2009

Do Campus Incubation Centres Provide a Successful Linkage Between Early-stage Entrepreneurial Ventures and the Irish Institutes of Technology?

Fiona Fox
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Do Campus Incubation Centres provide a successful linkage between early-stage entrepreneurial ventures and the Irish Institutes of Technology?

Fiona Ryan
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Fiona Ryan BA

A thesis submitted in fulfilment of the requirements of the degree of:

Taught Masters in Business Studies

Department of Continuing Education
Cork Institute of Technology

Research Supervisor:  Dr. Angela Wright

January 2009

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This study is an examination of the issues that are pertinent to the development of linkages, which campus incubation centres provide between their host Institutes of Technology (IoT) and their tenant firms. This research incorporates the views, opinions and recommendations of new firm entrepreneurs, campus incubation centre management, senior academic staff and researchers. This study responds to the lacuna of research on campus incubators hosted by the Institutes of Technology. This study confirms that campus business incubators that are affiliated to the IoTs are still in their infancy. The research acknowledges that these campus incubators are in a 'start-up' phase and consequently the findings of this research affirm that collaboration between the Institutes of Technology and their campus incubation companies is relatively low. The author has selected a qualitative method of research to seek the opinions, perceptions and attitudes of participants in this study in order to gain an in-depth understanding of activities, behaviours, concepts and their interrelationships.

A significant finding of this research is that the interests and objectives of the early-stage ventures and the academic staff are heterogeneous. Another important finding of this research is that there is a complex trade-off in terms of the needs of the academic researchers and those of the emerging entrepreneurial firms. The research illustrates that what is advantageous for the academic researchers may not necessarily benefit the incubation company. Conflict may arise due to issues with industry or market oriented concerns.

The findings of this research highlight the relationship between the Institute of Technology staff, the campus incubation centre and its incubatees. This relationship is predominantly an informal process, driven particularly, by individuals who are pro-active in seeking collaborative opportunities. An important finding of this research is the perspective and differing views between the researchers and the incubation staff as to the effectiveness of the research process for early-stage entrepreneurial ventures. This study will benefit stakeholders in the field such as policy-makers within an academic and incubator context and innovative entrepreneurs. Further research is warranted with regard to the remaining Institutes of Technology and Universities that host campus incubation centres, as this data would yield important and relevant information on the success of policy driven linkages.
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DEDICATION

This thesis is dedicated to my parents, Penny and Dan Conroy. They have been an inspiration to me throughout my life. Mum and Dad have always supported and encouraged me to do my best and made me what I am today.
ACKNOWLEDGEMENTS

• This study drew upon the knowledge and experience of managers, researchers and entrepreneurs and I would like to thank all the participants in this study who very generously gave their time.

• A big thank you to Paul Healy for his help in starting me on my journey with this thesis.

• I would particularly, like to extend an acknowledgement to my academic supervisor Dr. Angela Wright, for her readily available support all through the study, for her attention to detail and common-sense reviews on a regular basis during the writing of this dissertation.

• Thank you to my course director, Mr. John Meyler, for his direction with this thesis.

• I would like to thank Veronica Perdisatt, a fellow student and a true friend to me on this Masters programme.

• I would like to acknowledge the wonderful support, love and encouragement from my parents, Yvonne and Barry. I would particularly like to thank my Dad, Dan, for doing a superb job in proofreading this study for me.

• I would like to thank my children, Andrew, Alyssa, Ben and David for their limitless patience with Mum taking over their playroom and their happy faces, cheerful smiles and endless hugs. They made it all worthwhile. A big thank you to Colm and Margaret for their support and advice.
CHAPTER 1. INTRODUCTION

In terms of people actually starting new businesses, Ireland is right up there with the top countries in the world (Fitzsimons, 2009:1).

1.1. INTRODUCTION

In a competitive environment, starting up a new business venture is fraught with risk but can provide huge opportunities for the emerging business. Due to the current economic downturn, the environment in which these ‘start-up’ companies strive to succeed is becoming increasingly difficult. Although the future will be challenging for the Irish economy, the downturn offers opportunities, particularly for new business ventures. This research is an assessment of the current linkages that exist between the campus incubators and their host Institutes of Technology, and their incubation client companies.

The premise behind campus incubation centres (CICs), lies in their capacity to reduce ‘start-up’ costs for promising knowledge-based and high-tech entrepreneurial initiatives, which are generally small, targeting local or national markets, with a short to mid-term orientation. The early-stage entrepreneurial ventures require time, education of technological transfer processes and resources (access to Institute of Technology infrastructure – equipment and laboratories and technological knowledge) to develop their full potential. The challenge for these campus incubation centres is to offer early-
stage entrepreneurial ventures (particularly academic staff), the possibility of proving their abilities and skills outside academia and to eventually promote companies, through which they can further develop their entrepreneurial potentials.

1.2. BACKGROUND TO THIS RESEARCH

According to Atherton (2004), entrepreneurship can permeate all aspects of society and the economy. Individuals are more likely to be entrepreneurs and to be entrepreneurial when the external environment is right and conditions are conducive – and they are less likely to do so when these activities and predispositions are discouraged or resisted. O'Toole (2009) states that the level of entrepreneurship in Ireland has, historically, been high by comparison to other OECD countries. According to Fitzsimons (2009), there is nothing to suggest this situation will change significantly in the current economic climate (in O'Toole, 2009).

There is general agreement among representatives of Government and of tertiary education that the expansion of higher education has been enormously beneficial both to Irish society and to the economy (OECD, 2004). According to the Department of Enterprise, Trade and Employment (2008) as the global market becomes more sophisticated and demanding, the research and learning institutions are becoming more significant economic players at local, regional and national levels, and they must be able to respond better and faster to market demands. They must develop wider and deeper partnerships that harness and develop regional scientific and technological knowledge.
The Department of Enterprise, Trade and Employment (2008) states that strengthening links between national research infrastructures and industry and transferring knowledge to the marketplace remain key goals of its innovation strategy. In this context, the enterprise development agencies are addressing two issues, 1) The capacity of small and medium-sized enterprises to absorb and apply research and new knowledge; and 2) the increasing demand from enterprise for readily accessible applied research capabilities.

Peters *et al.*, (2004) state the entrepreneurial process moves through a number of processes – 1) the idea for a new product or service, 2) initial decision to proceed, 3) assembling the required resources, for e.g., information, finance and people, 4) actual launch of the venture and 5) building a successful business and finally harvesting the rewards. Peters *et al.*, (2004) argue that once the idea is recognized and the entrepreneurs decide to proceed with that idea, incubators could play a significant role from the point of assembling the resources to harvesting the rewards and the role of the incubator has changed in the entrepreneurial process from being a business centre with office facilities to one offering training, networking and consulting in all areas of expertise to startup firms.

According to the Tánaiste, and Minister for Enterprise, Trade and Employment, Mary Coughlan T.D. (in Enterprise Ireland, 2008b), the transfer of knowledge, technology and intellectual property from Ireland’s research institutions into the economy is critical to Ireland’s economic success in the more competitive times ahead. The Tánaiste (in Enterprise Ireland, 2008b), further states that discoveries must be quickly translated from
the research centres to the business world and the focus of that research must be on relevant areas of endeavour with the potential to have practical application.

1.3. JUSTIFICATION FOR THIS RESEARCH

Over the past decade, business incubators or business incubation programs have emerged as an important strategy for enterprise development at the international level (OECD, 1999; United Nations, 2000). According to Thompson and Downing (2007), business incubation offers a supportive and sometimes nurturing environment for new and young business. The incubator programs have emerged to enhance the important roles played by small and medium enterprises in the economy and to minimise the failure rate of ‘start-up’ enterprises (Gatewood et al., 1985; OECD, 1997; Wolfe et al., 2001). Provision of incubator services is adopting a holistic mechanism by considering the needs of ‘start-up’ businesses for solving entrepreneurial issues (Rice, 1992). According to Grimaldi and Grandi (2005), incubators need to pay attention to their strategic positioning and should realise the key importance of specialising in the services that they offer and of matching the variety of demands and expectations coming from new ventures.

Allen and McCluskey (1990) state that although business incubation is a strategically important program for the growth and development of new business ventures in an economy, literature on this topic has been very limited especially in terms of clients’ satisfaction with the assistance services provided by their incubators. According to
Enterprise Ireland (2008a), campus business incubation centres in Institutes of Technology, provide critical space for research-driven ‘start-up’ companies and make available business mentoring and a wide range of support services. In general, these companies have good links with the host institution and the Institute of Technology benefits from having a focal point of entrepreneurial activity on campus and a commercialisation route for their research (Enterprise Ireland, 2008a). According to Ó’Móráin (2008), regional enterprise is vitally important, now more than ever, and the Institutes of Technology have a unique and critical role to play by delivering new technologies and innovative solutions to companies in their locality.

According to the Department of Enterprise, Trade and Employment (2008), the Institutes of Technology play an important regional role in the development of innovative businesses throughout Ireland. According to Enterprise Ireland (2008c), the Tánaiste and Minister for Enterprise, Trade and Employment, Mary Coughlan T.D. urges the Institutes to intensify their efforts to work with companies in regional areas to deliver value for money from the State’s investment in their applied research capabilities. According to Enterprise Ireland (2008b), the Tánaiste and Minister for Enterprise, Trade and Employment, Mary Coughlan T.D announced the number of people employed in campus incubation companies that are managed by Ireland’s Institutes of Technology, has broken through the one thousand mark, emphasising as a nation, we must see more of this type of activity.
1.4. RESEARCH OBJECTIVES OF THE STUDY

The overall aim of this study is an assessment of the linkages that campus incubators provide between their incubation client companies and the Institutes of Technology. The objectives of this research are to examine the linkages between the campus incubation centres and their host Institutes of Technology and secondly, to examine the facilitation process between the campus incubation centres and their tenant firms - the early-stage entrepreneurial ventures.

1.5. RESEARCH FOCUS OF THE STUDY

The concept of campus incubation centres in Ireland is a relatively new one and campus incubation centres hosted by Institutes of Technology are still in their infancy. This study is, therefore, concerned with an assessment of the campus incubation centres in relationship to their providing linkages between their client companies and the Institute of Technology and is divided into five chapters as follows:

Chapter One presents the background and justification of the research of the research. This chapter outlines the objectives of the study and presents an overview of the structure of this study.

Chapter Two reviews the relevant literature relating to campus incubation centres. The literature review defines entrepreneurship and its historical development. It analyses the perspective of the entrepreneur and how entrepreneurship has developed in Ireland. The
Chapter Three provides an outline of the research methodology in the context of this study. The chapter describes in detail the research methodology used by identifying the research objectives and selecting a research design to provide understanding and insights for the author. The chapter describes in detail the research methodology chosen for this study and traces the steps employed in the use of qualitative methodology. This study takes as its unique focus the perceptions of twelve significant authorities who directly relate to campus incubation centres and the Institutes of Technology with whom they are affiliated. This chapter also details the limitations of the research and provides reasons for same.

Chapter Four provides the main findings of the research. The field research is based on data from the interviews conducted with twelve participants who have had some experience of college-industry linkage. This chapter reviews the formal and informal
relationships that enable the exchange of goods, services, personnel, information, ideas, expertise, and funding between the academic staff in the Institutes of Technology and clients companies of the campus incubators. This chapter reviews the relationship in terms of internal communication between the new firm entrepreneurs and that of the incubator staff.

Chapter Five, the concluding chapter, reviews the main findings of the research. Building on the findings of this study, recommendations for future research are also presented.
CHAPTER 2. LITERATURE REVIEW

The past is of no importance. The present is of no importance. It is with the future that we have to deal. For the past is what man should not have been. The present is what man ought not to be. The future is what artists are. The soul of man under Socialism (Oscar Wilde).

2.1. INTRODUCTION

The literature review begins with an overview of entrepreneurship, its definition, perspective of the entrepreneur and the level of entrepreneurship in Ireland. This chapter examines the Irish Higher Education Environment within the context of economic development. This research expands the academic literature by analysing the role of the Institutes of Technology in enterprise development and explores the linkages between industry and Higher Education Institutions (HEI). This study also examines the role and mission of incubation centres and their various structures. Financing of campus incubation centres, particularly with reference to Enterprise Ireland (EI) are examined. This chapter highlights the dearth of research on campus incubation centres (CICs) and their host institutions and concludes with a summary of the main points of the Literature Review.
2.2. DEFINITION OF ENTREPRENEURSHIP

Drucker (2006) states that, although the term entrepreneur has been used for 200 years, "there has been total confusion over the definition." (2006:21). According to Mazzarol et al., (1999), early research into entrepreneurship focused on the entrepreneur, seeking to determine personality characteristics which distinguished entrepreneurs from non-entrepreneurs and examining the influence of these on organisation formation rates.

According to Kuratko and Hodgetts (2001), entrepreneurship is a process of innovation and new venture creation through four major dimensions – individual, organizational, environmental and process, that is aided by collaborative networks in government, education and institutions. Carter et al., (2002) postulate entrepreneurship is vital for the creation of a sustainable, indigenous economy and can significantly affect economic growth, innovation, job creation, prosperity and national competitiveness. Lee and Tsang (2001) state that both practitioners and academics appear to believe venture success is more dependent on the entrepreneur than on any other factor. Timmons (2004) argues the concept of entrepreneurship has changed dramatically in the last decade, from historically being about ‘start-up’s, to a broader concept which can happen in ‘start-up’ companies, in early-stage companies, in later-stage companies, in big companies and small ones, in young ones and old ones, in the public sector and in the not-for-profit sector:
2.3. PERSPECTIVE OF THE ENTREPRENEUR

According to Carland et al., (1984), the goals of an entrepreneurial venture are profitability and growth and the business is characterised by innovative strategic practices.

Kets de Vries (1996) postulates an entrepreneur is an individual who is instrumental in the conception and the implementation of an enterprise. Baumol (1993) proposes the quest for profit or wealth plays an important motivational role in the entrepreneur's
pursuit of new business opportunities. It is more likely, according to Hsieh et al., (2007), that the entrepreneur’s critical task is to efficiently govern the process of discovering opportunities. Moreover, according to Zander (2007), the quest for profit takes place in a context where time is of the essence. In the eyes of the entrepreneur, ‘windows of opportunity’ are open only during limited periods of time, and being the first to exploit an opportunity is perceived to be associated with significant first-mover advantages (Zander, 2007). The entrepreneur’s task is to discover and exploit opportunities, defined most simply as situations in which products or services can be sold at greater than their cost of production (Casson, 1982; Shane and Venkataraman, 2000). Drucker (2006) concludes the entrepreneur always searches for change, responds to it, and exploits it as an opportunity.

According to Grimaldi and Grandi (2005), the ‘start-up’ process and early growth of new ventures have been the focus of considerable research effort. Of particular interest has been the identification of the factors, characteristics, and conditions which foster entrepreneurial processes, new venture creation, that contribute to their success (Smilor, 1986).

2.4. ENTREPRENEURSHIP IN IRELAND

According to Wennekers, (2006), in reviewing the current level of entrepreneurial activity in Ireland, cognisance should be taken of the fact that, while it is not possible to arrive at an exact optimum rate for early-stage entrepreneurship for Ireland, a country at
Ireland’s stage of economic development should have an early-stage entrepreneurship activity rate that is at least stable, if not increasing. This is necessary in order to avail of the innovation advantages and market opportunities presented by globalisation and by the information and communication technologies, which have reduced the importance of scale economies in many sectors (Wennekers, 2006).

The Small Business Forum Report (2006) recommended:

*Government should formally adopt a national entrepreneurship policy focused on optimising the number of ‘start-up’ businesses, and in particular on maximising the number of ‘start-up’s aspiring to and achieving high growth*


This recommendation was adopted by Government and *Towards the Development of an Entrepreneurship Policy for Ireland* was published by Forfás in September 2007. In its vision for an entrepreneurial society, Forfás (2007a) states that:

*Ireland will be characterised by a strong entrepreneurial culture, recognised for the innovative quality of its entrepreneurs, and acknowledged by entrepreneurs as a world-class environment in which to start and grow a business* (Forfás, 2007a:22).
In this report, Forfás (2007a) focuses on developing entrepreneurial activity in Ireland by building on Ireland’s strengths and providing for a mechanism to reduce barriers to entrepreneurship on an ongoing basis. It recognises that the current level of activity in Ireland is good and that a number of positive features are present which are highly supportive of entrepreneurs and entrepreneurial activity (Forfás, 2007a).

According to the authors of the Irish Global Entrepreneurship Monitor Report for 2007, Fitzsimons and O’Gorman (2008) state that Ireland continues to be one of the leading EU countries in terms of early-stage entrepreneurship and ranked Ireland third in the OECD, with 4.2 per cent of the adult population involved in new firm entrepreneurial activity. Fitzsimons and O’Gorman (2008) found that 8.2% of the adult population living in Ireland is engaged in entrepreneurial activity, an increase on the 2006 level of 7.4%. Fitzsimons and O’Gorman (2008) further state that more than nine out of every ten entrepreneurs report opportunity, rather than necessity, as their motivation for entrepreneurship (ninety four percent opportunity compared to seven percent necessity) and Irish people have positive attitudes towards entrepreneurship (in 2007, more than eight of every ten Irish people believe successful entrepreneurs are held in high regard).

Furthermore, this study by Fitzsimons and O’Gorman (2008) states that rates of entrepreneurship are highest among those with third or fourth level (postgraduate)

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1 The Global Entrepreneurship Monitor (GEM) is an index which is based on an adult population survey. Global Entrepreneurship Monitor (GEM) is a not-for-profit academic research consortium that has as its goal, making high quality international research data on entrepreneurial activity readily available to as wide an audience as possible. GEM (2007) conducted research in 42 countries. GEM is the largest single study of entrepreneurial activity in the world.
education. Fitzsimons (2009) emphasises it is the collective impact on the economy of these new businesses that is important (in O'Toole, 2009).

According to the Enterprise Strategy Group (2004), entrepreneurial skills and attitudes are core requirements in an innovation-driven knowledge economy and they must be fostered. The Department of Enterprise, Trade and Employment (2008) state that the pressure to be competitive drives innovation across the range of business practice; and conversely, innovation is a key driver of competitive advantage:

With greater competition in markets, companies need to draw on all their entrepreneurial and innovative skills to develop new products and services, to exploit their particular strengths, abilities or other advantages, and to meet their customers' need effectively

(Department of Enterprise, Trade and Employment, 2008:31).

The Enterprise Strategy Group (2004) further states that innovation requires a particular mindset that involves curiosity, creativity and problem-solving, and the ability to apply knowledge, insights and intuition to change them. Entrepreneurship requires this attitude, together with a desire for autonomy. It also requires a range of skills that is neither easy to teach nor learn, including people management skills, negotiation skills, problem-solving and communication skills (Enterprise Strategy Group, 2004).
According to Acs and Audretsch (2005), facilitating the implementation of innovative ideas in new businesses is the key to creating an enabling pro-business environment in an entrepreneurial society. Forfás (2008a) states its objective is to ensure that science and technology work for enterprise and Ireland, using innovation and research and development capabilities to enhance productivity and to commercialise new products and bring them to market.

Jordan and O'Leary (2007b) state that the *Strategy for Science, Technology and Innovation: 2006 to 2013*, suggests that Irish policymaking in relation to innovation is based on three main tenets: 1) that gross expenditure on Research and Development should be increased; 2) that agency support should be targeted at Higher Education Institutes (HEIs) or at businesses interacting with HEIs; and 3) that high technology sectors have the greatest potential for innovation and growth (Jordan and O'Leary, 2007b).

According to the OECD (2004), Ireland was one of the first European countries to grasp the economic importance of education and economists suggest that this upskilling of the workforce accounts for almost 1% per annum of additional national output over the past decade or so. As knowledge generation, use and dissemination become increasingly pervasive, the interests and needs of firms and higher education institutions will become ever more intertwined (O'Connor, 2007).
2.5. THE IRISH HIGHER EDUCATION ENVIRONMENT

Henry (2000) identified that the role of the Higher Education sector in increasing the supply of entrepreneurial talent to create and grow new businesses, will generate employment and create wealth for the local and national economy. Ireland’s economic development depends on exploiting opportunities to innovate, facilitated by a strong research and development base (Forfás, 2008a). According to the Irish Government’s National Development Plan (NDP) 2007-2013:

*Ireland’s move to a more knowledge-based economy is predicated on a number of key factors, including the level, quality and commercial applicability of research and development undertaken in industry and the research community and the extent of collaboration within the business community (NDP, 2007:74).*

According to Forfás (2004), throughout the 1980s and 1990s, there was little scope to carry out high quality research in universities in Ireland due to a lack of research infrastructure and a lack of funding to support researchers. Forfás (2004) states that the European Union framework programmes (FP) were the only substantial source of funding available to Irish researchers in that period and Irish researchers were highly successful in competing for, and winning FP contracts, in the face of fierce competition from other European countries. Forfás (2004) further states that Irish researchers ‘punched above their weight’ in successfully drawing down FP funds, which opened the door for Irish researchers to collaborate with their counterparts across Europe in leading edge disciplines, in accessing new technologies, practices and processes (Forfás, 2004).
According to the Higher Education Authority (2008), the higher education sector in Ireland comprises seven universities and fourteen Institutes of Technology as well as a number of designated higher education institutions. O'Connor (2007) states that the Irish academic research landscape has undergone dramatic changes over the last number of years as evidenced by Ireland's increasing conformance with international averages. According to Forfás (2008b), overall R&D expenditure on higher education research and development (HERD), has almost quadrupled over the period 1996-2006 in current spending terms. This moves Ireland closer to international averages (O'Connor, 2007).
Table 2.4  Ireland’s main HERD indicators, 2000-2006

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<tr>
<td>Higher education expenditure on R&amp;D, (€ millions)</td>
<td>238</td>
<td>322</td>
<td>492</td>
<td>601.4</td>
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<td>HERD as a % of GNP (IRL)</td>
<td>0.27%</td>
<td>0.31%</td>
<td>0.40%</td>
<td>0.40%</td>
</tr>
<tr>
<td>HERD as a % of GDP (EU-25 average)</td>
<td>0.37%</td>
<td>0.40%</td>
<td>0.39%</td>
<td>0.40%</td>
</tr>
<tr>
<td>Ireland’s rank among 29 OECD countries</td>
<td>22nd</td>
<td>19th</td>
<td>16th</td>
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(Forfás, 2008b:6).

According to O’Connor (2007), the two primary funders of research activity in the third level sector are the Higher Education Authority (HEA) through the Programme for Third-Level Research in Ireland (PRTLI) and Science Foundation Ireland (SFI). O’Connor (2007) further states that other funders of research in Irish higher education institutions are Enterprise Ireland, the Health Research Board, the Irish Research Council for
Science, Engineering and Technology, and the Irish Research Council for Humanities and Social Sciences.

According to the Higher Education Authority:

*There is much progress to be made in ensuring that our higher education institutions adopt a sectoral perspective, as well as an institutional perspective. Institutions need to identify their own unique strengths and seek to build on these strengths in contributing to the overall objectives of a higher education sector comprising a diversity of provision. In realising their broader missions, higher education institutions should be encouraged to build relationships within society and the community, with a view to informing their strategies and consistent with national objectives (2008:19).*

According to the Department of Enterprise, Trade and Employment (2008), one of the most important assets in Ireland's innovation system, and vital in a small economy with limited resources, is the quality of the public research infrastructure and its links to industry. The Department of Enterprise, Trade and Employment (2006) states that current government policy acknowledges that the transfer of knowledge from higher education institutions and public research organisations to the market place is key in developing a commercialisation environment and world-class research in Ireland. The Department of Enterprise, Trade, and Employment (2006) further states that the key objective of its Strategy for Science, Technology and Innovation: 2006-2013 is to drive the development
of a knowledge economy and to this end its budget is divided among three key areas, each of which is important for the academia-industry interface —university research infrastructure, enterprise support and research and commercialisation programmes. The Department of Enterprise, Trade and Employment (2008) states strengthening links between Irish research infrastructures and industry and transferring knowledge to the marketplace remain the key goals of the Irish Government’s Innovation strategy.

According to Ryan (2008), Enterprise Ireland has invested €275 million in the third level research and innovation system since 2000 to drive the transfer of research from the third level sector into useful products, technologies and services for enterprise. Ryan (2008) further states that to maximise the impact of this, Enterprise Ireland has built a strong and sophisticated commercialisation network, made up of Enterprise Ireland commercialisation experts and on-campus technology transfer officers, in the Irish third level sector to make the vital connections between Irish companies and the wealth of knowledge and expertise available in third level colleges.
2.5.1. ROLE OF THE INSTITUTES OF TECHNOLOGY IN ENTERPRISE DEVELOPMENT

According to Forfás (2007b), the aim of a review of the Institutes of Technology in enterprise development, was to develop a comprehensive picture of the initiatives and activities available in the Institutes of Technology (IoTs) to support enterprise growth under strategic planning, education and training, research, collaboration, company formation and resources.

According to Forfás (2007b) this study revealed four issues to enhance the role of the Institutes of Technology in enterprise development 1) a more strategic approach to ensuring industry input to IoT planning processes and the critical role of the enterprise development agencies in this; 2) recognition of all levels of Institute of Technology engagement with enterprise including graduate recruitment, training for company personnel, R&D and ‘spin-out’ activities; 3) the need to improve IoT flexibility in meeting industry requirements; and 4) the policy requirements to best support IoT’s evolution to meet the growing educational needs of the employed as well as the more traditional student base (Forfás, 2007b).

2.5.2. HIGHER EDUCATION-INDUSTRY LINKAGES

Rapid change in competition and the speed of innovation around the world have promoted the creation of linkages between research communities and commercial
enterprises (Plewa et al., 2005). Third Level Institutions, forced to find new ways of generating income due to increased competition and cuts in government funding, are increasingly commercialising their skills and research (Baaken, 2003). According to the OECD (2001), innovation and combining research efforts of private and public institutions have also become a key driver of economic performance. Universitätt Dortmund (2003) state that science and industry are the pillars supporting a country’s innovation system. According to Plewa et al., (2005), successful linkages between industry and third level institutions involve a high level of interaction, and linkage mechanisms not only have a positive effect on research outcome or technical quality, but also on knowledge transfer and satisfaction with the functional quality.

According to Fenton (2005), interactions between business and Higher Education Institutes (HEIs) lie at the heart of successful national and regional innovation policies but despite many exciting initiatives, collaboration between enterprise and academia has been limited in Ireland. This finding was supported by the Advisory Council for Science, Technology and Innovation (2007) who state that HEI-enterprise collaboration operates at a very low level in Ireland. This is consistent with the findings of the Enterprise Strategy Group report published in 2004.

According to Forfás (2008a), the Irish Government’s Advisory Council for Science, Technology and Innovation reviewed the relationship between enterprise and higher education institutions in Ireland and in a number of comparable countries. This review, according to Forfás (2007b), found that the two key constraints to the deepening of
enterprise-higher education collaborations in Ireland are the low absorptive capacity of enterprises for research and a gap in the availability of applied research that enterprises can readily access.

According to Forfás (2008a), the Royal Irish Academy set out a number of requirements to better foster enterprise-higher education collaborations, including in relation to developing a more positive disposition of researchers towards enterprise. The Royal Irish Academy (2006) concludes that academic partners need training and resources to develop their skills to support research careers in a more economically driven environment and for researchers to be successful in academia-industry partnerships, they need to learn how to approach their academic work as a series of future investment opportunities. Jordan and O'Leary (2007b) advocate that innovation is a business rather than a technological phenomenon and argue for a changed role for Higher Education Institutions to one of responding to innovative businesses.

In its Regional Planning Guidelines, the South West Regional Authority (2004) addressed the area of College-Industry Linkages and identified that:

*In the context of continuously developing the region's knowledge based economy, a clearer focus and evaluative structure must be placed on the linkages between the state agencies, third level institutions, indigenous firms and potential graduates/entrepreneurs, to ensure that supports to indigenous company creation*
and growth are operating at the highest attainable levels of effectiveness (SWRA, 2004: 24).

According to the South West Regional Authority (2008), a Business Innovation Benchmarking Survey was conducted in South West Ireland, Stoke on Trent, United Kingdom and Stuttgart, Germany in 2006/7 under the 'Directing Research into Viable Enterprises for Growth' (DRIVE for Growth Project) led by the South West Regional Authority. In the case of the Irish Regions (South West and South East Ireland), according to Jordan and O'Leary (2007), survey results identified there were some serious issues around the area of college-industry linkages. The evaluators of this study, Jordan and O'Leary (2007) state that clear patterns emerged, which demonstrated that the majority of companies who responded, rarely to never interacted in any meaningful manner with the educational sector. Jordan and O'Leary (2007) further state that fewer than one in five of these businesses indicated they interacted frequently with academics for innovation. The South West Regional Authority (2008) state the results from the UK region were similar to that of the Irish region, and the German results reveal greater levels of interaction between business and academia, based on the number of indigenous and multinational automobile industry companies with sub-supplier chains in the region, with strong personal linkages into their local Higher Education Institutes.

According to the South West Regional Authority (2008), the survey highlighted important structural and cultural differences between the firms and Higher Education
Institutes in terms of their approaches to developing innovation. This is supported by O’Connor (2007) when discussing current levels of collaborative activity:

*Differing cultures, timelines and expectations constitute challenges for all. A number of those consulted in both enterprise and academia highlighted the issue of communication and the importance of building up trust between parties* (O’Connor, 2007:61).

According to the South West Regional Authority (2008), the DRIVE survey analysis highlighted that Higher Education Institutes and firm anticipated timescales for innovation or research were substantially different and that many firms held a strong belief that approaching the Higher Education Institutes for assistance in product or process innovation was often a waste of time. The South West Regional Authority (2008) further state the study’s key finding supports the view that collaboration is low and recommends more needs to be done to address the gaps between what is expected in Irish public policy from these linkages and what in reality (given current structures and resources within HEIs) such linkages can, in the medium term, contribute to economic growth.

According to Jordan and O’Connor (2005), their survey of 184 foreign-owned and indigenous businesses revealed that 68% of businesses rarely or never interact with third level colleges. The results, according to Jordan and O’Connor (2005), indicate that more emphasis needs to be placed on funding applied rather than basic research and that a
greater role needs to be played by knowledge mediating institutions to act as a bridge between academia and business. Jordan and O'Connor (2005) further suggest that Ireland's regional innovation systems are undeveloped and seem to have little to offer high-tech business in pursuit of enhanced innovation performance. Forfás (2007b) notes that:

*In general, across the Universities and Institutes of Technology consulted, there was little evidence of research undertaken by the education providers being fed back to industry*

(Forfás, 2007b:138).

According to the South West Regional Authority (2008), it is generally recognized that current levels of industry-academia collaboration in Ireland are low but this weakness has been recognized and there are a growing number of state supports being put in place to address the matter.
According to Grimaldi and Grandi (2005), the 'start-up' process and early growth of new ventures have been the focus of considerable research effort. Smilor (1987) states that there is considerable interest in the identification of characteristics, factors and conditions which foster new venture creation and entrepreneurial processes which contribute to their success. According to the Department of Enterprise, Trade and Employment (2008), it has been shown internationally, that collaboration and cooperation between firms is a fertile source of innovation. Autio and Klofson (1998) state that networks of firms, public institutions and educational institutions provide focus and efficiencies that deliver
a competitive edge. Incubating organisations are part of a wide range of initiatives aimed at stimulating and supporting entrepreneurship (Autio and Klofson, 1998).

2.6. BUSINESS INCUBATION

2.6.1. DEFINITION OF BUSINESS INCUBATION

The concept of incubator” is often used as an overall denomination for organisations that constitute or create a supportive environment that is conducive to the ‘hatching’ and development of new firms (Chan and Lau, 2005; Lindholm-Dahlstrand and Klofsen, 2002). Rice and Matthews (1995) state that business incubators are institutions designed to assist with the fundamentals of business process knowledge. The incubation concept seeks an effective means to link technology, capital and know-how in order to leverage entrepreneurial talent, accelerate the development of new companies, and thus speed the exploitation of technology (Grimaldi and Grandi, 2005).

2.6.2. PURPOSE OF BUSINESS INCUBATION

A business incubation program targets and then selects potential, new and existing ‘start-up’ ventures in the community to be its clients, co-locate them into a specific facility (incubator), enhance their success by providing them with a wide range of business assistance services (Lalkaka and Bishop, 1996). According to Fenton (2005), once the
A start-up company has reached a more advanced stage of business development, they can move into their own or commercial premises which occurs usually, when the entrepreneur is confident of his/her ability to manage the business. Fenton (2005) states this also coincides with the expiry of the agreed licence or rental agreement with the incubation centre. According to Campbell and Allen (1987), since the establishment of the first business incubator, most incubators have been established as publicly funded vehicles for job creation, urban economic revitalization, and the commercialisation of university innovations, or as privately funded organisations for the incubation of high potential new ventures.

Hackett and Dilts (2004) propose the following corollary:

*It is important to keep in mind the totality of the incubator. Specifically, much as a firm is not just an office building, infrastructure and articles of incorporation, the incubator is not simply a shared office facility, infrastructure and mission statement. Rather, the incubator is also a network of individuals and organizations including the incubator manager and staff, incubator advisory board, incubate companies and employees, local universities and university community members, industry contacts, and professional services providers such as lawyers, accountants, consultants, marketing specialists, venture capitalists, angel investors and volunteers* (Hackett and Dilts, 2004:57).
According to Smilor and Gill (1986), the business incubator seeks to effectively link talent, technology, capital and know-how in order to leverage entrepreneurial talent and to accelerate the development of new companies. Lalkaka (2002) states that the driving force behind the new venture creation process is the entrepreneur. Rice and Matthews (1995) purport the incubator seeks to develop this entrepreneurial talent by providing complementary services that support and promote the skills and expertise of the entrepreneur when the firm is most vulnerable to market uncertainty.

2.6.3. BENEFITS OF BUSINESS INCUBATION FOR THE NEW FIRM ENTREPRENEUR

Tornatzky et al., (1996) postulate that business incubators provide their clients with a wide range of business assistance services ranging from tangible (e.g., physical facilities and office equipment) to intangible services such as (e.g., emotional support) through direct counselling by incubator managers and interacting with other clients and bridging networks to business people outside incubators.

Incubators have the potential to yield other intangible benefits for entrepreneurs; for instance, a critical issue for new firms is a lack of credibility with stakeholders such as suppliers, customers and new employees (Lender, 2003; Totterman and Sten, 2005). According to Bollingtoft et al., (2005), incubators typically seek to provide a nurturing business environment by actively ensuring that ‘start-up’ firms get the resources, services and assistance they need. Bollingtoft et al., (2005) further assert that incubators try to
address many of the failures of the market: information costs, lack of services and business assistance and financing.

2.6.4. LIMITATIONS OF BUSINESS INCUBATORS

According to Peters et al., (2004), incubators are evidently not uniformly effective and past incubator managers do underscore that they must mature and develop capabilities. They argue that some of the reasons for incubator failures have been identified by the National Business Incubation Association (NBIA) in the United States as follows: (a) While entrepreneurs wanted high levels of expertise and capital, a majority of the incubators focused on infrastructure or simply failed to deliver the services they had promised; (b) with the same personnel services offered to the start-ups, the choice of resources for entrepreneurs was limited. Rice and Matthews (1995) identified that the failure of business incubators can be attributed to unrealistic expectations, inadequate resources and inappropriate governance and management structures.

According to Peters et al., (2004), incubators can directly provide some of the resources based on their need as well as indirectly provide access to resources via formal and informal networking to sources beyond the incubator. Peters et al., (2004) state that while no two incubators are precisely alike, they do share the following traits: co-location of business, shared services, management assistance and networking.
Although various categories of business incubators have evolved with differing priorities reflecting their sources of funding, all share an ambition to support the development and survival of new, entrepreneurial ventures (Hannon, 2005).

2.6.5. EVOLUTION OF BUSINESS INCUBATORS

According to Grimaldi and Grandi (2005), while most incubators have certain common services and activities, they also offer distinct services that reflect their own customer base as well as the specific resources available within their respective communities.

Grimaldi and Grandi (2005) state that incubators have been around since the 1950s, but the Internet has spawned a new breed focused on on-line technologies and services. According to Chinsonmboon (2000), the Information Technology revolution of the second half of the 1990s has changed some of the basic rules of the incubation industry. Chinsonmboon (2000) argues speed to market, quick access to capital, synergy, network, and strategic cohesiveness are now the basic keys for the success of Internet-related ventures. Many entrepreneurial initiatives, according to Autio and Klofsten (1998), have proven to lack management rather than technical expertise. Grimaldi and Grandi (2005) state market changes have revived and reshaped the concept of incubation, leading to the growth of private incubators, e.g., profit-oriented institutions, and fee/equity oriented. Grimaldi and Grandi (2005) propose that interest in private or profit incubators, has increased over the last few years and stems from the importance attached to high-tech companies and more generally to the economy. The purpose of for-profit incubators is to
quickly create new ventures and in return to take a portion of equity in the new venture as fees (Chinsonmboon, 2000).

Grimaldi and Grandi (2005) argue that the existence of different incubators and the evolution of their business models over time have been driven by the evolution of company requirements and needs, which in turn has prompted incubators to diversify their offer of services. Grimaldi and Grandi (2005) further state the focus of current incubation models is on more intangible and high-value services (access to advanced competencies, learning experiences, knowledge, synergies, networking, etc.). Heydebreck et al., (2000) posit that interest in the campus incubation centre model stems from their emphasis on the transfer of scientific and technological knowledge from universities and colleges to firms.
2.7. CAMPUS BUSINESS INCUBATION CENTRES

2.7.1. MISSION OF CAMPUS BUSINESS INCUBATION CENTRES

The primary mission of a campus business incubator is to increase economic development in the region by assisting entrepreneurial firms during their growth and development phase (Rice, 1992; Rice and Matthews, 1995; NBIA, 2008). Initially incubators emerged in proximity to Higher Education Institutes with the aim of promoting technology transfers and the commercialisation of innovative and novel research (Shane, 2002; Albert and Gaynor, 2003; Lender, 2003).

According to Enterprise Ireland (2008a), campus business incubation centres are:

*Incubation centres that provide vital transitional spaces between the research and business worlds and create environments where the commercial potential of third-level R&D can be maximised. Incubation space provides a physical space in which to house and promote entrepreneurship and can greatly improve the survival and growth prospects of 'start-up' campus companies*

(Enterprise Ireland, 2008a:47).

2.7.2. OBJECTIVES OF CAMPUS BUSINESS INCUBATION CENTRES

Campus incubators or campus incubation centres (CICs) normally pursue three key objectives: technology transfer, promotion of entrepreneurship and the commercialisation
of leading-edge research (Zucker et al., 2002; Lender, 2003). Other secondary objectives include the development of entrepreneurial spirit, civic responsibility, image and new sources of finance (Albert and Gaynor, 2003). The social relationship of the University or Higher Education Institute business incubator provides the entrepreneurial firm with access to business process knowledge (Studdard, 2006).

2.6.3 CATEGORIES OF TENANT FIRMS

Tenants of incubator facilities can be ‘spin-out’ firms, which have directly emerged from the Higher Education Institute research and knowledge base or ‘spin-in’ firms, keen to take advantage of the facilities and research profile of the Higher Education Institute to establish new research and development-based companies (McAdam and McAdam, 2008).

Roberts and Malone (1996) define ‘spin-outs’ as a mechanism in which governments seek to generate economic impact from their research and development by transferring technology from the research and development function to a commercial organisation. Nicolaou and Birley (2003) take account of the human element and state a ‘spin-out’ is formed by individuals who were former employees of the parent organisation.
2.7.3. **FINANCING OF CAMPUS INCUBATION CENTRES**

According to Aerts *et al.*, (2007), in a study of European incubators, the key institutions that have given rise to the European incubation centres, are the national and regional governments where 71% of the respondents could count on their support at the moment of establishment. For 62%, Higher Education Institutes or other Research and Development organisations were fundamental in the incubator set-up process. The most important income source according to Aerts *et al.*, (2007) comprises the tenants themselves. 81% of the incubators raise their funds from the rent and the tenant service fees. Both national and regional governments cover a great deal of incubator costs. According to Aerts *et al.*, (2007) they financially support 63% of the incubators. One-third of the incubators are sponsored by the European Union or other international organisations. Aerts *et al.*, (2007) reveal that universities and other R&D organisations rarely participate in incubator sponsorship (13% of the incubators), although they play a decisive role in the establishment process.

According to Hannon (2004), the 'payback' from incubation programmes should be in increased outputs of better quality in reduced time to market, or healthier, stronger outputs less susceptible to debilitating processes. Forfás (2007b) notes that in general, across the Universities and Institutes of Technology consulted, there was little evidence of research being taken by the education providers being fed back to industry. The South West Regional Authority (2008) acknowledge that although the low levels of industry-academia collaboration are low, that this weakness has been recognised and there are a growing number of state supports being put in place to address this matter.
2.7.4. ENTERPRISE IRELAND FUNDING CAMPUS INCUBATION CENTRES

According to Enterprise Ireland\(^2\) (2008a), its strategy is designed to ensure that opportunities for Irish enterprises and entrepreneurs are maximised throughout all regions and that relevant support is provided at a local level to meet the increasing challenges faced by ‘start-up’ companies in the global market place. Enterprise Ireland increasingly aims to strengthen the research and technology base in the indigenous sector and to assist in the commercialisation of ideas in Higher Education Institutes. (Jordan and O’Leary, 2007).

According to Enterprise Ireland (2008a), over the last ten years, the state agency has invested €50 million in incubation centres in Irish third-level education institutions to encourage the set-up of high-tech, knowledge intensive enterprises. Of this, a total of €38 million has been invested in facilities at the Institutes of Technology (with support from the European Union) which translates into support for 20 business incubation centres in sixteen Institutes of Technology. According to Enterprise Ireland (2008a), tenant companies benefit from the research environment, being able to tap into mentors and the facilities of the host institution. The institutions benefit from having a focal point for entrepreneurial activity on campus and a commercialisation route for their research.

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\(^2\) Enterprise Ireland is the government agency responsible for the development and promotion of the indigenous business sector. Its mission is to accelerate the development of world-class Irish companies to achieve strong positions in global markets resulting in increased national and regional prosperity.
2.8. STATUS OF RESEARCH ON CAMPUS INCUBATION CENTRES

According to Hackett and Dilts (2004), much attention has been devoted to the description of incubator facilities, less attention has been focused on the incubatees, the innovations they seek to diffuse, and the incubation outcomes that have been achieved.

According to Lender (2003), there is only limited research pertaining to incubators hosted by Third Level Institutions. Shane (2002) postulates the literature tends to relate primarily to technology transfer issues and the income generated from them. Zucker et al., (2002) concentrates on the commercialisation of research by contrast to Steffenson and Rogers, (1999) who focus on the exploration of the impact of the context involved. According to McAdam and McAdam, (2006), there is little acknowledgement of the importance of the incubator hosted by a Higher Education Institution as a formal mechanism for embedding the small firm in entrepreneurial networks, thus encouraging the small enterprise to develop its own set of networks (McAdam and McAdam, 2006).

The South West Regional Authority (2008) state that campus incubation centres in the South West and South East of the country are still in their infancy and are still considered to be in 'start-up' mode. Furthermore, they postulate these campus incubation centres are showing early evidence of success to demonstrate their worth, once funded, set up and managed appropriately, and they warrant greater encouragement and support.
2.9. CONCLUSION

The Literature Review examined the level of entrepreneurship in Ireland and explored Government and public sector policy to address the needs of entrepreneurs and new venture creation. This research highlighted the role of the Higher Education Institutes in facilitating and enabling enterprise development and business incubation. This chapter explored the concept, of business incubation, its evolution and purpose and how business incubators can benefit the new firm entrepreneurs. The Literature Review examined the mission, objectives, and financing of campus incubation centres, particularly with reference to Enterprise Ireland (EI). This chapter reveals campus incubation centres in the South West and South East of the country are still in their infancy and are still considered to be in 'start-up' mode. Furthermore, the research reveals these campus incubation centres are showing early evidence of success to demonstrate their worth, once funded, set up and managed appropriately and they warrant greater encouragement and support.

It is evident from the existing literature that information on campus incubation centres in Ireland and more specifically, within the Institutes of Technology, is still in its infancy. Emerging from the extant literature, the researcher finds there is a gap in the literature and that research is needed regarding the interaction between Institutes of Technology and campus incubation.
CHAPTER 3. RESEARCH METHODOLOGY

3.1. INTRODUCTION

The purpose of this chapter is to describe the research methodology employed to identify whether campus incubation centres provide a successful linkage between early-stage Entrepreneurial ventures and Institutes of Technology. The chapter will discuss the methodology used in this study under the following headings: research problem, research question, research objectives, research design, research strategy, data collection, interviews, and data analysis.

According to Emory and Cooper (1991) research is a systematic inquiry aimed at providing information to solve problems. According to Brannick and Roche:

*Research methodology is essentially a decision-making process. Each decision made is affected by, and in turn, influences every other decision. It is a system of decisions, all of which are interrelated. The one decision that focuses, and to a large extent drives all the rest, is the definition of the research question* (1997:3).
3.2. RESEARCH PROBLEM

Cresswell (2003) stated that a research problem is the issue that exists in the literature, in theory, or in practice that leads to a need for the study. According to Brannick and Roche (1997), the research problem is the starting point of all research and poses exceedingly difficult intellectual challenges. The authors postulate the process of developing the research question begins with the identification of the broad research area; and this is followed by the formulation or definition of the research question which in turn produces a clear statement of the issues to be investigated.

In theory, Campus Incubation Centres cultivate an entrepreneurial spirit enabling ‘start-up’ companies to successfully develop their business. Business incubators differ from campus incubators in that they rarely have formal links to Higher Education Institutes (HEIs), are not entrenched within an academic environment and do not typically support campus enterprise development. A key motivating factor for the researcher in deciding on this subject, whilst researching the concept of these new Campus Incubator Centres (CICs), was the dearth of information from an Irish context. As identified in chapter two, Enterprise Ireland have invested €38 million to date, in facilities at the Institutes of Technology (with support from the European Union) which translates into support for 20 business incubation centres in sixteen Institutes of Technology. To the researcher’s knowledge, there are two Masters theses published on the subject of CICs, both of which concentrate on developing a best practice model. The researcher has cited them both in the previous chapter on the literature review. To the author’s knowledge, there has not been any literature published by Enterprise Ireland nor any Institute of Technology on the
performance of these campus incubation centres since the inception of the programme three years ago.

3.3. RESEARCH QUESTION

According to Saunders et al., (2000), the pitfall that must be avoided at all costs, is asking research questions that will not generate new insights.

The researcher will endeavour to identify if Campus Incubation Centres provide a successful linkage between early-stage entrepreneurial ventures and Institutes of Technology. For the purposes of this study, the author defines linkage as:

*Relationships that enable the exchange of goods, services, personnel, information, ideas, expertise, grants and other supports to business that occur between two or more parties, over a sustained time period. Payment is a feature of some but not all linkages* (Hobbs et al., 2008:16).
3.4. RESEARCH OBJECTIVES

Cresswell (1998) highlights that over the past two decades, research approaches have multiplied to a point at which investigators or inquirers have many choices. Prior to choosing a methodology, it was important to establish the research objectives and associated questions to determine the choice of research methodology in this study.

Saunders *et al.*, (2000) contend that research objectives are likely to lead to greater specificity than research questions. This is not to say that the research questions could not have been written with a similar amount of specificity. Saunders *et al.*, (2000) doubt that the same level of precision could be achieved through the writing of research questions alone and research objectives require more rigorous thinking which derives from the use of more formal language.

This study responds to the lacuna of research on campus incubators hosted by the Institutes of Technology and the objective of the researcher is to advance knowledge in this area. The main aim of this study is to examine the development of linkages, which campus incubation centres provide, between their host Institutes of Technology and their tenant firms. Another objective of this research is to examine if campus incubation centres facilitate the entrepreneurial process.
3.5. RESEARCH DESIGN

Easterby-Smith et al., (1999) state that research designs are about organising research activity, including the collection of data, in ways that are most likely to achieve the research aims. According to Emory and Cooper (1991), research design is:

First, a plan for selecting the sources and types of information relevant to the research question. Second, it is a framework for specifying the relationships among the study’s variables. Third, it is a blueprint for outlining all of the procedures from the hypotheses to the analysis of data

(Emory and Cooper, 1991:139).

According to Malhotra (1999), research designs may be broadly classified as exploratory or conclusive. The primary objective of exploratory research is to provide insights into, and an understanding of, the problem confronting the researcher (Malhotra, 1999). The author theorises that conclusive research assists the decision maker in determining, evaluating and selecting the best course of action to take in a given situation; this is subdivided into descriptive research which describes something, usually market characteristics or functions and causal research which is used to obtain evidence of cause-and-effect (causal) relationships.

The researcher selected an exploratory approach in this study, as it places considerable emphasis on specifying research objectives. This is supported by Easterby-Smith et al., (1999) who state it places considerable emphasis on the nature of the problem being
investigated and the philosophical stance taken will dictate the relationship of the research process and research concerned with testing hypotheses will place emphasis on the data collection stage.

3.5.1. QUALITATIVE VERSUS QUANTITATIVE METHODOLOGIES

Qualitative research provides understanding of the problem setting and insights, whereas quantitative research, seeks to quantify the data and typically, applies some form of statistical analysis (Malhotra, 1999). Easterby-Smith et al., (1999) argues that the distinction between qualitative and quantitative techniques is not always clear such as the technique of interviewing or, a single piece of data, such as an interview transcript, can be analysed in either way.

According to Sekaran (2003), description of the matter under study is the main essence of qualitative research and a range of interpretive techniques can be used to decode, translate, decipher patterns, and discover the meaning of phenomena that occur. Qualitative research is an unstructured, exploratory research methodology based on small samples that provides insights and understanding of the problem setting (Malhotra, 1999).

Malhotra (1999) refers to quantitative research as research that uses mathematical analysis. It is further explained by Easterby-Smith et al., (1999) as an important feature
of quantitative techniques in that the process of data collection becomes distinct from analysis.

The author has selected a qualitative research methodology as according to Hobbs et al., (2008), the nature of linkages between organisations is qualitative and highly dependent on the involvement of organisation personnel.

According to Malhotra (1999), McDaniel and Gates (2004), qualitative research involves the following: subjective analysis, unstructured data collection, probing questions, small sample size, substantial information from each respondent, low degree of replicability, exploratory research, non-statistical data analysis and an objective to gain a qualitative understanding of the underlying reasons and motivations. By contrast, quantitative research involves statistical analysis, structured data collection, limited probing questions, large sample size, varied amount of information from each respondent, high degree of replicability, descriptive or causal research, statistical data analysis and an objective to quantify the data and generalise the results from the sample to the population of interest (Malhotra, 1999 and McDaniel and Gates, 2004). Malhotra (1999) concludes that qualitative and quantitative research should be viewed as complementary.

The researcher has adopted an exploratory research approach in selecting the qualitative method of research, by a literature search, having spoken with experts in the area of campus incubation centres and by conducting face-to-face semi-structured interviews. A qualitative perspective was adopted by the researcher to explore the experiences and
perceptions of those involved in managing the incubation facility, the early-stage ventures and the academic staff who have worked with these incubation companies. A quantitative approach would not have yielded any data relating to the richness of the information gathered and advantages to be gained from being immersed in the respondents world. The researcher selected a qualitative method of research because she was seeking the opinions, perceptions and attitudes of participants in this study in order to gain an in-depth understanding of activities, behaviours, concepts and their interrelationships.

3.6. RESEARCH STRATEGY

Saunders (2000) refers to research strategy as a plan of how the researcher will go about answering the research question. The researcher used a grounded theory approach in this study to research the subject by analysing the data as it was collected and developing a conceptual framework after the first face-to-face interview to guide subsequent work. This approach yielded richer data from the participants. A research approach was required by the researcher that facilitated the emergence of key issues from which theories and patterns would be determined. Strauss and Corbin (1998) emphasise the following aspects of this approach:

- Grounded theory is principally an inductive approach (theory follows experimental data);
- Theory emerges from the process of data collection and analysis;
Therefore the researcher does not commence the research study with a defined theoretical framework;

Instead, the researcher identifies relationships between the data, develops questions and test hypotheses.

3.7. DATA COLLECTION

Data can be obtained from primary or secondary sources (Sekaran, 2003).

3.7.1. PRIMARY RESEARCH

Primary data according to Malhotra (1999), is data originated by the researcher for the specific purpose of addressing the research problem. It is further explained by Sekaran (2003) as the information obtained firsthand by the researcher on the variables of interest for the specific purpose of the study.

As previously outlined, this research was comprised of twelve qualitative, semi-structured interviews with the following cohorts:

- Entrepreneurs and early-stage 'start-up' companies in the two selected Campus Incubation Centres
- Campus Incubation centre managers in CIT and WIT
- Senior academic staff from the two selected Institutes of Technology
• A research centre in each Institute of Technology: the Technologies for Embedded Computing (TEC) centre, CIT and the Telecommunications Software and Systems Group (TSSG), WIT.

In the current study, the answers provided to the chosen research questions are from early-stage entrepreneurial ventures or incubatees of the selected campus incubation centres (Rubicon Centre, CIT and ArcLabs Research and Innovation Centre, WIT). Senior staff from Cork Institute of Technology and Waterford Institute of Technology and managers of both Incubation Centres and research centres with both Colleges working on collaborative projects with the Incubation Centres. The information gained from these meetings was then compared and contrasted by the researcher.

The researcher applied the following to overcome data quality issues:

1. Reliability:

   The findings from non-standardised research methods may not necessarily be repeatable as they reflect reality at the time they were collected, in a situation which may be subject to change (Marshall and Rossman, 1999). The researcher will make and retain notes relating to the design of the research, the reasons underpinning the choice of strategy and methods and the data obtained.

2. Interviewer and interviewee bias:
Overcoming bias is integral to the way the interview is conducted. Measures the researcher took included:

- Preparation and readiness for the interviews
- The level of information supplied to the interviewee was provided on a confidential basis
- Researcher’s approach to questioning. The questions were open allowing the respondent to expand on their points of view
- Researcher’s scope to test understanding
- Researcher’s approach to recording information (via a digital voice recorder) (Saunders et al., 2000).

3.7.2. SECONDARY RESEARCH

Secondary data according to Malhotra (1999), is data collected for some purpose other than the problem at hand. It is further explained by Sekaran (2003) as information gathered from already existing sources. Advantages for the researcher with this method included easy accessibility, relatively inexpensive and quickly obtained.

The researcher used online business journals and academic publications from online databases in Cork Institute of Technology and University College Cork as well as publications from the Irish Government, the European Union, the Organisation for Economic Co-operation and Development (OECD), state-sponsored organisations such
as Forfás, Enterprise Ireland and the Higher Education Authority, and Irish newspapers (The Sunday Business Post and The Irish Times).

3.8. PERSONAL INTERVIEWS

Interviews may be highly formalised and structured, using standardised questions for each respondent, or they may be informal and unstructured conversations (Saunders et al., 2000).

Saunders et al., (2000) recommend participants be told about the nature of the outputs to which the research is intended to lead and what would happen to the data collected during and after the project. Healey and Rawlinson (1994) suggest that it is usually best to leave sensitive questions until near the end of an interview because this allows a greater time for the respondent to build up trust and confidence in the researcher.

The benefits of conducting a semi-structured (non-standardised) interview over a standardised interview (such as a questionnaire) for the researcher included:

1. Providing the researcher with an opportunity to probe answers, where the researcher needs the interviewees to explain or build on their responses, for example, regarding issues relating to intellectual property. The interviewees used
words or ideas in a particular way and the opportunity to probe these meanings added significance and depth to the data obtained.

2. This brought the discussion into areas the researcher had not previously considered, for example, intellectual property.

3. This gave the interviewee an opportunity to hear himself/herself ‘thinking aloud’ about things s/he may not have previously considered.

4. Managers were more likely to agree to be interviewed, rather than completing a questionnaire, especially, where the interview subject was relevant to their own current work. It provided them with the opportunity to reflect on events without needing to write anything down (North et al., 1983). This situation allowed feedback and personal assurance to the interviewees about the way in which information will be used. Respondent companies in this study preferred to remain anonymous as they were revealing their own thoughts on the subject matter. These names are available to the examiner in confidence.

5. Potential research participants who receive a questionnaire through the post may be reluctant to complete it for a number of reasons. They may feel it is not appropriate to provide sensitive and confidential material to someone they have never met. They may not wish to spend time writing explanatory answers, especially if the meaning is not entirely clear. Healey (1991:206) suggests that "the interviewer... has more control over who answers the questions" by contrast to a questionnaire which could be passed from one person to another.
3.9. THE INTERVIEW

The researcher in this study conducted focused semi-structured interviews; as the primary emphasis is gaining information about the subjective perceptions of the respondents. The flexibility of this method enabled the researcher to explore more fully the opinions and behaviours of the participants particularly, where the questions may be either complex or open-ended, and where the order and logic of questioning may need to be varied. This method of qualitative research not only reveals and understands the 'what' and the 'how' but also places more emphasis on exploring the 'why' (Saunders et al., 2000:245).

A critical activity for the researcher in this study was the observation of the incubation companies, their relationship with incubation centre staff, how the facilities were utilized and how the academic staff networked with the entrepreneurs. The researcher conducted eleven prearranged (by telephone) face-to-face interviews with the following four cohorts:

1. The managers of both campus incubation centres.

2. Three interviews with campus incubation centre client companies based in the Rubicon Centre and and three interviews with tenant firms located at ArcLabs. All company participants had some experience of collaborative work with an Institute of Technology.

3. An interview with a senior academic staff member from each Institute of Technology.
4. A face-to-face with a manager of a CIT research centre and a pre-arranged telephone interview with the Commercialisation Director of a research centre in WIT.

The researcher did not employ a set list of questions but instead used the interview guide as a checklist to ensure all points were covered reflecting the grounded theory approach adopted by the researcher. This provided a rich set of data for the researcher.

In the semi-structured interviews, the researcher had a list of questions to be discussed, although this varied from interview to interview. Some questions were omitted in particular interviews, given the specific organisational context. The order of questions varied according to the flow of conversation. The nature of the questions and the ensuing discussion required that the data be recorded (with the permission of the interviewee). During the interview with Michael Loftus, Head of School of Science, CIT, the author’s voice recorder broke down and did not record the full length of the interview. The researcher immediately made some handwritten notes after the interview ended.

There are risks attached to semi-structured interviews. The researcher was given highly sensitive commercial information from certain participants and there were issues of trust. The researcher ensured her level of preparation and knowledge in relation to the research context, question and objectives was satisfactory to establish her credibility when meeting the interviewees. To avoid this situation from developing, the researcher
outlined the participants’ right not to answer any question and the interview would be stopped if they wished.

The researcher drew up an interview guide in order to pose the same set of questions to respondents. Using the interview guide in this study, ensured all relevant points were covered during the interview and established consistency across all interviews. This enabled the researcher to better analyse the data collected. The interview style was informal. The author opened each interview by explaining why the information was being gathered and that it was confidential. Participants were encouraged to divulge not only the facts but also what they were thinking and feeling throughout the project progression. The author adopted a relaxed, non-confrontational style and clarified points during the conduct of the interview. Further clarification of unclear points was sought from interviewees via email after the author had transcribed the voice recordings of the interviews.

The entire set of responses from each participant was subjected to a content analysis in order to determine the main themes underlying the responses. Comparisons were then made across interviewees on the basis of the themes, rather than on exact responses. This approach resulted in the researcher collecting a rich set of data. Both the advantage and disadvantage of this approach was the wealth of data generated. Great detail was achieved. To address the issue of organizing this information, a content analysis as outlined by Cummings (2001) was carried out on the interview findings. Three main themes with nine sub-themes, were identified and the responses of each interviewee were
categorized under each of them. This content analysis is presented in the findings in chapter four.

3.10. DATA ANALYSIS

Malhotra (1999) contends data analysis is not an end in itself. The author postulates the preliminary plan of data analysis prepared as part of the research design should be used as a springboard. Interviews by the researcher were transcribed into Microsoft Word.

Coding in qualitative data analysis tends to be in a constant state of potential revision and fluidity (Bryman and Bell, 2003). According to Easterby-Smith et al., (1999) there are two basic ways of analysing qualitative data: current analysis where-by the researcher analyses the data numerically and examines the frequency of the data; and secondly, grounded theory, where the researcher goes by feel and intuition, aiming to produce common or contradictory themes and patterns from the data which can be used as an interpretation. According to Bryman and Bell (2003), coding is one of the most central processes in grounded theory. In this study, the author placed great emphasis on coding due to the selection of a grounded theory approach. The researcher used this process to break down, examine, compare and categorise the data to create concepts which were then grouped under similar themes. The researcher, when coding, stayed close to the data and observations were placed carefully in context.
3.11. LIMITATIONS OF THE STUDY

As identified in the Literature Review, although business incubators do share the following traits: co-location of business, shared services, management assistance and networking, no two incubators are precisely alike. The selection of technology incubation companies for inclusion in this study is viewed as a limitation. The results of this research may shift with respect to other types of incubation client companies not focused entirely on technological entrepreneurial activities. Longevity issues are associated with this research study as firms were not studied for a set period of time. The concept that the campus incubator is helping the firm for long-term survival was not studied.

The literature review highlighted a lacuna of empirical research on campus incubation, particularly, within the context of Irish Higher Education Institutes. Campus Incubation Centres are relatively recent additions to the campuses of a large number of Institutes of Technology. The goals and objectives of the two campus incubation centres profiled are similar, but each centre is heavily influenced by the host Institute and their Advisory Boards.

Due to time and costs, the researcher was limited to selecting two campus incubation centres and their host Institutes of Technology.
3.12. CONCLUSION

This chapter detailed the research problem, objectives and question. It examined the current research methodologies and supported the choice of a qualitative, exploratory approach as the most appropriate research methodology. The empirical element of this research study involved interviewing twelve respondents directly related to the research study. The chapter detailed the data collection methods employed and the limitations of the research methodology. The results of the research findings and an analysis of the data are presented in the next chapter.

The following chapter will reveal the findings of these twelve interviews and interpret the relevance of these findings.
CHAPTER 4. RESEARCH FINDINGS AND ANALYSIS

It's not what you look at that matters, it's what you see

Henry David Thoreau (1817-1862).

4.1. INTRODUCTION

The purpose of this chapter is to analyse and discuss the results obtained from the thematic analysis of the two selected campus incubation centres and their relationships with their host Institute of Technology and their tenant firms. The interpretation and analysis of the research findings are considered within the context of the research questions and theories emerging from the literature review.

4.2. CATEGORIZATION OF THE MAIN FINDINGS

As described in Chapter Three, the researcher selected Cork Institute of Technology and its campus incubation centre, the Rubicon, and Waterford Institute of Technology and its Campus Incubation Centre, part of its Research and Innovation Centre known as ArcLabs. The researcher conducted twelve semi-structured interviews with four cohorts which were detailed in the previous chapter.
The rationale for the selection of these two colleges was the accessibility made available to the researcher and their geographical proximity. The choice of the respondents was influenced by the prerequisite of having some experience between the College and the respective Campus Incubator Centre.

Tenants of campus incubation centres can be 'spin-in' companies, keen to take advantage of the research profile and facilities of the Institutes of Technology (as well as other higher education institutions) to establish new research and development companies or 'spin-out' companies, which have emerged directly from the college knowledge and research base.

An important fact arising from this current study is the variety of issues relating to the relationship expressed by all the respondents. The researcher has coded them according to the following headings:

- **Communications**
  - Networking
  - Relationship Building

- **Resources**
  - Human Capital
  - Financial/Funding
  - Technical

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The focus of this research specifically relates to the issues between three key stakeholders (1) Campus Incubation Centres (2) Campus Incubation Companies and (3) Institutes of Technology. The main issues which relate to these three stakeholders are described in detail under the following headings.

4.3. COMMUNICATIONS

The predominant focus of this research centres on the level of communication between the campus incubation companies and their host Institutes of Technology. The managers of both incubation centres concur as to the strategic importance of their role as a point of contact for their clients with the college:
Our unique selling point here is that we are looking for projects where we can offer a relationship between our client companies and academic staff and easy access to resources at the College

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

Another respondent notes the following:

*The essence of what I see these centres as being about, is the relationship between our companies and the college. That has to be the reason why companies are here or that we are working with them at all*

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

This research has found that the object of the campus incubation centres is to bring support to their incubatees by positioning themselves as a single point of contact for business support:

*We offer a combination of support. We point people in different directions for different supports*

(Dr. William O’Gorman,

Head of Research, Centre for Entrepreneurship, WIT).
This research has found there are challenges for campus incubation centres which are physically separated from the main college campus. The study finds that the Rubicon Centre is physically located on the main campus of Cork Institute of Technology whereas, ArcLabs is located on the 150 acre West Campus, Carriganore, less than a ten minute drive from the main campus of Waterford Institute of Technology. The academic staff in WIT see this distance as a challenge in terms of connectivity:

"It is a close relationship on one level, but being physically located on another campus, you know there is a separation. There’s no question about it and you have to work at that to keep the connection and to be physically part of what happens there as well"

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

This view is supported by another colleague:

"Some of the limitations would be the distance between this campus and the main campus. It is difficult to make the connection, to get other people involved in the activities here because you are off-site and you are off-campus"

(Dr. William O’Gorman, Head of Research, Centre for Entrepreneurship, WIT).
By contrast, the research indicates their client companies in ArcLabs do not feel disadvantaged by being located off the main campus. This study reveals they have never been part of the main campus and do not feel this will negatively impact on their operations:

\[\text{Any time I have ever needed anything, you just get someone's name you can email and you organise a time to meet to sit down, the same as if you were on the same campus. It is not having any real effect on me as such but if I was more into hardware and wanted more interaction with for example the Engineering Department, then that might impact}\]

(Respondent D).

4.3.1. INTERNAL AND EXTERNAL NETWORKING

According to Hughes et al., (2007), the main objectives of networking are acquisition of knowledge and access to resources. An interesting finding emerging from this study is the high value placed on networking as a critical factor for developing links between the incubation companies and the college, thus, building on extant literature that the most important service offered by the incubator is the opportunity for networking among tenant companies, i.e., internal networking. This research reveals incubation client companies can utilise two types of networks: internal and external networks. All
respondents in this study emphasized the value of networking in this study. This research thesis notes that internal networks are particularly useful to building social capital as they enable multiple early-stage ventures to share all kinds of resources. Interestingly, this study finds that trust is an important factor in building a relationship and is deeply embedded in networks. Five of the six incubation companies emphasized their use of the incubator to facilitate relationships with other incubator residents:

*Internal networking is a key activity here in the centre, where we introduce clients on a one-to-one basis to each other, particularly, when we think there are opportunities to work together*

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

Another respondent in this study, underlines how important the role of networking is to their incubation centre business model:

*We have a unique model here. It facilitates networking but I am not too sure if there is the same degree of facilitation and networking in the other campus incubation centres around the country*

(Dr. William O’Gorman,
Head of Research, Centre for Entrepreneurship, WIT).
This research can state that as tenants of the incubation centres are all physically located under the same roof, the incubation centre created potential opportunities for collaboration between the companies to occur. According to one interviewee, the communal areas such as the canteen provides the focal point for this interaction:

The canteen is where a lot of the stuff happens on an ongoing, daily basis. There is a lot of connection and discussion between the researchers and those working in the commercial companies. There is a lot of technology and business skills within the building and people figure out where they can go to get that fairly quickly

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

This study finds that both incubation centres host informal monthly networking events to which college staff, clients companies and other business located off-site are invited. Interestingly, the research revealed they contrast in terms of organisational control. It is the client companies themselves, the entrepreneurs, who organise their event known as ‘Open coffee club’ in ArcLabs:

I have seen these kind of networks, that are driven by organisations failing regularly, because you are on site, and there is an expectation that you will deliver to them. What I really want is something the entrepreneurs would drive themselves
This view was endorsed by a client company in ArcLabs:

*It started off with the CEOs from a couple of years ago. And that just didn’t really take off and it was decided you need to invite everyone. Every Friday morning we have an ‘open coffee club’ which is working well* 

(Respondent A).

Conversely, the manager of the second selected incubator in CIT, organises their open coffee morning events. This respondent emphasises the informal nature of the event:

*I think the key to it is they are informal. People say we are not in their faces. That we don’t force anyone to do anything they don’t want to do. If it was too regimented, to be quite frank, they would not come.*

(Paul Healy, Manager, Rubicon Centre).

Interestingly, a respondent from a research company revealed his opinion on the profile of entrepreneurs they are dealing with:
We are dealing with people in the technology industry here and as a general rule we find some people do not tend to have open, outgoing, extroverted personalities. It takes quite a lot of effort to get everyone networking together

(Barry Downes, Director of Commercialisation, TSSG).

Further analysis of this research reveals that the majority of incubation clients like to know 'what's going on' and expect to be updated on campus about local and national events via email or centre noticeboards or, informal conversations with Incubation Centre staff:

We have been to quite a few college events. We tend to go over and see what is going on

(Respondent B).

This research finds that just one of the six incubation companies did not explore any networking opportunities because the respondent company's sole focus is on research and development of the company's product, with no requirement for sales and marketing and other business development services. The respondent company's relationship within the incubation centre, is solely with the research centre with whom they are collaborating and is co-located in the same building. This research reveals it to be a 'spin-in' company to collaborate with the research centre co-located in the campus incubation centre:
We do not have any direct dealings with the other companies in terms of networking or business relationships. I know some of the staff in those companies from when I worked with the TSSG

(Respondent E).

4.3.2. RELATIONSHIP BUILDING

As evidenced in the Literature Review in Chapter Two, relationship building is a critical factor for all entrepreneurs in their development. The research finds that both campus incubation centre managers highlight the importance of their roles in building a relationship with their client companies:

In general, we give ongoing advisory support and mentoring to the companies that are here

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

This research affirms that geographical proximity of the campus incubation centre on the main campus of the college further benefits relationship building within the campus network:
The location of the centre on the college campus is a huge advantage because it allows clients to be involved in the campus environment which they cannot if they are located elsewhere. That's a huge advantage, not only in terms of accessing resources, but also accessing other services, for example, attending CIT courses held nightly in the college

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

This study notes that the selected campus incubation centres had not yet reached their third year of operation and there was a learning process for the campus incubation centre managers in selecting the right companies to complement the CIC's business model:

You have to look at the early-stage ventures and make a judgement initially as to whether or not this company can and is interested in developing a relationship. I think we have gotten some of that wrong or we certainly let it run to a point to see whether something can happen and if it isn't there then we just have to move on. I think we maybe will be a little more selective over time. We will be asking harder questions of those companies when they come in and while they are here

(Tom Corcoran, Innovation Centre Manager, ArcLabs).
This study can reveal academic researchers wish to build a relationship with the client company building on the foundations of a smaller initial collaborative project with the companies:

* A typical project might be a prototyping project but ultimately the idea is that it leads on to larger projects which build in eventually to our product offering for these companies in the short to medium term

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

According to this academic respondent, there needs to be excellent communication between early-stage ventures and the specialised research centres in developing a good working relationship:

* We are in discussions with companies that have a significant development capability, and extensive industry experience but they would not be in a position to know the direction into where a particular research is evolving. The likelihood of anyone being able to say we can do that for you is low. However, the better you get at your job, the more you can do. We want to know where an early-stage venture is looking to be in two years time and how that correlates to where a group of researchers are also looking to be in that period.

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).
This research reveals that weak ties were formed between incubation companies that came into contact with each other as an outcome of dealing with other colleagues. This study has found that these weak ties were not all in-depth nor frequent contacts but these ties can be called upon by the incubation companies for support, information, and help with queries in the incubator network and thus, provided the potential to generate new ideas.

This research acknowledges the majority of information exchange for campus incubation client companies has centred around generic areas which are all common elements for ‘start-up’ companies such as marketing, accounting and agency funding mechanisms. Due to the relevance of knowledge and technology, together with early ‘start-up’ phases, this research notes that the entrepreneurs were initially slow to divulge information:

*There are other technology companies here as well and we work with some of them. We give each other work which is helpful*

(Respondent A).

The researcher notes that within the extant literature, trust is a critical element in building mutual co-operation and developing communication. This study reveals trust to a key factor for the incubation companies in developing relationships with others:
We each have a whiteboard in the office and there were times when we would spend a couple of hours brainstorming with the other person. I am able to help him. I have experience and understand about projects and applications. I can help him go back and focus on what the next task is. He has got a technical understanding that is far beyond anything that I have, and is able to help me with future technical problems. And that’s something that I never expected to get, even though that is the idea of the centre. Helping each other, I didn’t conceive how that could happen

(Respondent C).

This research reveals the benefit for some respondents by co-locating with other entrepreneurial ventures at various stages of development within the incubation centre facility:

I think there is a huge advantage being able to work with other companies at the same stage of development as ourselves and particularly with others that are at more advanced stages.

(Respondent F).

This study can reveal that it was the intangible resources from both centres that were of particular value to the client companies, particularly, their relationship with the centre
managers. Intangible resources are harder to measure and include the enhancement of networks and the management of know-how. The role of the centre managers in building and maintaining trust was highlighted by all the companies, particularly with regard to confidential issues pertaining to each company. As respondent C revealed, the centre manager pushed him 'over the line' by supporting him in completing project proposals ahead of the required deadline. Another respondent supported this by emphasising how beneficial a good relationship with the centre manager is:

*I think the relationship with the centre manager is vital. I deal with him all the time, whether it is trying to figure out the best office space or issues we can and can't host here*

(Respondent D).

Another respondent emphasised the value of trust in developing a good relationship with the centre manager:

*A number of times I have sought advice regarding tough decisions and the centre manager was always very helpful in those situations and I feel everything is confidential*

(Respondent C).
4.4. RESOURCES

The findings of this study illustrate that tangible resources from the incubation centres flow to the new venture. According to the research, these resources include physical space, infrastructure and financing. The Telecommunications Software Systems Group (TSSG) in WIT market the facilities of the incubation centre space in ArcLabs as part of their process to attract 'spin-in' companies to collaborate with them:

As part of the 'spin-in' process, TSSG helped us secure office space here in the incubation centre. It is a nice environment here and we have office space and broadband access

(Respondent E).

This study notes that the physical resources of both centres, in terms of offering clients for example, desk space, network access, canteens and shared services were all factors which attracted the entrepreneurs to the centre. As respondent D declared:

I have never come across anything with the combination this facility offers me

(Respondent D).

The majority of incubation companies support the view of this respondent:
Location is key which is why we are here. This centre offers us parking, and a fully serviced canteen. We looked at another supported centre in a business park but it was neither as comfortable nor as attractive as the centre here

(Respondent A).

The centres’ flexibility in dealing with entrepreneurs, in terms of opening hours was highlighted by all the incubation centre client companies:

I like the ‘start-up’ environment as opposed to say a more corporate environment where you are just doing a nine-to-five and you are one of many. The building is open from 7am to I think, 11pm. You have swipe card access outside of normal office hours and again, it’s open on Saturday and even on Sunday you can get access to the building, so in terms of access to the building, it’s fine, there are no restrictions

(Respondent E).

This research identifies that competitive market rates to be a key factor for ‘start-up’ companies selecting a business location from which to operate:

Market rates are very competitive here. You cannot beat what the incubation centre is offering here. It is ideal for a ‘start-up’ because you know exactly what
you are paying for. In addition it is serviced so you just come in and 'plug and play'.

(Respondent A).

In this research study, it was noticeable that the incubation companies, usually less than one year old, had high expectations that the incubator would fulfil a range of managerial functions on their behalf, such as identifying appropriate funding sources, arranging business meetings with advisors and academic staff, and staff/student employment. However, this study can reveal that there is a significant difference in the level of ability and experience of the entrepreneurs participating in the Enterprise Platform Programmes in both campus incubation centres:

A certain section of the group who were coming out of the programme were fairly green and there was another section of the class who had incredible experience

(Respondent D).

As the early-stage ventures matured, the firms tend to move away from the services and support offered by the incubator towards an internal focus. Resulting from these face-to-face informal meetings with the respondents, this study can reveal that some companies mature faster than others but all respondents revealed a reluctance to completely sever

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3 The Enterprise Platform Programme is a one-year full-time professional training and enterprise support programme aimed at the needs of entrepreneurs in a business 'start-up' situation. The programme is run in conjunction with the Institutes of Technology and is co-funded by the Department of Education and Science and Enterprise Ireland.
ties with the incubation centre when their tenure is up. The study reveals the tenancy agreements in the two selected campus incubation centres recommends between two years and nine months and three years.

*It is also important to know when it is time to leave. You are in a high comfort zone here but it is not like running your own business in the real world. I think it is important not to stay too long.*

(Respondent A).

4.4.1. HUMAN CAPITAL

This research reveals the transfer of knowledge into the early-stage ventures is critical for their development and people with the right expertise are key to this knowledge transfer. The study can reveal that from discussions with academic staff, a career path in research is not well defined in a nationwide context. The research indicates there is a shortage of students in certain research areas which is now populated by international students and there is no guarantee they will stay in the Irish economy. Most of the contract researchers are on two to three year contracts:

*Based on what I experienced in Silicon Valley, success was achieved there as they imported talent and, critically, were able to keep that talent in the region. A very*
high proportion of the software developers that I met there had come from places such as India, Korea, China and Ireland. Many of their local hires moreso filled roles in management and marketing than in technology-specific areas and they were able to leverage the imported talent to achieve long term gain for the region. Will we be capable of retaining the talent that we have imported to Ireland or will we see huge outflows of that talent over time? Are we educating the knowledge economies of other countries? I’m sure we are to some extent. Are we getting enough gain out of this process to justify our investment in it? This is a difficult question to answer in precise quantitative terms. On balance, I believe that our efforts in this context are justified as the talent pool that is being created by our research activities is being leveraged by ‘start-up’ companies (many of which are ‘spin-ins’ to the Rubicon Centre) either by way of direct hiring of graduates/researchers or through the undertaking of joint research projects or shared usage of facilities

(Michael Loftus, Head of Faculty of Science, CIT).

An important finding of this study is that several industry interviewees did not perceive the Institute of Technology, in general, to be market oriented. The research reveals several respondents spoke of a cultural disconnect in terms of the working week between business and academic staff:
I think there is a difference between the amount of work carried out by the entrepreneurs in comparison to the level of work put in by lecturers. There is a different mindset towards meeting deliverables and deadlines. In our working environment, we do not have three months off in the summer as do academic staff.

(Respondent B)

The study of one incubation centre reveals that the majority of technology companies based in the centre were using a similar skillset, attracted by the comparable skillset and knowledge base of the research centre co-located on-site. The findings from this study can reveal that the similar skillset employed by companies in the incubation centre, resulted in a small proportion of head-hunting of staff:
It's not like renting an office in a business park where companies wouldn't interact with other companies as much, whereas here, engineers will interact together and you get to see who's who and who's good and who's not good. So, there can be kind of staff poaching going on as well. Not a huge amount but in general it is okay. The down side is that there is a number of tech companies here and we are all using the same resources in terms of recruitment so people are moving. We need to be realistic and not hike up the salary rates too high, so when people are moving to just try and keep things competitive but not to strangle each other, because we are all in 'start-up' phase

(Respondent A).

No friction or tension between companies at this location, was observed by the researcher. This research can reveal that all the respondents from the incubation companies expressed their support for access to the internal network to discuss problems, seek support and mutual co-operation if needed:

Recruitment has been one of our biggest challenges. Some of the initial team came from the TSSG. I spoke to people there, made them dollar offers and they joined. But recently I have been pulling in external people. We have hired people through agencies but it has been a very sort of hit and miss process. I do not want to be going back continually looking for a team, trying to poach TSSG staff. They were happy to get an initial team out, but I am not sure they would be happy
if I continually went after their people. I know other companies here that are incubation companies that have the same difficulties trying to hire. It is difficult to get engineers in this area. Especially in the current climate, everyone is reluctant to move. It's considered a bigger risk. I'm not sure on paper if there really is a bigger risk than being in the likes of a multi-national corporation

(Respondent E).

An interesting finding of this study reveals that all but one of the campus incubation company did not employ student placements within their organisation. The majority of interviewees echoed the views of this respondent:

To date we have not hired any graduates because there is obviously a learning curve if you hire a graduate. We are not in a position at the moment to absorb that learning curve

(Respondent E).

This study reveals that the sole campus incubation centre, that had taken on student placements in their organisation, did not find it to be a positive experience:

When you are taking on young students, you have to be prepared to supervise them. I think we may not have given them adequate supervision even though they
all were individuals with strong ability. We gave them work where they were out of their depth. They did not finish anything and I put that down to insufficient supervision and a lack of control on our part. I never received a copy of the work assignment of one student following my request for one, nor did his Head of Department visit me subsequently to discuss his experiences

(Respondent B).

Interestingly, this thesis notes that one campus incubation company interviewed, a 'spin-in' company, did not express interest in developing any links with the college, apart from the research centre with whom it is collaborating:

I don’t see any immediate gains for us trying to pursue or create links with the college. I’m not sure what it would do for us, apart from maybe giving you insights into graduates coming through if you were looking for good graduates

(Respondent E).

4.4.2. FUNDING

This research finds that funding is of vital importance to the survival of the college research centres and the early-stage ventures located in the campus incubation centres. Within the scope of this study, this research finds that collaborative projects between
small business and colleges, which are funded by Enterprise Ireland, include the innovation voucher initiative and the innovation partnership initiative.

This study reveals that both incubation centres have been quick to avail of the innovation vouchers scheme for their client companies and have pronounced it to be a successful programme for them. Its objective is to build links between Ireland's public knowledge providers and small businesses and to create an innovation culture within the small business itself. Funding of five thousand euros is available to small limited companies and the work is carried out by the recognised college or knowledge provider. An interesting finding emerging from this study is that centre management view the innovation voucher scheme as an introduction to linking their client companies with the relevant college research group:

The innovation vouchers have been a quick and easy mechanism for doing that but it is very limited in what it can do. We are looking for ways to build on that

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

The other centre manager interviewed in this study supported this view:
There has been a high success of the innovation vouchers. We use that for them to put their toe in the water to test the relationship

(Paul Healy, Innovation Centre Manager, the Rubicon centre).

Both research centre managers in the Institutes of Technology, interviewed in this study, suggest that early ‘start-up’ ventures are not financially in a position to work on larger collaborative projects with them:

There is no point in us pulling money out of the incubation companies when they are five minutes outside of the door of the Enterprise Platform Programme because they won’t have a huge amount of money

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

This view is highlighted by the second research centre manager:

On a practical basis, it is difficult to collaborate with many early-stage ventures as they do not have the cash flow

(Barry Downes, Director of Commercialisation, TSSG).
Arising from these comments, this study notes that from the perspective of the academic respondents:

*The more money the company is putting in, the more deadline orientated they are and the more risk adverse they tend to be*

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

This study can reveal the most successful projects, in one of the research centres, to be from entrepreneurs who are willing to invest capital in order to be able to collaborate with them:

*We have worked very successfully with companies where there is an entrepreneur who sees the problem that they can solve in the market-place and are prepared to put their own cash on the line. In these projects we have been very, very successful. However, participants coming out of the Enterprise Platform Programme, in my opinion, have an unrealistic attitude whereby they believe they have free access to the resources of this research and development centre. This is not possible as we are funded solely by competitive research tenders*

(Barry Downes, Director of Commercialisation, TSSG).
This research finds that funding and increased sales revenues are some of the greatest challenges the incubation companies face:

No matter what you say you are going to run out of money. Cash flow is a huge problem. I am certain that if I didn’t have the incubation centre I wouldn’t have a job right now

(Respondent C).

This view was supported by other respondents such as the following:

The main thing you worry about is cash flow and finances, from that respect you just can’t beat the campus incubation centre

(Respondent C).

This research reveals that there was a high expectation among the companies, specifically, the companies less than one year old, that incubator centre management could fulfil a range of management functions, particularly in identifying appropriate funding resources on their behalf:

For small companies, when you are in a place like an incubation centre, you are dependent on the management sourcing the best deals. If they do not source the
best deals, then they have to pass it on to the small companies. I did not feel the incubation company and therefore, their parent organisation, the college, were getting value for money which meant that they were passing on to me their negotiating skills with regard to getting the value for money. So there were a few drawbacks on the money

(Respondent B).

In this research, three companies identified their link with the college research centre resulted in lower development costs. Two of these companies are ‘spin-out’ companies which came out of the college research centre and the third, a ‘spin-in’ company, specifically to benefit from the knowledge base within the centre.

By contrast, this research finds that the respondent companies found the innovation voucher initiative a very small amount in terms of funding:

In my opinion the voucher funding was too small but the process itself is simple

(Respondent F).

This research finds several respondent companies had decided not to proceed with the innovation partnership initiative for a variety of reasons, but funding was not an issue:
When we looked at collaborating on an innovation partnership with the college, the funding, which was seventy-five per cent, did attract me but not the fact that the college would be project managing it for me. I felt that if the college were responsible for the project delivery then their post graduates would be building up a level of expertise and a level of understanding but the company would not build up any level of expertise. None of the people employed by the company could go and work with the college research team and neither could the college research team come and work in our office where we could ensure they would not be working on student hours.

(Respondent B).

4.4.3. TECHNICAL

According to the findings of this research, the majority of campus incubation companies are high technology companies which have a strong research and development component. This study notes that both of the selected incubation centres actively promote and offer access to advanced technology laboratories, equipment and other technical and research resources such as faculty, staff, students and libraries within their Institutes of Technology.
The study reports that the more clearly the campus incubation centres defined the incoming new venture profile, the better the incubator is able to leverage the firm’s given competencies as well as creating potential synergies among the resident client companies. Interestingly, the research reveals that TSSG operate off two models: firstly, a standard campus company model where the group creates the company and feeds that company with technology. This is known as a ‘spin-out’ company.

The companies that were founded outside of here but came in to leverage or licence some technology that was developed in the research group. In other cases, the companies have taken both people and technology out and have established themselves here in the incubation centre

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

Secondly, the ‘spin-out’ model occurs when the research group attracts the company (sometimes into the region) to work with them. In this model, the TSSG contributes expertise in technology product development as well as research and development in general:

We have a very close relationship with our ‘spin-in’ and ‘spin-out’ companies. However, we do not have a close relationship with the incubation centre companies for a variety of reasons such as we have nothing to do with their area of expertise. In our experience the companies that we have met with would have a
technology skill but would lack business skills. We find the best marriages are with companies with strong business skills but poor research and development skills

(Barry Downes, Director of Commercialisation, TSSG).

The research finds ‘spin-in’ companies need to have financial backing in order to collaborate with the research centres:

For these companies, either we transfer our intellectual property into them in return for an equity position in their company or alternatively if they are a ‘spin-in’ they are engaging in an innovation partnership programme with us where they have to contribute a certain amount of cash

(Barry Downes, Director of Commercialisation, TSSG).

The research finds there is a focus by incubation companies who have collaborated with academic staff on the acquisition of technologies and knowledge as key to value creation within their own firms. The study finds new technology acquisition was the most important criterion for one respondent.
Obtaining technical information and knowledge is my highest priority in terms of research outcome

(Respondent F).

The research finds that only one incubation company commented on the technical resources within the college and the participant reported:

*Resources used for teaching and basic research are always going to be spread too thinly in any institution and this college is no different*

(Respondent F).

The research reveals that due to this experience with the college, this client company questioned why the campus incubation centre itself is linked to just one Institute of Technology:

*In my opinion, it is a disadvantage for this incubation centre to limit itself to just one institution in terms of research equipment and expertise. I feel that in terms of laboratory resources and staff expertise, that a research institute can only be expert in one or two areas. However, entrepreneurs can start up ventures in any of thousands of possible areas. I feel it is more of an advantage to be connected to an institution that has the exact technology requirements, even if I have to fly to that location every so often. I think this is better than being able to walk back and
forth to a centre if they do not have either the equipment nor the expertise. Why do they limit themselves?

(Respondent F).

This respondent proposes the establishment of a formal linkage between the campus incubation centres and other third level institutions:

*I think it would be a good idea for the incubation centre to consider developing some form of strategic alliance or joint venture with other Institutes of Technology or Universities, nationally or internationally, with specific skillsets in specific research or industry sectors, which links back into the campus incubation centre. After all, the incubator is supposed to be giving support to the early-stage ventures*

(Respondent F).

4.4.4. ACADEMIC

The research has already noted the collaborative opportunities offered by the Institutes of Technology to incubation companies. The centre managers in this study pro-actively market the connection between the centre and its Institute of Technology:
In terms of supporting the clients, I rely very heavily on resources within the college, particularly some of the resources that are here, for instance, the School of Business. That is where I get my support from, whereas in another environment you'd probably have to pay people to do that kind of activity

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

This study finds senior academic staff recognise the opportunities the campus incubation centres can bring to the academic environment:

The co-location of the Innovation Centre and Cork Institute of Technology (CIT) has generated many benefits, not least the ease with which relationships can be developed between 'start-up' businesses and the relevant people in CIT. For example, the Centre manager will often seek my opinion on new businesses that are seeking to be admitted to the Centre. We will discuss their initial plans, their long-term potential and the extent to which CIT or other third level institutions could help them achieve new product/service development, business viability/expansion and success in exporting product/services. Visibility to these requirements provides me with the opportunity to connect these companies with the most suitable CIT departments and to ensure that our teaching and research programmes match their requirements

(Michael Loftus, Head of Faculty of Science and Computing, CIT).
This study notes that the campus incubation centre managers are aware that they can draw upon resources within the college:

*The academics the companies work with have generally not been based here. We have been able to pull in people from engineering, technology, and from marketing to broaden the connections beyond what is in this physical building*

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

The other incubation manager notes that:

*Companies want to be here because they feel being on campus is easy. It attracts students into the companies*

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

This study reveals the support by the college towards its entrepreneurship policy, by co-locating the Centre for Entrepreneurship within the School of Business in WIT with the incubation centre, as well as the TSSG research group. The research reveals that the TSSG and the Centre of Entrepreneurship have a close relationship with the centre mentoring TSSG’s campus ‘spin-out’ companies:
Most of the research that we do is related to entrepreneurship so we are close to our source of response

(Dr. William O’Gorman,
Head of Research, Centre for Entrepreneurship, WIT).

The research observes that in the campus incubation centres’ first three years of operation only a small number of academics have been attracted to the entrepreneurship offered by the incubation centres:

*Academics have permanent, pensionable jobs, eighteen hours a week whereas entrepreneurs work for very little money and long hours. It’s a difficult one*

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

This study notes that the incubation centres affiliated to CIT and WIT host other academic activities and entrepreneurship programmes in their centres which enhances the links between the organisations. The Rubicon Centre is actively involved with the CIT Prize for Innovation, an annual competition sponsored by the South Cork Enterprise Board, for students and academic staff in Cork Institute of Technology, with innovative business ideas. In addition, the centre operates an Enterprise Start Programme, which provides new 'start-up's with information and training delivered by experienced entrepreneurs, with funding from FAS, the national training agency and Enterprise
Ireland; and together with other partners hosts the Enterprise Platform Programme for South West Ireland known as the Genesis programme. ArcLabs also hosts the Enterprise Start Programme and the Enterprise Platform Programme for South East Ireland, as well as being associated with the first and currently the only postgraduate diploma for enterprise development. One of the largest research groups in the country, Telecommunications Software & Systems Group (TSSG) of WIT is also co-located at the ArcLabs facility. It was founded in 1996. Since then, it has grown into a large research centre (over 40 active projects, over 40 completed projects, 120 active staff and students, and over €40Million in funding received from 1996 to 2007):

It is working here. We have to work hard to make it happen. And there is a good degree of integration between the academic side of things and also the entrepreneurs that are here. Our Enterprise Platform Programme is unique [nationally] as it is the only one that a postgraduate diploma for development associated with it. Not only does it help with their business but it is also part of the accreditation process for them to get their post graduate diploma in enterprise development. This helps their business to grow and develop. Because of that we assign what we call academic mentors to mentor them through the process. We have two cohorts now. We have a separate programme for enterprise centre managers from all over Ireland who follow the same pattern for postgraduate diploma in enterprise development and we have academics mentoring the enterprise centre managers as well. Between these two pieces of mentoring, there is a huge opportunity for networking because many people are involved in the
process and each person, each lecturer has their own skill set. Depending on what the enterprise centre manager or the entrepreneur needs, it is very easy for a lecturer to contact someone else for a response

(Dr. William O’Gorman, Head of Research, Centre for Entrepreneurship, WIT).

This research finds that informal relationships with academic staff also played a key role in attracting several client companies to both incubators. This study notes that these staff were either lecturers within academic departments or researchers in the centres. This study also notes that events organised by professional not-for-profit organisations, such as IT@Cork, proved a successful forum in introducing the college to the entrepreneurs:

*We knew the academic lecturer before we started into this development. He came to us and we were looking for somebody to help us with our complete redevelopment, re-architecting with the product, a complete research and development project, which was why we moved here. He gave us great support. He invited us down to the main campus when they brought over some from visitors from other countries to the college and gave us an opportunity to present our products. We did get good support from individuals*

(Respondent B).
This study reveals a key factor for college 'spin-out' companies, was their pre-existing contact base within the college infrastructure which they were able to leverage to their advantage:

*We have a very good relationship with lots of people in the college. We need several different competencies within the company. We touch base with quite a few people around us - we have people in tourism and leisure who are fantastic. We have access to software and hardware engineers. We touched base with the German department as well because we just wanted help with one of the translations and pricing. If you have a good relationship with people in the college or the research centre, what I found is there is somewhere here who knows the answer or can point you in the right direction. That's an incredible resource to have*

(Respondent D).

4.5. GOVERNANCE

This study can state that both campus incubation centre managers play a key role in identifying linkage mechanisms to connect their client companies with academic staff and departments within the college:
I see my role in terms of finding mechanisms to help connect both the companies here and the researchers

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

The direction of the research in this paper is focused on linkage between early state ventures located at campus incubation centres and the institutes of technology to whom they are affiliated. This study does not find any evidence of formal mechanisms in place to support this. This research finds there is a divergence in the goals and objectives of incubation staff and those of senior researchers. Incubation centre staff are focused on activities that help their companies to grow and research staff are focused on developing innovation. The study finds a lack of knowledge of each other’s area of expertise, particularly with regard to the area of risk management in research:

There is not really a mechanism in place for us to work properly with them. They have a commitment under their contract with their companies to try and maximise to benefit that the company gets from the learning they go through. That is primarily in terms of business development. A lot of it is about getting them training as quickly as possible. Innovation typically takes longer to deliver into that cycle

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).
One respondent proposes how a formal mechanism between the incubation staff and the research centres will benefit the early-stage ventures:

*I think internally the incubation centre manager and enterprise platform programme manager can strike a deal with each company. The companies will come to us seeking support, prototyping or other forms of innovation, and that relationship will grow because if they know we do things, two things can happen. Firstly, they may start to tailor some of their business development towards the fact that we exist and we can deliver a particular type of innovation that they want or secondly, they will start to suggest new ideas to us that will harness our know-how in a new direction which is somewhere they want to take it* (Dr. Kieran Delaney, Manager, TEC Centre, CIT).

This research did not yield any data from respondents in incubation companies relating to formal mechanisms between the college and the incubation centres.

4.5.1. PROCESS

The research reveals the process of incubation is about the engagement of the incubator with the new venture and the possibility to change over time due to the new venture’s current life cycle’s needs. The connection with the Institute of Technology brings specific value added related services to the incubation centres such as the college image,
the use of college equipment and laboratories, student placements and collaborative work
with college research centres and specific college departments. The role of the incubator
manager is central to this process:

*Our prime focus is linking the companies that are coming in with the college’s research centres. Basically, we look at the project, then we contact the relevant research centre, explaining we feel we have a project they may be interested in and we sit down with the research centre and we meet the client together. Then we let the research centre drive on and develop that relationship separately.*

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

As part of their process, the study reveals that the Rubicon centre utilises the services of the development office within CIT as:

*It offers easy access to the college*

(Paul Healy, Innovation Centre Manager, the Rubicon Centre, CIT).

This research has found that the physical separation of ArcLabs from the main campus has proved to be advantageous within the context of internal processes:
We did not get subsumed into a lot of the processes that happen in a larger education institution. We have a lot of freedom here, freedom to develop our own identity as much as anything. We are very part of the whole system

(Tom Corcoran, Innovation Centre Manager, ArcLabs).

The view is echoed by one of WIT’s research centres. The TSSG have found this physical detachment from the main campus and its co-location with the incubation companies to be beneficial in terms of creating a different working environment within the research group:

We have seen it as a positive experience and quite essential as it has allowed us to build a very different culture to the one that exists within WIT. I mean this in a positive sense as the main focus is on undergraduate education which has different processes and procedures which are quite different to from running research of any type, whether that would be academic research to commercial development of technology

(Barry Downes, Director Commercialisation, TSSG).

This study notes that as an example of this the staff of the TSSG are on standard commercial contracts with twenty one days holiday leave per annum. The respondent further states:
The core culture of our organisation is one that blends academic research with a strong commercial software orientation. Both of these cultures require the building to be fully accessible at all hours, seven days a week, offering staff flexibility and core hours. The majority of our staff work a minimum ten hours per day and our work is project and deadline driven. This is not part of the standard undergraduate education culture. The ArcLabs facility is a major benefit to us

(Barry Downes, Director of Commercialisation, TSSG).

The research does not reveal any formal processes between college and incubation centres in terms of developing linkage and the management of communication appeared problematic due to differing organisational environments in the incubation centre and the academic institutions:

There is a meeting of minds I would say in a sense that we all have a picture of where we want to go, and we all have a common sense that things should change in a particular direction, and I would say that there’s no disagreement about what type of things should be created. The difficulty comes in merging our operational flow because at the end of the day my targets and those of the centre managers are different. And the difficulty is that each of us has a deep understanding of our own areas and perhaps an over-stated understanding of what the others are doing
There is a lack of connective tissue between people, the lack of a single process, two separate processes running in parallel which in reality are invisible to each other. There is an awareness that each process exists but not much more than that. At the end of the day, the company is responsible for their own existence and their own improvement. We cannot share information about companies without that company's knowledge

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

Arising from these comments, this research notes that other research centre respondent acknowledges it does not have a strong relationship with the incubation centre it co-locates with:

We do not have a very strong relationship with ArcLabs. We see it as a location where our campus companies 'spin-in's can get office space and we see it as part of our offering in the context of affordable, competitively priced office space and they are physically located in the same building as ourselves. This promotes connectivity between them and ourselves

(Barry Downes, Director of Commercialisation, TSSG).

This study finds there is great willingness and commitment among certain academic staff to improve the process of collaboration between the incubation centre and the college:
The Innovation Centre is an integral part of a bigger picture. It creates a focal point for business innovation connected with education, employment, long-term development and strategic development of the region. It connects very strongly with the whole notion of advancing the knowledge economy. In fact, my great hope for the development of this region lies in places like the Innovation Centre, where 'start-up' businesses are being generated that are rooted here locally as distinct from being temporarily located here as a consequence of point-in-time competitive advantages that we may have had

(Michael Loftus, Head of Faculty of Science and Computing).

This research can report that there are differing views between the researchers and incubation staff as to the effectiveness of the research process for an early-stage venture. The study notes the occurrence of an insufficient flow of information between the companies and the researchers which contributes to a lack of mutual understanding of events. The study notes that researchers want to see the total picture of the company but confidentiality is an issue. The incubator staff have their own relationship with their companies which is separate to that of researchers:

The difficulty is that there is really no way of bridging that gap at the moment because their relationship with the company is their relationship. Our relationship with the company is ours. They are separate. If a company has
difficulty from a financial point of view, I can’t know about that. The company is not going to tell me. The centre manager can drop hints but I can’t act on that. So that’s a big break in any relationship that can happen with a company

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

This research reveals the TSSG has created ‘spin-out’ companies as part of its commercialisation process:

We have had a number of processes for campus companies or ‘spin-out’ companies as they are also known. Firstly, we have recruited external entrepreneurs to create the company and we have transferred the technology into it so they have effectively created the company, absorb the technology that we have researched and then some of our researchers have moved into the company. Secondly, we have had cases where we have hired the entrepreneur at the last few stages of the project to undertake commercialisation. They have ‘spun-out’ with the team.

(Barry Downes, Director of Commercialisation, TSSG).

An interesting finding from this study is that this respondent does not feel that academic researchers themselves should set up their own companies:
We have not had an instance, and I do not think I would welcome it, where a PhD researcher would say he would like to create a company. Quite frankly, I do not think they have the right skills to run a company. In all cases, we would look for experienced entrepreneurs or Chief Executive Officers (CEOs) that have a proven track record to run those companies. We can provide a role for a Chief Technology Officer or the Chief Scientific Officer and we can provide a variety of technical staff and product managers or even marketing managers but there is no way I would see a PhD researchers creating companies by themselves. It just wouldn’t make sense

(Barry Downes, Director of Commercialisation, TSSG).

This research notes the support by the ‘spin-out’ companies of the TSSG’s commitment to commercialisation their companies:

*We are in the process of finalising the technology transfer with them so that in itself is a very difficult process for WIT as it is one of the first companies to through the process with them. It has been a learning curve for both of us along the way. I think we have helped each other to correctly define the process*

(Respondent A).
This research can state that services provided by the campus incubation centres are marketed by the research centres and the colleges in attracting new ‘spin-in’ companies:

*It’s part of the spinning-in process. The research group helped us in securing office space down in the incubation area. It’s a nice environment. We have an office space and we’ve got broadband access.*

(Respondent E).

A respondent from a ‘spin-out’ company found the business focus of the research centre they were dealing with to be extremely advantageous:

*The TSSG are not an academic organisation. People working here are either researchers or come from industry but the commercialisation element of the organisation is very industry focused and staff in this area of the organisation have industry experience. There is a good mix of people. I have not worked very closely with the research side but they have a very academic element there. In terms of commercialisation, it is very much build the product, get it to market, develop a business plan, and get funding. It is very much business focused.*

(Respondent A).
This research notes that there are formal internal processes between the incubation centre staff and their client companies and this is welcomed by the firms:

_The Centre Manager carries out reviews of the companies, so they drag you over the coals, which is nice because I have experienced creating a company outside of these incubation centre structure but the difference! The experience is very, very different and what tends to happen is, because you do not have the benefit of these people’s advice without paying for it or you are giving away equity. I mean you end up making mistakes you shouldn’t and making decisions on not quite enough information that could have been slightly better. It does make a big difference_

(Respondent D).

This study can reveal that by contrast to the academic staff, all respondents from the incubation companies did not feel part of the college process and some respondents felt the majority of academic staff probably knew nothing of their activities:

_Most people here in the centre do not think about the college. It does not occur to us because we are so far removed from what happens in the college. We are not really part of their process_

(Respondent A).
4.5.2. PROJECT MANAGEMENT

This research can state that the incubation centre companies are key target clients for the research centres:

_The more there is leadership the better and a lot of the project works that we do and a lot of support activities that we do relate to the incubation centre client companies. We tend to get the majority of the Information Communications Technology (ICT) projects with the incubation centre clients_

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

This respondent further adds in this study, that ideally the research centre is positioning itself, to be able to exploit all the research and development potential for the early-stage venture:

_We want to be in a position where we can say we have presented and supported that company with real innovation entry points and given them every chance_

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

The research reveals that project management with the incubation companies is currently in initial stages for some research centres:
We need to be in the right place at the right time with the right idea for a company. We also need that company to be at the right stage for them to take that idea on. It is actually still in the formative stages. These things will take a while to sort out

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

The findings of this study can reveal a significant difference in the organisational environment and culture between the institutes of technology and the campus incubation centres. The research finds that project deadlines are a significant issue between these two cohorts:

*When a client comes in, they are driven to deadlines and some of the biggest issues that people have with the college or with an academic is, can the college deliver this in time and why should they bother. So what we say to them is we will let the college be the development partner, and that's the way we work*

(Paul Healy, Innovation Centre Manager, Rubicon Centre).

The research reveals a third of the respondent incubation companies were dissatisfied with the length of time it took to achieve project completion with the academic staff on joint projects. For them, the study finds, time is money:
Time is the major factor. 'start-up' companies do not have the time. Established companies, if their pockets are deep enough, can wait until the true value of the work can be realised. Researchers have other priorities and that makes it difficult

(Respondent F).

The study notes these respondents acknowledge the risk was accepted on both sides. The study notes that 'time to market' for the product is a key factor for success for these companies and the respondents interviewed tended to take a short term perspective on research and development activities. Interestingly, one respondent further commented:

One of the things I have criticised myself in the last two to three years was allowing the company to go into "Research and Development mode" because our productivity was not what it should have been at all. I wonder was it something to do with the move towards a kind of academic research and development project where there was no end customer. I regret that we did not have better project management skills

(Respondent B).
4.5.3. POLICY

The research reveals the incubation centre programme plays a central role in both Institutes’ policies with regard to entrepreneurship, innovation and regional economic development. The research reveals a high level of commitment to the programme by all respondents in this study who are working for the Institutes of Technology.

The research finds that in general the third level institutes are currently focused on individual departments, on individuals advancing their academic careers and “people in the system” being rewarded by increasing student numbers, having viable courses, generating traditional research output as measured by traditional research measures in terms of publication, where the colleges now have delegated authority to award their own PhDs. The weakness, the study finds, is that individuals are not being equally rewarded for positively engaging with industry. This study reveals that knowledge of both centres has been developed on an organic basis by academic staff motivated to conducting research, particularly if it gives them an advantage in winning research funding:

Despite the many advances that have been made using technology to support video conferencing and teleworking, co-location brings with it huge advantages with regard to relationship development and the building of trust and understanding between new businesses and the Institute. The strength associated with the development of personal relationships with the businesses in the Rubicon Centre, is also a weakness in the sense that the relationships are heavily based on personal contact and personal knowledge. We have quite a distance to travel yet
to establish a more robust, process-based relationship management approach in this context

(Michael Loftus, Head of Science, CIT).

The study notes the respondents from the academic cohort recognise the strengths the incubation centre programme can add to the value creating activities within their own departments/faculties:

The relationship between the Rubicon Centre and CIT is very much of the symbiotic kind. Every improvement or expansion that is made to the capabilities of my faculty (Faculty of Science and Computing) increases the range and quality of services and supports that we can offer to the Rubicon Centre and its tenants. The more that they can leverage our capabilities, the stronger they become and the greater the demand that they create for our services going forward. All of this adds up to increasing the range and quality of opportunities for the sustainable economic development of the region and its people

(Michael Loftus, Head of Faculty of Science and Computing, CIT).

This study finds that education goes through massive cycles and the ability of the colleges to engage with the incubation centres on different levels is heavily influenced by
the guidelines college staff are operating within. The overall policy of the Institutes is summarised by the following respondent:

*The incubation centre is an integral part of a bigger picture. It gives you innovation connected with education, connected with industry, employment, long-term development and strategic development of the region. It connects with the whole notion of advancing the knowledge economy. In fact my great hope for the development of this region lies in places like the Rubicon Centre. We would see a high number of innovative businesses, on foot of that initiative. It would be rooted here locally as distinct from multinational investment which comes in and flows and moves depending on international economic circumstances.*

(Michael Loftus, Head of Faculty of Science and Computing, CIT)

This research does not reveal any data from incubatee respondents relating to academic policy towards themselves or the campus incubation centre.
4.6. OTHER FINDINGS

4.6.1. COMMERCIALISATION AND INTELLECTUAL PROPERTY (IP)

This research can reveal that intellectual property\(^4\) (IP) is a significant issue for both incubation centres and college researchers and research centres. The study finds that both Cork Institute of Technology and Waterford Institute of Technology are currently redefining and redocumenting their IP policies:

A lot of Institutes of Technology have been in discussions for the last two years to develop a common policy. It is now reaching a stage where there is consistency in the system but I do not think any University or Institute of Technology in the country is fully up to speed in doing this properly

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

The research indicates the TEC centre in CIT is expanding from its current staff complement of fifty to broaden its expertise into commercialisation and technology transfer:

\(^4\)According to Enterprise Ireland, \(\text{ retrieved on January 11, 2009 from www.enterprise-ireland.com/TechSearch/Useful+Documents/Step+2++Identify+the+Intellectual+Property.htm}\), there is no precise definition of 'intellectual property' but it can be divided into the areas of patents, trade marks, industrial designs, copyright and confidential information. Whether collectively or individually, these rights are important as they are not only the product of its creators but are valuable intangible assets that can be financially exploited.
We have a plan to fill and create positions with dedicated technology transfer skill sets and with commercialisation skill sets. Our area of research can be applied to everything from marine science all the way through to farming to vehicles, to basic things like consumer computers to pharmaceuticals. It is not possible to bring in a commercialisation person who can see all of that with any degree of depth. They will know their own particular area. There is no one person who we can hire who can cover all backgrounds.

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

The findings of this research indicates the commercialisation of research with regard to the licensing of IP is still at a developmental stage in CIT:
We have plans in action to try and develop something that's efficient and supportive of industry but there again in implementation, my attitude would be that we will not get enough licence money off of anything that we produce to sustain anything in its own right. There are people who are strongly of the opinion that we should give away the IP for nothing. I think that should be listened to as well. There isn’t a licensing deal that we can move in to the next five, six, seven years where we would make a big hole in any of the deficits that the Institutes or the Universities are facing at the moment. It does not work that way

(Dr. Kieran Delaney, Manager, TEC Centre, CIT).

By contrast this study acknowledges that the TSSG Research group are in existence for twelve years and employ approximately one hundred and fifty staff. This research finds that in addition to their research capabilities, they have recently added a commercialisation function which utilises approximately one third of their staff, with one third of the remaining staff working in academic research and the remaining third working in applied research, in collaborative European Union programmes:

This strategy assumes a linear model of smart people thinking up ideas on the academic side and then transitioning through applied research to commercialisation out into companies. The reality is very different. We tend to think of it as ideas originating in all parts of our organisation, coming together in
a variety of self-reinforced viewpoints. We find that regularly, it is our commercial staff, being very connected to the internet for example, that would inform applied research and ultimately create a context around certain academic work

(Barry Downes, Director of Commercialisation, TSSG, WIT).

The study reveals that early-stage ventures view a college IP policy as critical in the colleges' service/product offering to new clients:

If the institutes of technology do not build up a reputation for developing IP, such as patents and protectable software, for the companies that come to them for help, then I believe they will fail to attract further commercial projects. It is pointless for a company to develop a product that cannot be protected

(Respondent F).

The research can reveal that several incubation companies feel the Institutes of Technology should clearly document their IP policy, for example on their website which outlines the process companies go through if they want to do an IP or technology transfer:
The college needs to get to the point to be able to attract external entrepreneurs and industry people in to do that, to keep it going. It is a delicate process to do it from within. It is probably easier to get people to come in from outside and work with the college as opposed to growing your own entrepreneur. In my own experience, I think that my being part of the process delayed things.

(Respondent A).

The research finds that three companies withdrew from participation in collaborative project with the college due to concerns with IP residing with the college:

We looked into participating in an innovation partnership initiative which is funded by Enterprise Ireland. However, intellectual property was an issue for me as the IP was going to reside with the college and we did not proceed with this.

(Respondent B).

4.7. SUMMARY

This research is a preliminary study regarding the linkage between campus incubation companies and their Institutes of Technology. From the analysis of the primary research of the twelve semi-structured interviews, the research findings suggest there are obvious similarities and differences between the two campus incubation centres and their
Institutes of Technology from the perspectives of the academic staff and those of the incubation client companies. The research results will be extracted and the research findings, recommendations and conclusions will be developed in the following chapter.
CHAPTER 5. CONCLUSION AND RECOMMENDATIONS

*The campus incubation centre is an integral part of a bigger picture*

(Michael Loftus, Head of Faculty of Science and Computing, CIT).

5.1. INTRODUCTION

The discussion in this chapter centres on the thematic areas presented in Chapter four. For a systematic approach, the same broad themes from the previous chapter are used to frame the analysis. The themes are numbered in parallel in both chapters. The discussions will show how the current study confirms, contributes and challenges previous literature in the field of campus incubation centres.

Underpinning this study is the analysis of the perceptions of twelve people whose remit in professional life allows them to speak with authority on this subject matter. The conclusions that follow are based on the data yielded from the author’s field research in conjunction with the relevant literature on campus business incubation and government policies relating to enterprise, entrepreneurship, science, technology and innovation. This study seeks, therefore, to make a contribution to research on the subject of campus incubation in Ireland, specifically in the context of campus incubators providing a linkage mechanism for collaboration between the Institutes of Technology and the incubation centre client companies.
As in Chapter four, the discussions of themes are divided under the following subheadings:

➤ Communications

- Networking
- Relationship Building

➤ Resources

- Human Capital
- Financial/Funding
- Technical
- Academic

➤ Governance

- Process
- Project Management
- Policy

➤ Other Findings – Intellectual Property
5.2.  REVIEW OF THE MAIN FINDINGS

5.2.1.  COMMUNICATIONS

According to Grimaldi and Grandi (2005), incubators need to pay attention to their strategic positioning and should realise the key importance of specialising in the services that they offer and of matching the variety of demands and expectations coming from new ventures. The findings of this current research can affirm the incubator centre managers concur as to the strategic importance of their role as a point of contact for their clients with the college. "Our unique selling point here is that we are looking for projects where we can offer a relationship between our client companies and academic staff, and easy access to resources at the college" (Chapter 4:72). A significant finding of this study reveals that where a campus incubation centre is located off the main campus, that it poses a challenge for incubator centre staff in maintaining connectivity, but interestingly, this research reveals that this is not an issue for early-stage ventures as they have never been part of the campus and do not feel they are missing out on anything. "Any time I have ever needed anything, you just get someone's name you can email and you organise a time to meet to sit down, the same as if you were on the same campus" (Chapter 4:74).
5.2.1.1. NETWORKING

Barrow (2001) states that the impact of incubator facilities on the early-stage venture result in access to new knowledge, expertise, networks and cost effective access to leading edge research. This leads Rothschild and Darr (2005), to conclude that these unique resources enable firms to trade quickly without large overheads while also offering credibility to the enterprise for opportunities for networking. The findings of this research support the value of the campus incubation centre facilities in providing networking opportunities for their tenant companies. "Internal networking is a key activity here in the centre, where we introduce clients on a one-to-one basis to each other, particularly, when we think there are opportunities to work together" (Chapter 4:75).

A significant finding of this research reveals all respondents in this study emphasized the value of networking. Common facilities, such as the canteen, permitted this interaction to occur. The research reveals both incubation centres host networking events which are proving successful because in the opinion of one respondent "They are informal. People say we are not in their faces" (Chapter 4:77). The research does not yield any statistical data as to the proportion of attendees that are academic staff but the study confirms their attendance.

5.2.1.2. RELATIONSHIP BUILDING

According to Hallen and Eisenhardt (2008), despite their importance, forming relationships can be difficult for new firm entrepreneurs. A significant finding from this
research reveals that as the incubation centres are in operation less than three years, they are currently in a learning process as to the selection criteria of companies to complement the CIC’s business model. “You have to look at the early-stage ventures, and make a judgement initially, as to whether or not this company can and is interested in developing a relationship” (Chapter 4:80).

An important finding arising from this research is that there needs to be excellent communication between early-stage ventures and the academic research centres in developing a good working relationship. “We want to know where an early-stage venture is looking to be in two years time, and how that correlates to where a group of researchers are also looking to be in that period” (Chapter 4:81).

Eisenhardt and Schoonhoven, (1996) propose that for these new companies, lacking valuable resources or capabilities, relationship formation may be difficult due to the new organization’s limited ability to contribute value to relationships and forming these relationships can be difficult as potential partners may be uncertain about the quality of the new organization’s resources and capabilities. According to the findings of this research, weak ties were formed between incubation companies that came into contact with each other as an outcome of interacting with other colleagues. These ties, albeit infrequent and not in-depth, can be called upon by the incubation companies for support, information and help with queries in the incubator network, and significantly this study finds it provides the potential to generate new ideas. “There are other technology
companies located here and we work with some of them. We give each other work which is helpful” (Chapter 4:82).

Trust is a key issue for the new firm entrepreneurs. “Helping each other. I didn’t conceive how that could happen. It is something I never expected to get, even though that is the idea of this centre” (Chapter 4:83). Reflecting the literature on the advantages of co-location for the entrepreneurs, this research reveals the benefit for respondents co-locating with other early-stage ventures at various or similar stages of development within the incubation centre facility. “I think there is a huge advantage being able to work with other companies at the same stage of development as ourselves and particularly with others that are a more advanced stage” (Chapter 4:83).

The predominant focus of this paper is whether the campus incubation centres provide a successful linkage between their tenant firms and their host Institute of Technology. This study can reveal it is the intangible resources that the companies found of particular value, predominantly their relationship with the centre manager. “A number of times I have sought advice regarding tough decisions and the centre manager was always very helpful in those situations and I feel everything is confidential” (Chapter 4:84).

5.2.2. RESOURCES

According to Kirchhoff (1994), entrepreneurial firms frequently seek resources during formation and development of the business but these resources are generally difficult to
acquire since they exist outside the boundaries of the firm. Studdard (2006), states that in developing new technology based firms, college business incubation centres are environments where firms may acquire such knowledge and business competences. This study supports these findings, revealing that the tangible resources of both incubation centres, in terms of offering clients financial assistance, physical space, and infrastructure for example, desk space, network access, canteens and shared services were all factors which attracted the entrepreneurs to the centre. “I have never come across anything with the combination this facility offers me” (Chapter 4:85). The research finds the majority of incubation companies support the view of a participant who emphasised “Location is key which is why we are here” (Chapter 4:86).

5.2.2.1. **HUMAN CAPITAL**

According to Lin (2001), human and social capital is the catalyst that facilitates the movement of resources through the social structure of the firm. This research reveals the transfer of knowledge into the early-stage ventures is critical for their development and people with the right expertise are key to this knowledge transfer. An important finding of this study is that several incubation company interviewees did not perceive the Institute of Technology, in general, to be market oriented. Several participants in this study outlined a cultural disconnect in terms of perceptions of the working week between business and academic staff commenting “there is a different mindset towards meeting deliverables and deadlines” (Chapter 4:90). These findings support O’Connor (2007) who states that on the academic side, active collaboration with industry is not for all but
nevertheless, it is a role that Third-level institutions, in the light of the growing knowledge intensity of economic development, are being asked to assume more strongly. The author acknowledges the debates within the broader literature on whether implementing profit-making business related strategies will represent a positive or negative change for Third Level Institutions. This current research supports the findings of Gassol (2007), who concludes that since the links with businesses arise as ad hoc solutions to intermittent situations, a culture that supports them has not yet been rooted within the third level educational system and that instead, the prevailing culture and structure opposes the development of appropriate mechanisms to promote them. "There is a difference between the amount of work carried out by the entrepreneurs in comparison to the level of work put in by lecturers" (Chapter 4:90).

Barrow (2001), states that a university resource is the availability of specialist skills-based labour where it may be an advantage to be located close to a college in order to make the firm known to students in specific disciplines. The findings of this research can highlight that all but one of the campus incubation companies did not employ student placements within their organisation due to "a learning curve if you hire a graduate" (Chapter 4:92) and the companies interviewed did not feel they were in a position to employ them. The respondent company did not find working with students to be a positive experience, but the company acknowledged they gave the student "inadequate supervision and there was a lack of control on our part" (Chapter 4:92).
5.2.2.2. FUNDING

Given the high costs of innovation, Grant (1998), postulates that developing links with universities can be strategically advantageous for the firms by reducing research and development and other costs. Markman et al., (2005) postulate the college link may result in reduced development costs and this finding is supported in this research. Two of these companies are ‘spin-out’ companies which came out of the college research centre and the third, a ‘spin-in’ company, attracted by the knowledge base within the centre. The research reveals that funding and increased sales revenues are some of the greatest challenges the incubation companies face. “The main thing you worry about is cash flow and finances, from that respect you just can’t beat the campus incubation centre” (Chapter 4:97). An important finding arising from this research, is that both research centre managers in the Institutes of Technology, interviewed in this study, suggest that early ‘start-up’ ventures are not financially in a position to work on larger collaborative projects with them as “on a practical basis, it is difficult to collaborate with many early-stage ventures as they do not have the cash flow” (Chapter 4:95).

5.2.2.3. TECHNICAL

According to Cooper (1986), high technology companies are dependent upon current knowledge of technical and market opportunities, and this knowledge is most likely to be acquired in a Higher Education Institute already active in a given technology. This current research confirms the majority of the incubation centres are high technology firms which have a strong research and development component. “The companies that were
founded outside of here but came in to leverage or licence some technology that was developed in the research group” (Chapter 4:100). This study affirms that both incubation centres interviewed, actively promote and offer access to advanced college technology laboratories, equipment and other technical and research resources such as faculty, staff, students and libraries. The research highlights there is a focus by incubation companies who have collaborated with academic staff on the acquisition of technologies and knowledge as key to value creation within their own firms. The study found four of the six respondent companies described “obtaining technical information and knowledge” (Chapter 4:101), as their highest priority on research outcomes. Further analysis of this research revealed that the campus incubation centre should have formal ties not just with its own Institute of Technology but also to other higher level institutes located nationally and internationally as “it is more of an advantage to be connected to an institution that has the exact technology requirements” (Chapter 4:102).

5.2.2.4. ACADEMIC

Lofsten and Lindelof (2005), propose proximity to the university coupled with the knowledge, facilities and labour force can be valuable in several ways. This study finds the incubation centres affiliated to CIT and WIT host other academic activities and entrepreneurship programmes in their centres which enhances the links between the organisations. A significant finding of this current study reveals that informal relationships with academic staff also played a key role in attracting several client companies to both incubators. “Visibility to these requirements provides me with the
opportunity to connect these companies with the most suitable CIT departments and to ensure that our teaching and research programmes match their requirements” (Chapter 4:104). This study notes that these staff were either lecturers within academic departments or researchers in the centres. An important finding of this research reveals a key factor for college ‘spin-out’ companies, was their pre-existing contact base within the college infrastructure which they were able to leverage to their advantage. “If you have a good relationship with people in the college or the research centre, what I found, is there is somewhere here who knows the answer or can point you in the right direction (Chapter 4:109).

5.2.3. GOVERNANCE

Gassol (2007) finds that since Higher Education Institutions play an important role as knowledge generators in the development of the technology small and medium-sized enterprises (SMEs), innovation systems try to design and implement mechanisms that help promote the transfer of knowledge from colleges to businesses. He postulates that links between colleges and business are developed in various ways, consulting by faculty to businesses, investment in pre-competitive research and development, financial support from businesses to students, technology licensing, and the creation of businesses from research results. A new finding from this research reveals that business and social networks between the Institutes of Technology, are not being fully utilised in terms of a formal mechanism, to improve the efficiency and effectiveness of campus incubation centres and their tenant firms. “There is not really a mechanism in place for us to work
properly with them” (Chapter 4:110). The findings of this current study reveals that the incubation centre managers see their “role in terms of finding mechanisms to help connect both companies and researchers” (Chapter 4:110). However, this study does not find any evidence of formal mechanisms in place to support this. Interestingly, this research reveals the centre managers to be performing like entrepreneurs, in the role of creating linkages with the academic staff in the main campus.

According to Plewa et al., (2005), successful linkages between higher education institutes and industry involve a high level of interaction and linkage mechanisms which not only have a positive effect on research outcome or technical quality, but also on knowledge transfer and satisfaction with the functional quality. The findings of this research illustrate there is a divergence in the goals and objectives of incubation staff and those of senior researchers. The findings of this study highlight that incubation centre staff are focused on activities that help their companies to grow and research staff are focused on developing innovation. “A lot of it is about getting them training as quickly as possible. Innovation typically takes longer to deliver into that cycle” (Chapter 4:110). Analysis of this research reveals a formal mechanism would “enable early-stage ventures to start to tailor some of their business development towards the fact that researchers exist and researchers can deliver a particular type of innovation that they want” (Chapter 4:111).
Mian (1994), states that the process of incubation in college incubators is focused mainly on the incubator manager’s direct involvement and increased participation incentives tap faculty members’ commitment, therefore enhancing commitment. The findings of this current research affirm there is great willingness among some academic staff to improve the process of collaboration between the incubation staff and the college but the research does not reveal any formal processes between the college and the incubation centre in terms of developing linkage. “We all have a picture of where we want to go, and we all have a common sense that things should change in a particular direction, and I would say that there is no disagreement about what type of things should be created. The difficulty comes in merging our operational flow because at the end of the day my targets and those of the centre managers are different” (Chapter 4:114). Furthermore, an important finding of this research is there are differing views between the researchers and the incubation staff as to the effectiveness of the research process for an early-stage venture. The incubator staff have their own relationship with their companies which is separate to that of researchers. “The difficulty is that there is really no way of bridging that gap at the moment because their relationship with the company is their relationship” (Chapter 4:116). This study finds that by contrast to the academic staff, all respondents from the incubation companies did not feel part of the college process and some respondents felt the majority of academic staff probably knew nothing of their activities. “Most people here in the centre do not think about the college. It does not occur to us because we are so far removed from what happens in the college. We are not really part of their process” (Chapter 4:120).
5.2.3.2. PROJECT MANAGEMENT

Lockett and Wright (2005) find co-operation with academic staff may provide access to the latest knowledge in the area of interest thus resulting in the development of more innovative products. The findings of this research highlight that the senior staff of both college research centres interviewed, concur as to their positioning themselves to be able to exploit all the research and development potential for the early-stage venture companies. "We want to be in a position where we can say we have presented and supported that company with real innovation entry points and given them every chance" (Chapter 4: 121). By contrast to the findings revealed by respondents from the academic institutions, an important finding of this study reveals a significant difference in the organisational environment and culture between the Institutes of Technology and the campus incubation centres. An important finding of this research finds that project deadlines are a significant issue between these two cohorts as "When a client comes in, they are driven to deadlines and some of the biggest issues that people have with the college or with an academic is, can the college deliver this in time and why should they bother" (Chapter 4:122).

An important finding of this research reveals a third of the respondent incubation companies, were dissatisfied with the length of time it took to achieve project completion with the academic staff on joint projects. For them, the study finds, 'time is money'. "Time is a major factor. 'Start-up' companies do not have the time. Established companies, if their pockets are deep enough, can wait until the true value of the work can be realised. Researchers have other priorities and that makes it difficult" (Chapter
4:123). The study notes these respondents acknowledge the risk was accepted on both sides. The study notes that 'time to market' for the product, is a key factor for success for these companies and the respondents interviewed tended to take a short term perspective on research and development activities. As one respondent admitted, "I regret that we did not have better project management skills" (Chapter 4:123).

5.2.3.3. POLICY

This research finds that the incubation centre programme plays a central role in both Institutes' policies with regard to entrepreneurship, innovation and regional economic development. The research reveals a high level of commitment to the programme by all respondents in this study who are working for the Institutes of Technology. Further analysis of this research finds that the ability of the colleges to engage with the incubation centres on different levels is heavily influenced by the guidelines college staff are operating within. "We have quite a distance to travel yet to establish a more robust, process-based relationship management approach" (Chapter 4:124).

An important finding of this study is that in general the third level institutes are currently focused on individual departments, on individuals advancing their academic careers and 'people in the system' being rewarded by increasing student numbers, having viable courses, generating traditional research output as measured by traditional research measures in terms of publication, where the colleges now have delegated authority to award their own PhDs. The weakness, this research has found, is that individual academic
staff are not being equally rewarded for positively engaging with industry. This finding reveals that knowledge of both centres has been developed on an organic basis by academic staff motivated to conducting research, particularly if it gives them an advantage in winning research funding. "We have quite a distance to travel yet to establish a more robust, process-based relationship management approach" (Chapter 4:124). The findings of this study support the views of Renault (2006) who concludes that researchers make choices within the context of constraints imposed by the Third Level Institute. An important finding from this study is some constraints are policy-based incentives and others are based on the researcher’s discipline.

5.2.4. OTHER FINDINGS – INTELLECTUAL PROPERTY

According to George et al., (2002), linkages with third level institutes can enable the firm to gain and master different knowledge bases that can then be used in developing innovative products to obtain patents that strengthen its competitive position and financial performance. An important finding from this research reveals intellectual property (IP), is a significant issue for both incubation companies and the academic research centres. The study finds that both Cork Institute of Technology and Waterford Institute of Technology are currently redefining and redocumenting their IP policies. "The Institutes of Technologies have been in discussions for the past two years to develop a common policy. It is now reaching a stage where there is consistency in the system but I do not think any University or Institute of Technology in the country is fully
up to speed in doing this properly” (Chapter 4:127). The study reveals that early-stage ventures view a college IP policy as critical in the colleges’ service/product offering to new clients. “If the Institutes of Technology do not build up a reputation for developing IP, such as patents and protectable software, for the companies that come to them for help, then I believe they will fail to attract further commercial projects” (Chapter 4:130). A new finding from this study reveals that half of the participant companies did not proceed with collaborative work with the Institutes of Technology, on the Enterprise Ireland funded, Innovation Partnership initiative, due to concerns over IP residing with the college.

5.3. RECOMMENDATIONS FOR THE FUTURE OF CAMPUS INCUBATION CENTRES

Although campus incubation companies may increase their business and technical knowledge capacity while resident in the centre, it does not guarantee that they will survive or grow beyond their current capacity once they have exited the cocoon of the incubator. From the author’s own personal research on this subject, the researcher feels the following fields should be addressed:

- Future research should attempt to study three strands of campus incubation company development: 1) their initial arrival in the centre, 2) from initial arrival to departure of the centre and 3) their ability to survive outside of the campus
incubation centre environment. This would provide increased knowledge of the effects and success of the campus incubation centre infrastructure.

- This study has identified campus incubation client companies are at different stages of business development. Future research on the needs of the incubation companies at each phase of their development, should be analysed in more detail, for eg., funding.

- A formalised framework for building closer co-operation on collaborative projects between the Institutes of Technology and the campus incubation client companies, which can be facilitated by the incubator staff, would be recommended. This framework would address the different needs of the client companies at their various stages of development. These areas would not only be in collaborative research and development projects, but also in the area of student and staff exchange, access to academic equipment and technical expertise.

- A priority focus on reducing time to market issues for the entrepreneurs is strongly recommended.

5.4. RECOMMENDATIONS FOR FUTURE RESEARCH

Within the area of campus incubation, the author suggests that the following areas merit further research:

- This study concentrated on two Institutes of Technology and their campus incubation centres. Both centres have different business models. An interesting
area for further and more extensive research would be to conduct research with all fourteen Institutes of Technology and their campus incubation centres. This research focus would yield more data on this emerging new area of research.

• Another area that would merit research is the issue of linkage of the campus incubation centres with specialist third level institutions, other than their host institution. This linkage could be at a national or international level. These engagements may facilitate interaction in terms of mobility of researchers and/or entrepreneurs, and access to specialised resource requirements and expertise.

• The researcher would recommend the Institutes of Technology investigate the setting up of a formal process, by which to encourage and reward academic staff to engage with entrepreneurial activities, particularly with the services offered by the campus incubation centre, and the early-stage entrepreneurial ventures.

• This research has identified intellectual property as a significant issue, when commercialising research in the area of technology transfer. The technology transfer process can hinder or detract from closer collaboration between small firms and academic groups. This is an area that merits further detailed research.
5.5. CONCLUSIONS

This paper expands the academic literature by its findings on campus incubation centres and their relationships with their campus incubatees and their host Institutes of Technology. This study has addressed the issues relevant to the development of linkages between the incubation centres, the Institutes of Technology and the respective client companies. Semi-structured interviews, conducted with twelve senior academic staff and entrepreneurs, provided the main findings in Chapter four. These qualitative findings provide significant and informative insights into campus business incubation centres and their linkage with their host institutions and their incubatees.

The primary conclusions of this study confirm campus business incubation centres affiliated to the Institutes of Technology are still in their infancy. The evidence finds the campus incubators are currently trying to get the right mix of clients for the centre and this is still a 'work in progress'. The research reveals there is contradictory evidence regarding the knowledge networks and information flows resulting from Institute of Technology interaction. An important finding of this study is that the interests and objectives of the early-stage ventures and academic staff are heterogeneous. There is a complex trade-off in terms of the needs of the academic researchers and those of the new firm entrepreneurs. What is good for the academic researchers may not be a shared objective or priority for the incubation company. In fact this may conflict or inhibit market oriented or industry driven issues.
The relationship between the Institute of Technology staff, the campus incubation centre and its incubatees is predominantly on an informal basis, particularly driven by individuals who are pro-active in seeking collaborative opportunities. This study has found the incubation centre manager’s primary role is to assist and provide the early-stage ventures with the ability to acquire knowledge. My study reveals that in managing the incubators, the centre managers themselves, must perform uniquely like the entrepreneurs.

In conclusion, this study finds the evidence is mixed regarding the linkages between campus incubation companies and the Institutes of Technology. The campus incubators have been successful in terms of creating networking and relation building opportunities between the Institutes of Technology and their incubation client companies. There is less evidence to support a formal mechanism to develop collaborative activities between these stakeholders and priority should be given to this issue.
APPENDIX A

References
REFERENCES


Enterprise Ireland, 2008b. From Bench to Boardroom - Commercialising Irish Research, Dublin: Enterprise Ireland.


APPENDIX B

Interview Guide
INTERVIEW GUIDE

- Can you give me a brief overview of your role?
- Do you have a relationship with COLLEGE/INCUBATION CENTRE?
- What are the benefits to this relationship?
  - Do you think these could be strengthened?
- What are the limitations to this relationship?
  - How could these be corrected? Could any processes be put in place to improve this situation?
- What is the most important outcome for you from this relationship? What has it offered you?
- How has the INCUBATION CENTRE facilitated the links or relationship between the COLLEGE and yourself?
  - Can these advantages be built upon and strengthened?
  - Can the disadvantages be addressed? In what way?
- What are the advantages that you get from being based here in the COLLEGE campus?
- Have you found any disadvantages with regard to this geographical proximity?
- In what way has the INCUBATION CENTRE provided an enhanced platform for the development of networks and links between enterprise and academia? With other stakeholders such as venture capitalist companies/innovation support agencies such as Enterprise Ireland?
- Have you encountered any barriers to these relationships?

These questions were the lead questions for each of their areas explored in the interviews. Supplementary questions were asked where appropriate, in order to explore more fully the experience of the interviewees.
APPENDIX C

List of Interviewees
<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>DATE INTERVIEWED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paul Healy</td>
<td>Innovation Centre Manager, Rubicon Centre, CIT</td>
<td>24th September, 2008</td>
</tr>
<tr>
<td>Tom Corcoran</td>
<td>Innovation Centre Manager, ArcLabs, WIT</td>
<td>7th October, 2008</td>
</tr>
<tr>
<td>Dr. W.G. O’Gorman</td>
<td>Head of Research, Centre for Entrepreneurship, WIT</td>
<td>15th October, 2008</td>
</tr>
<tr>
<td>Barry Downes</td>
<td>Director of Commercialisation, TSSG, WIT</td>
<td>22nd October, 2008</td>
</tr>
<tr>
<td>Dr. Kieran Delaney</td>
<td>Manager, TEC Centre, CIT</td>
<td>9th October, 2008</td>
</tr>
<tr>
<td>Mr. Michael Loftus</td>
<td>Head of Faculty of Science and Computing, CIT</td>
<td>3rd October, 2008</td>
</tr>
<tr>
<td>Respondent A</td>
<td>Incubation Client Company</td>
<td>15th October, 2008</td>
</tr>
<tr>
<td>Respondent B</td>
<td>Incubation Client Company</td>
<td>4th November, 2008</td>
</tr>
<tr>
<td>Respondent C</td>
<td>Incubation Client Company</td>
<td>9th November, 2008</td>
</tr>
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<td>Respondent D</td>
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<td>4th November, 2008</td>
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<td>Respondent E</td>
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<td>15th October, 2008</td>
</tr>
<tr>
<td>Respondent F</td>
<td>Incubation Client Company</td>
<td>23rd September</td>
</tr>
</tbody>
</table>
APPENDIX D

Glossary
| **GLOSSARY** |
|-------------------|--------------------------------------------------|
| CIC               | Campus Incubation Centre                        |
| EI                | Enterprise Ireland                              |
| FP                | Framework Programme                             |
| HEA               | Higher Education Authority                      |
| HEI               | Higher Education Institution                     |
| ICT               | Information Communications Technology            |
| IoT               | Institute of Technology                         |
| R&D               | Research and Development                        |
| TEC Centre        | Technologies for Embedded Computing Centre      |
| TSSG              | Telecommunications Software and Systems Group    |