design, most previous studies on the incubation process have not used this approach or accounted for bias and retrospective sense making. Additionally, the longitudinal approach follows the multiple calls in the entrepreneurship literature for the need for further longitudinal entrepreneurship

research to chart the development of entrepreneurial ventures over time (Davidsson et al., 2001, Bygrave, 2007).

7.1.3 Policy contributions

The findings from this research have policy implications for various individuals including incubator management, incubator funders, entrepreneurs and regional policymakers. The implications for these various individuals will be discussed in more detail below.

Incubator management policy implications

Most policy implications for incubator management in relation to providing suggestions on how to improve the incubation process have not focused on specific types of incubation processes but address incubation in general. The findings from this thesis provide policy implications to address both incubation in general and specific incubation processes.

The findings from this thesis have policy implications for incubator management around the incubation processes selection component. First, the findings demonstrated that the use of multiple actors contributed to a more effective selection process and, therefore, the more likely success of potential new venture creation. This suggests that incubator management should involve more than one actor in the decision-making process as it has positive implications for new venture creation. This policy implication is particularly important for the university incubation process which used one actor or the BDM at the beginning of the process who acted as a gatekeeper for the academic entrepreneurs to be able to commercialise their ideas.

Second, the findings also demonstrated that the use of multiple selection criteria contributed to a more effective selection process. This suggests that incubator management should use multiple criteria as it has positive implications for new venture creation. However, the findings also have implications for the selection criteria used for recruiting entrepreneurs to the process. It was found that entrepreneurs with prior entrepreneurial experience were positively affected by their experience during the incubation process as they were more quickly able to identify opportunities, make fewer mistakes, access resources, better engage with incubator management actors and need less support. This suggests that incubator management should include entrepreneurial experience as part of the selection criteria. This is particularly important in a time-

sensitive incubation process such as the regional incubation process which aims to spin-off companies quickly to achieve regional development objectives. For the university process, which has limited resources, selecting academic entrepreneurs with entrepreneurial experience is also important as habitual academic entrepreneurs need less support and resources.

It was also found that entrepreneurs with prior industrial experience were positively affected by their experience during the incubation process as they were more easily able to identify opportunities, had more confidence and were more easily able to access resources in the given sector. This also suggests that incubator management should include industrial experience as part of the selection criteria. This is particularly important in a time-sensitive incubation process such as the regional incubation process which aims to spin-off companies quickly to achieve regional development objectives and has objectives of starting spin-offs in specific sectors. Entrepreneurs were also positively affected by their formal education during the incubation process as it helped them assess opportunities, more easily access contracts from the university they previously attended, provided technical competences, confidence and more easily access external resources. This also suggests that incubator management should include formal education as part of the selection criteria.

Another policy implication for the selection process is that incubator management should involve the entrepreneur in the selection process as the findings from this thesis demonstrated that it enables them to understand what their potential role would be in the process, to obtain initial feedback on their business ideas and to engage with incubator management actors to gain a sense of their capabilities. In the university process, this is particularly important as it was found that academic entrepreneurs were not included in the selection process.

Finally, it was also found that the time frame of the selection process was important for managing the expectations of the entrepreneurs and to enable the entrepreneurs to enter the process quickly to progress their ideas to be first to market. This suggests that incubator management should pay more attention to the expectations of the entrepreneurs and time frame of the selection process as it affects potential new venture creation. This policy implication is particularly important for the university incubation process which had no standard time frame which meant that ideas could remain in the process for a long period of time without progressing and the entrepreneurs were left in

the dark over whether or not they were selected. Additionally, the University missed out on being first to market on ideas because of the long selection process.

The findings from this thesis also have policy implications for incubator management around the interaction with regional organisations/actors. First, it was found that the strategic use of regional organisations/actors by incubators is important as it enables entrepreneurs to benefit from economies of scale reducing the time, cost and hassle of 'getting up and running'. This suggests that incubator management should strategically utilise regional organisations/actors to reduce transaction costs for the entrepreneurs. This is particularly important for the university process which did not use regional organisations/actors strategically, negatively affecting the academic entrepreneurs and potential new venture creation.

Second, it was found that regional organisations/actors play a large role in delivering business support in the incubation processes. Following Patton et al (2009), this suggests it is important to manage the external network/interaction with regional organisations by sustaining their interest and involvement by acknowledging their contributions and understanding their motivations for participating.

The findings from this thesis also have policy implications for how incubator management balances its funder's requirements with the needs of its entrepreneurs. The regional incubation processes funding requirements were found to affect negatively the entrepreneurs and potential new venture creation. While this mostly has implications for incubator funders which will be discussed below, it also suggests that incubator management should be aware of how it manages the needs of its funders. One incubator management actor from the regional incubation process suggested that this may be possible by making sure there is a balance between private sector and public sector experience in the incubator where the former helps to remind the process to think about the needs of its entrepreneurs. This point suggests that incubator management should consider the requirements they place on entrepreneurs to be able to demonstrate their outputs to their funders. In the regional process, requiring entrepreneurs continuously to fill in a CRM system to document their outputs, to promote the incubator in the region and to only select regional organisations/actors as service providers negatively affected new venture creation and is counterproductive to the entrepreneurial process.

The findings from the thesis also suggest that incubator management from regional incubators in particular should be more aware of how they fit into the RIS as it was

found that existing regional organisations/actors were in competition with the regional incubator and did not want to engage with the entrepreneurs. This suggests that incubator management from regional incubators need to clearly articulate their objectives to other regional organisations/actors to facilitate the entrepreneur's engagement with external actors during the incubation process.

Another policy implication for incubator management actors is around the theme of risk aversion. The findings from this thesis highlight that processes with higher levels of risk aversion negatively affected the entrepreneurs and potential new venture creation. This suggests that incubator management should try to limit risk aversion during the incubation process. This is particularly important for the university incubation process which displayed high levels of risk aversion negatively affecting the entrepreneurs and potential new venture creation.

The findings from the thesis also suggest that incubator management should consider how they are using 'duty of care' in the incubation process as a negative use affects potential new venture creation. This is particularly important in the university incubation process as incubator management actors used duty of care to protect the university rather than the academic entrepreneurs limiting the time they could spend on developing their spin-offs. This suggests that the university incubation process can learn from the student incubation processes positive use of duty of care which can be used similarly to encourage academic entrepreneurs during the process by explaining the realities of entrepreneurship and its implications while at the same time allowing them the freedom to balance their own workload.

Another policy implication for incubator management actors is around the theme of management learning. The findings from this thesis demonstrated that strategic incubator management learning is important to refine and improve the overall incubation experience for the entrepreneurs. This is particularly important for incubator management from the student and university incubation processes where it was found that there was little or no learning involved to improve the processes. This suggests that incubator management should build in management learning to the incubation process to help improve the process for the entrepreneurs.

Finally, the findings from this thesis have policy implications for incubator management around the incubation processes business support component. First, it was found that incubator management differ in their entrepreneurial experience and incubator

management with prior entrepreneurial experience positively affects the entrepreneur's readiness for co-production. This suggests that incubator management should recruit individuals whenever possible with prior entrepreneurial experience as it affects the success of new venture creation. This implication is particularly important for the university and student incubation processes as incubator management actors were mostly lacking entrepreneurial experience. Second, it was found that incubator management that utilise a broader range of production modalities during the business support contribute more successfully to new venture creation. This suggests that whenever possible incubator management should use a broad range of co-production modalities. This implication is particularly important for the incubator management from the university and student process which used a limited range of co-production modalities.

Third, it was also found that the three processes offered different types of support which affected the success of new venture creation. Physical resources or the physical incubation of entrepreneurs 100% of the time positively affected the entrepreneurs as it meant they could benefit from being co-located with incubator management actors and engage and obtain support as and when they needed it. This suggests that incubator management whenever possible should design incubation programmes with 100% physical incubation as it positively affects new venture creation. This implication is particularly important for the student and university incubation process which did not physically incubate entrepreneurs. Innovation resources also positively affected the entrepreneur's ability to identify and evaluate opportunities during the incubation process. This suggests that incubator management should also design incubation programmes with the inclusion of innovation resources for entrepreneurs to be able to better identify and evaluate their opportunities. This implication is particularly important for the student and university incubation process which did not provide innovation resources which negatively affected the student and academic entrepreneurs' ability to develop their ideas.

High growth business support was found to be specifically limited in the student incubation process which negatively affected the student entrepreneurs' and their ability to develop spin-offs with high-growth potential. This suggests that incubator management from the student incubation process in particular should accommodate student entrepreneurs with high-growth aspirations by either providing the support

themselves or by partnering with other regional organisations/actors with such expertise.

Finally, the findings from the thesis highlight that entrepreneurs are heterogeneous in their experience and background which means they require different levels of business support. Following Clarysse et al (2005), this suggests that incubator management may design incubation programmes offering various business support models in parallel. This is particularly important for novice entrepreneurs as incubation programmes need to address their inexperience to have a positive impact on potential new venture creation.

University senior management policy implications

The findings from this thesis also have implications for university senior management as it was found that academic entrepreneurs are highly affected by the entrepreneurial culture of the university. In the university process, the academic entrepreneurs were negatively affected by the excessive use of CDAs, the controlling of IP, the continuous policy changes towards entrepreneurial activity and the lack of time given to develop their spin-offs. This suggests that university senior management should focus on developing/facilitating a culture within the university that is pro entrepreneurship. This may be achieved by demonstrating their support for entrepreneurial activities by giving academic entrepreneurs time to work on their spin-offs, removing the policies around the excessive use of CDAs and control of IP. In particular, the implication for Vice-Chancellors is that they should consider maintaining a consistent policy towards new venture creation as constant change of policy negatively affects the academic entrepreneurs and the university incubation process. Additionally, it was found that the university incubation process functioned more successfully when it was embedded at the faculty level rather than centralised within the University. This suggests that University senior management should consider where they place their TTOs within the University.

Entrepreneur policy implications

The findings from this thesis also have implications for entrepreneurs who aim to participate in incubation programmes. First, it was found that entrepreneurs with prior industrial experience in the sector they were starting a business were more easily able to recognise opportunities in those sectors, had more confidence and could more easily access resources. Following Shane (2000: 466), this suggests that entrepreneurs should

"look to discover opportunities in what they know as they will be more likely to discover opportunities in sectors that they know well than in sectors that are 'hot' because the investment in the information necessary to recognise opportunities is likely to occur long before a particular sector is popular". It also suggests that entrepreneurs who are applying to incubators with objectives to spin-off companies in specific sectors should confirm their prior industrial experience fits within the same sectors. Additionally, the findings from this thesis also highlight that incubators vary in their selection process. This suggests that entrepreneurs should be aware of the existence of difference screening practices and prepare their candidacy more carefully (Aerts et al., 2007). Finally, novice entrepreneurs who are applying to incubators should confirm that incubation processes will provide the necessary resources to accommodate their needs and gaps in knowledge (e.g. entrepreneurial knowledge and access to networks) as it will positively affect potential new venture creation.

Incubator funder policy implications

The findings from this thesis also have policy implications for incubator funders. The findings from this thesis suggest that incubator funder requirements can have negative impacts on new venture creation. It was found that the regional incubation process, which was funded by multiple regional stakeholders, was the most negatively affected by its funders' requirements. These requirements included obliging the entrepreneurs to go through a procurement process to obtain services from regional organisations, requiring the incubator to demonstrate regional impacts and highlighting that future funding would only be provided if current funding was spent. The findings from this thesis demonstrated that these requirements negatively affected new venture creation during the incubation process as the requirements did not allow the entrepreneurs to be entrepreneurial, took time away from developing their spin-offs, forced them to engage with regional organisations/actors that were substandard and created negative competition and tension between regional organisations/actors. This suggests that incubator funders should consider the requirements they place on incubators as they may have negative implications for the entrepreneurial process which is counterproductive to incubator funder objectives. In particular, the procurement process, which was highlighted by all the entrepreneurs as counterintuitive towards entrepreneurship, should not be included in incubation programmes as it slows down the new venture creation process, does not allow the entrepreneurs to engage with potential

service providers up front and be commercial with them and adds additional costs to the spin-off by adding on a 20% non-recoverable VAT to anything procured.

The findings from the thesis also have implications for incubator funders in relation to the amount of financial resources they provide to incubators to achieve their objectives. It was found that incubators without adequate financial resources negatively affect the entrepreneur and new venture creation. In the university and student incubation processes, the limited financial resources provided by the University negatively affected the academic and student entrepreneurs and their ability to develop their spin-offs during the processes. This suggests that incubator funders and incubator management should communicate more clearly about their objectives and specify the resources that are needed to achieve objectives.

Regional policy implications

The findings from this thesis also have regional policy implications. It was found that the socio-economic and cultural setting of the RIS plays an important role in potential new venture creation during the incubation process as it influences the mentality of regional organisations/actors and their openness to engage with the entrepreneurs. The findings from this thesis highlight that in a weak region, regional organisations/actors are less willing to engage with entrepreneurs which negatively affects their ability to develop their spin-offs during the process. This suggests that regional policymakers who support incubators in weak regions should consider also introducing regional policies to promote entrepreneurship in that region.

Researcher implications

The findings from this research also have implications for researchers. It was found that there are clear differences between incubation processes and how these differences impact entrepreneurs and new venture creation in the context of the incubation process. This suggests that researchers should clearly explicate the type of incubation process they are researching as it will lead to more informed findings and help to bring consensus to the literature around types of incubation processes. Additionally, the findings support the argument that entrepreneurship is context dependent (Zahra and Wright, 2011). The entrepreneurs were found to be affected by the incubator organisation that provided support and the regional context they were based within. This suggests that researchers should also build in context to their research designs as it will strengthen their findings and theoretical contributions (ibid).

7.2 Personal development

The research undertaken in this PhD has contributed significantly to the personal development of its author. First, it has provided the author the opportunity to develop a critical understanding of the literature of various areas including the incubation, technology transfer, entrepreneurship education, entrepreneurship and RIS literature. This has not only helped the author to become more knowledgeable about the debates in these literatures but also to understand the gaps and how to bring together previously unconnected literatures. Second, the thesis has enabled the author to develop further skills around qualitative methods which is an essential research methodology utilised in management research. More specifically, the author improved skills around the use of CAQDASs (e.g. NVivo) to help facilitate the analysis of qualitative data. Research training courses and international webinars provided knowledge on the best use of the programme which will be beneficial for future qualitative research. Cross-case analysis skills, as well as the management of large sets of data, were also further developed as a result of the analysis undertaken in this thesis. Third, the research enabled the author to develop further skills around designing research for the collection and analysis of data. As research designs are important for undertaking research, these skills will also be important for future research. Fourth, the overall process of the PhD enabled the author to improve self-management skills. These skills include goal setting, decision making, planning, scheduling and task tracking to achieve objectives for the thesis. Self-management skills will also be beneficial for future research projects and endeavours. Fifth, limitations that arose from the PhD process, specifically around data access, provided the author with knowledge on how to handle these issues better in the future. For example, the author learned that flexibility and communication is essential in the research process. This includes accommodating the needs of interviewees, modifying research designs and clearly communicating the objectives and aims of the research to stakeholders. Finally, attending conferences during the PhD enabled the author to improve presentation and communication skills such as building academic Power Point presentations, presenting research and answering questions from an audience.

7.3 Limitations

The best efforts were made to create a sound research design in order to address the research aims and questions set out in this thesis. However, there are some limitations which need to be addressed, many of which arise from the nature of qualitative research. As with most qualitative research, there is an inherent researcher bias stemming from

the use of qualitative methods (Bluhm et al., 2011). The use of multiple researchers in the data analysis process was not possible due to funding constraints. A second limitation, also as with most qualitative research, is the inherent lack of generality of the theory as a result of using a case study method (Eisenhardt, 1989). To help increase the generalisability of the research findings, as mentioned in the methodology section, the selection of cases was not random but reflected the selection of specific cases (e.g. incubation process archetypes) to contribute to theory (Eisenhardt, 1989). Additionally, the multiple case study design was also selected to help with this issue as it "yields more robust, generalisable and testable theory than single-case research'' (Eisenhardt and Graebner, 2007: 27).

A third limitation was that not all the interviews were transcribed by the author. As a result of time constraints, an external transcription company was used to transcribe some of the interviews. To limit errors, steps were undertaken to test the quality of the transcriptions (Bryman and Bell, 2007). The steps undertaken included sending one interview to the external transcription company. The interview transcription was then checked against its original recording to ensure the actual words on the audiotape matched the transcribed text.

There were also limitations in relation to data access which did not allow observation analysis to take place in two of the three incubation process types. To overcome this issue, in-depth interviews were undertaken with multiple entrepreneurs from the university and student process and documents were used. A fifth limitation was that longitudinal data could not be collected from the second group of entrepreneurs interviewed from all three processes in the same way. This was a constraint related to the timeframe of the PhD. This meant that in the student and university process, a second group of entrepreneurs were not longitudinally tracked. To overcome this issue, entrepreneurs across from the student and university process were selected at different stages in the process to be able to obtain a more complete perspective of the process and to mitigate bias and "retrospective sense making" (Eisenhardt and Graebner, 2007: 28).

7.4 Further research

Future studies could address a number of important areas which were outside the scope of this thesis. One area in particular could explore further the inductively-derived constructs (risk aversion, entrepreneurial knowledge, social capital, incubator management learning and duty of care) which were found to be important for

understanding the incubation process. Risk aversion in particular could be important to further explore in the university context as it was found to affect negatively the academic entrepreneurs the most out of the three entrepreneur types.

Another area of research could focus on the cognitive processes of entrepreneurs such as the way entrepreneurs think and the individual decision-making processes or heuristics adopted by entrepreneurs (Ucbasaran et al., 2001, Baron, 1998) and how it affects them during the incubation process. This would be interesting as it has been suggested that cognitive processes are beneficial to an entrepreneur during the opportunity recognition process (Baron and Ensley, 2006). Entrepreneurs with strong entrepreneurial cognition may be more likely to develop new opportunities quickly (Wright et al., 2004). In the context of the incubation process, understanding how entrepreneurs with strong or weak entrepreneurial cognition could be important for incubation processes with short incubation periods and could also have implications for the selection criteria incubators use to recruit entrepreneurs to the process.

Based on the findings that suggest that the RIS is more complex than is projected in the literature, another area of research could focus on unpacking further the complexity of the RIS and how it affects other entrepreneur types in the same region outside the incubation process. This is important as while there have been many calls in the literature to address the differences between (spatial) contexts in which entrepreneurial activities take place (Zahra and Wright, 2011, Wright, 2011, Hoskisson et al., 2011), the findings from this thesis suggest that more research is needed to account for the differences within regions rather than across (spatial) contexts. Future research could also focus on a comparative analysis of incubation processes in a strong region with incubation processes in a weak region to analyse the impact of the two different region types on the incubation process and how it functions. Linked to this point, future research could also focus on understanding how the incubation process engages with other types of innovation systems such as NIS. While this study aimed to understand the incubation processes link to the RIS, there was some evidence that the entrepreneurs were also engaging with organisations external to the region. Further research could explore links with other innovation systems which could provide another level of understanding to incubation processes and how they function.

Another area of research could also focus on research questions that aim to understand how sector differences affect how support is delivered to spin-offs in different sectors

during the incubation process. This may be an interesting area of study as it has been suggested in the literature that different sectors may need distinctive resources (Mustar et al., 2006). Finally, future research could focus on longitudinally tracking student and academic entrepreneurs in real time. This approach was not possible in this study as it would have exceeded the PhD period. This longitudinal approach would aim to address the multiple calls in the literature for further longitudinal entrepreneurship research to chart the development of entrepreneurial ventures over time (Davidsson et al., 2001, Bygrave, 2007).

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Appendix I

Entrepreneur Interview Questions

1. Can you explain the company you are currently developing/have developed during your time within the incubator?
2. Where are you currently in the process of starting a business within the incubator?
3. What is your prior experience with start-ups? How do you think it affected you starting a business in the incubation process?
4. What is your education? How do you think it affected you starting a business in the incubation process?
5. What is your industrial experience? How do you think it affected you starting a business in the incubation process?
6. Do you have family have a background in business? If so, how do you think it affected you starting a business during the incubation process?
7. Can you describe how the incubation process functioned?
8. If there was a selection process, can you explain how it functioned? What was the type of criteria the incubator utilised to select you to join the process? Who was involved in the selection process?
9. Can you think of a particularly important episode during the selection process that worked well? What about that didn't work well?
10. What types of business support did you receive from the incubator? Which were most helpful and why?
11. Can you think of a particularly important episode when you received support that worked well? What about that didn't work well?
12. Were there any barriers you experienced for obtaining support? How did you overcome them?
13. Who was involved in delivering business support to you? What was their role in the process? Can you explain how they helped you? What types of interactions were they? How often? Who was the most helpful and why? Unhelpful and why?
14. Did the regional environment play any role in helping or constraining you from starting a business during the incubation process? If so, how and why?
15. Did you utilise any regional organisations/actors to help you develop your business during the incubation process? If so, how and why? Was it easy to engage with regional organisations? Why or why not? How did the quality of regional organisations/actors affect how you started a business during the incubation process?
16. Did the culture in Newcastle affect you how you started a business during the incubation process? Why or why not?
17. Did you have access to regional finance during the incubation process? If so, how did it affect how you progressed through the process?
18. How did you utilise regional networks to help develop your business during the incubation process? Which networks? Did anyone from the process help to facilitate access to networks? If so, how did they do that?

Incubator Manager Interview Questions

1. Can you explain what your role is at the incubator and for how long you have worked there?
2. Can you explain what your level of entrepreneurial experience is?

3. What are the objectives of the incubator and how do you think this affects how the process functions?
4. How do you think the incubator's financial resources affect how the process functions?
5. What are the key components of the incubation process and how did they function?
6. How did you select entrepreneurs to the incubation process?
7. What was the criteria you utilised to select entrepreneurs to the process?
8. Who was involved in the selection process and what were their roles?
9. What types of business support are provided to entrepreneurs during the incubation process?
10. Who supplied the business support to the entrepreneurs and what was their role?
11. If you were engaging in delivering support, can you explain that process? What types of interactions were they? How often?
12. Do you face any barriers in your role in delivering business support? If so, what were they and how did you overcome them?
13. Do the entrepreneurs face any barriers when starting a business in the context of the incubation process? If so, what were they and how did you help them overcome them?
14. Did the incubation process change over time? If so, how and why?
15. How does the process utilise external regional organisations/actors? Which ones and why? Was it easy for the entrepreneurs to engage with these external regional organisations/actors? Why or why not? How did the quality of regional organisations/actors affect how the process functions?
16. How did the regional environment play a role in how the incubation process functions? Do you think the regional environment played any role in how the entrepreneur started a business in the context of the incubation process? If so, how and why?
17. How do you think the processes location in the North East region affects how the process functions?
19. How did the culture in the North East region affect the entrepreneur and how they started a business during the incubation process?
20. Do the entrepreneurs have access to regional finance during the incubation process? Why or why not? How do you think this affected how the process functioned?
21. Do entrepreneurs utilise any regional networks to help develop their business during the incubation process? Did anyone from the process help to facilitate access to networks? If so, how did they do that?

Appendix II

POSTGRADUATE PHD DISSERTATION

Information and Consent Request

This form is to gain your consent to participation in the research for this PhD dissertation. Your participation is voluntary. You may withdraw from the research at any time and for any reason. The data collected from the interviews will be treated with confidentiality. When using the questionnaire, you will have the options of omitting questions that you do not want to answer. You can consent to none, one, some or all of these purposes. Post interview, a typed transcript of the interview will be sent to you in advance of any of it being used for your approval. You will be able to indicate if there is any part of it that you would prefer not to be used, or that you would wish to remain anonymous.

Please do get in touch if you would like to talk about this further. You can contact me, Drew Gertner (mobile: 07728855750 or drew.gertner@newcastle.ac.uk). My PhD supervisors are Professor Ian Clarke (Ian.Clarke@newcastle.ac.uk) and Professor John Goddard (John.Goddard@newcastle.ac.uk) who may also be contacted for further questions.

To ensure compliance with the Data Protection Act 1988 and to develop good practice, the University would like your consent on the below points relating to your participation in the dissertation interviews 2011:

□ Consent to participate in the interviews.

□ Consent to use the interviews for use internally - i.e. for the needs of the dissertation.

□ Consent to use the interviews externally - i.e. for external examination

□ Consent for the original names to be used

□ Consent for subsequent publication

Signed _____ **Date _____**

Print Name _____

The information that you give on this form and accompanying monitoring information will be used under the terms of the Data Protection Act 1998. Information will be processed manually and automatically. You will have the right of access to your Personal Data, to have any inaccurate data amended and to know for what purpose the information is being processed.